Hygiene and Ecology

Workbook
for students of medical faculty

Module 1
General problems of hygiene and ecology

Student____________________
Year of training ____________
Group____________________
CONTENTS

Subject 1. Introductory lesson. Research methods used in hygiene ........................................... 2
Subject 2. Methods of determination of ultra-violet radiation intensity and its prophylactic
dose. Usage of the ultraviolet radiation for the disease prevention and air
sanation ........................................................................................................................................... 6
Subject 3. Methods of determination and hygienic assessment of natural lighting and
artificial illumination in different premises ..................................................................................... 8
Subject 4. The method of determining the temperature, humidity and the air movement
direction and velocity indoors and their hygienic assessment ....................................................... 11
Subject 5. Methods of hygienic estimation of complex effects of the microclimate on the
human heat exchange ....................................................................................................................... 15
Subject 6. Methods of hygienic estimation of air conditioning and ventilation of rooms .. 18
Subject 7. Methods of hygienic estimation of noise and vibration .............................................. 21
Subject 8. Methods of hygienic estimation of living conditions in a flat and a hostel ........... 24
Subject 9. Method of sanitary-topographical inspection of water supply sources and
sampling of water for bacteriological and sanitary -chemical analysis ...................................... 28
Subject 10. Methods of drinking water quality improvement. Purification ................................... 31
Subject 11. Methods of drinking water disinfection ...................................................................... 34
Subject 12. Method of hygienic estimation of drinking water quality based on the results of
laboratory analysis (centralized water supply) ............................................................................. 36
Subject 13. Method of hygienic estimation of drinking water quality based on the results of
laboratory analysis (decentralized water supply) ...................................................................... 40
Subject 14. Methods of hygienic estimation of soil according to sanitary examination of the
land parcel and results of laboratory analysis of samples ............................................................. 43
Subject 15. Methods of study and hygienic estimation of collective nutrition adequacy ......... 46
Subject 16. The calculation method of individual nutrition adequacy estimation .................. 49
Subject 17. Method of determination and hygienic estimation of nutritious status by the
index of vitamin provision of the organism .................................................................................... 53
Subject 18. Methods of expert assessment of food products according to their laboratory
analyses .............................................................................................................................................. 55
Subject 19. The investigation method of food poisonings of microbial etiology ................. 59
Subject 20. The investigation method of food poisonings of non-microbial etiology ............ 63
Subject 21. Method of investigation and hygienic estimation of dustiness and chemical
pollution of air in the work area ................................................................................................. 67
Subject 22. Methods of hygienic estimation of physical and chemical factors of industrial
conditions ..................................................................................................................................... 72
Subject 23. Sanitary investigation of an occupational poisoning ............................................... 75
The methods of study .................................................................................................................... 80
Subject 25. Methods of estimation of physical development of children and teenagers ....... 82
Subject 26. Method of hygienic estimation of the secondary school design, provision and
maintenance ................................................................................................................................. 84
Subject 27. Methods of studying age psychological and physiological peculiarities in
children and teenagers. Hygienic estimation of the educational and upbringing
regimen of different children’s groups ......................................................................................... 88
<table>
<thead>
<tr>
<th>№</th>
<th>Name of practical skill</th>
<th>Date of its working up</th>
<th>Mark</th>
<th>Signature of the teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Carrying out the physical, chemical and bacteriological measuring of environmental objects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Determining the ultraviolet radiation intensity by biological and photochemical methods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Determining indices of natural lighting and artificial illumination of premises using luxmeter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Measuring the temperature parameters, the absolute and relative air humidity the air movement speed in premises</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Determining the radiant temperature, equivalent-effective and resultant temperature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Sampling the air for determination of the microbial, dust, chemical pollution by sedimentation and aspiration methods using laboratory analyses. Calculation the indices of ventilation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Measuring noise and vibration level using the noise-and-vibration complex, noise dosimeter and noise spectrum analyses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Carrying out sanitary inspection of living conditions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Sampling the water during the selection of the water supply and drinking water sources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Mastering the methods of water purification, disinfection and deactivation in field conditions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Calculation the quantity of the chloride lime or two-three salt of calcium hypochlorite for the water disinfection by chlorination measurement or hyperchlorination method</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Assessment the drinking water quality using results of laboratory analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Determining presence of the organic pollution in drinking water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Sampling the soil for physical and chemical indices determination, chemical, bacteriological, helminthological analyses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Calculation the organism daily energy expenditure and requirements in nutrients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Calculation the caloric content and balance by nutrients of nutritional ration – using menu-schedule and the results of the food products and ready meals laboratory analyses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>Determining the capillary resistance using Matussis or Nesterov manometer. Carrying out the test with Tilmans reagent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Assessment the food products quality using organoleptic methods, sample them for laboratory analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Determining the type of food poisoning and its cause</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>Performing the act of food poisoning investigation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>Mastering the main methods of sanitary and chemical analysis of air in the work area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>Carrying out instrumental and laboratory research of the physical factors of air in the work area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>Determining the toxic substances content in the air using universal gas analyzer UG-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>Carrying out somatoscopic, somatometric, physiometric, neuropsychological researches of the children’s and adolescents’ physical development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>Mastering methods of complex assessment of the children’s and adolescents’ physical development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>Mastering the methods of hygienic assessment of school plot and building, the school premises and furniture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>Mastering methods of assessment of school time-table and pupils’ day regimen</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
INTRODUCTION TO HYGIENE AND ECOLOGY

Subject 1. INTRODUCTORY LESSON. RESEARCH METHODS USED IN HYGIENE

Learning objective

- To master the knowledge about the hygiene as a science and sanitation, their goals, tasks, components, significance of hygienic knowledge for doctors of different profile.
- To learn the classification of hygienic methods of the research of the environment and its influence on organism and health.

Basics

**You should know:**
- A concept of «prophylaxis» as one of the basics of medicine, hygiene and sanitation as its components.
- Basic concepts, methods and research facilities from physics, chemistry, biology, microbiology, physiology and other preceding courses which are used in research of environmental factors and their influence on human health.
- Basics of the mathematical processing of medico-biological research results.

**You should have the following skills:**
- The physical, chemical and bacteriological measuring of environmental objects and their influence on an organism.
- Using the computers or calculators during the statistical processing of the results of hygienic researches.

<table>
<thead>
<tr>
<th>#</th>
<th>Name of the methods</th>
<th>Essence of the method</th>
<th>Objects of research</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1. Methods of studying the objects of the environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>The organoleptic methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>The physical methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>The chemical methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.4.</td>
<td>2. The physical-chemical methods</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>------</td>
<td>---------------------------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1.5.</td>
<td>The biochemical methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.6.</td>
<td>The microscopic methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7.</td>
<td>Microbiological methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7.1</td>
<td>The bacteriological methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7.2</td>
<td>The mycological methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7.3</td>
<td>The serological methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7.4</td>
<td>The helminthological methods</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Methods of studying the responses of the organism

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.</td>
<td>The physiological methods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2.</td>
<td>The psychological methods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.3.</td>
<td>The biochemical methods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4.</td>
<td>The toxicological methods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5.</td>
<td>Experimental methods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5.1.</td>
<td>The natural experiment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5.2.</td>
<td>The laboratory experiment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5.3.</td>
<td>The chamber experiment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3. Separate methods

<table>
<thead>
<tr>
<th>3.1.</th>
<th>The epidemiological methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3.2.</th>
<th>The sanitary and statistical methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3.3.</th>
<th>The method of sanitary inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Test questions

1. Classification of methods used in hygiene.
2. Methods of studying the objects of the environment, their essence.
3. Methods of studying the organism responses, their essence.
4. The epidemiological methods used in hygiene.
5. Experimental methods, their kinds.
7. The method of sanitary inspection and description of the object of sanitary supervision.
HYGIENE OF THE AIR ENVIRONMENT

Date ________

Subject 2. METHODS OF DETERMINATION OF ULTRA-VIOLET RADIATION INTENSITY AND ITS PROPHYLACTIC DOSE USAGE OF THE ULTRAVIOLET RADIATION FOR THE DISEASE PREVENTION AND AIR SANATION

Learning objective
- To become familiar with physical and biological characteristics of ultraviolet radiation (UVR).
- To master the measuring methods of the ultraviolet radiation intensity.
- To master the measures of the ultraviolet radiation intensity and the calculations of the exposure to it using different measuring methods.

Basics
You should know:
- The nature, the physical characteristics and the spectral distribution of solar radiation.
- The physical characteristics, the spectral distribution and the biological effect of UVR.
- The dosimetric units and measuring methods of the UVR.

You should have the following skills:
- Working with ultraviolet meter (UV-meter) according to its manual.
- Using the mathematical methods of the UVR intensity and dose assessment.

1.1. ____________________________________________________________________________
1.2. ____________________________________________________________________________
1.3. ____________________________________________________________________________

2.1. ____________________________________________________________________________
2.2. ____________________________________________________________________________
2.3. ____________________________________________________________________________

3.1. Devises for measurement________________________________________________________________
3.2. Place of measurement____________________________________________________________________
3.3. Results of measurement___________________________________________________________________
4. The erythemal dose of UV radiation and the method of its determination

5. The physiological dose of UV radiation \( D_{ph} = \frac{D_{er}}{2} = \)

6. Determination of prophylactic dose of UV radiation by the formula

\[
D_{pr} = \left( \frac{B}{C} \right)^2 \cdot \frac{1}{8} D_{er} =
\]

where \( B \) is distance between patient and source of UV irradiation, \\
\( C \) is standard distance for determining \( D_{er} \) (50 cm)

7. Artificial sources of UV radiation

8. Schemes of prophylactic irradiation for children and adults by the artificial sources of UV radiation

Test questions

1. Hygienic characteristics of solar radiation.

2. Hygienic characteristics of UV radiation.

3. Diseases connected with insufficiency of UV radiation and their prophylaxis.

4. Diseases connected with surplus of UV radiation and their prophylaxis.


7. The method of determination of erythemal dose of UV radiation with the help of Gorbachov's biodosimeter.

Signature of the Teacher ___________ Signature of the Student ___________
Subject 3. METHODS OF DETERMINATION AND HYGIENIC ASSESSMENT OF
NATURAL LIGHTING AND ARTIFICIAL ILLUMINATION IN
DIFFERENT PREMISES

Learning objective
- To learn the hygienic requirements for natural lighting in different premises.
- To master the geometrical, lighting engineering methods of natural lighting indices determination, to
learn how to assess the results of instrumental measuring, and to draw a hygienic conclusion about natural
lighting in differing premises.
- To learn the role and the meaning of the rational artificial illumination as the means of lengthening the
activity period of people, and disease and fatigue prevention.
- To master the methods of the measurement and hygienic assessment of artificial illumination in different
premises with the help of a luxmeter and calculation methods.

Basics
You should know:
- Physical characteristics and hygienic significance of natural lighting, tasks and criteria of its assessment
considering the type of visual work and functions of the premises.
- External and internal factors that natural lighting level of the premises depends on.
- Basic physiological functions of the visual analyzer (visual acuity, contrast sensitivity etc). Vision as an
integral function of visual analyzer.
- Main harmful effects of insufficient and excessive lighting on human health and work capacity. The
influence of lighting on the myopia development.
- Measuring methods and indices of the natural lighting.
- Physical basis of illumination, concepts and measurement units for light.
- Physiological functions of the visual analyzer, their dependence on illuminance.
- Hygienic requirements and significance of artificial illumination in different premises.
- Types of artificial illumination and their comparison (advantages and disadvantages).
- Factors that influence the level of artificial illumination.
- Methods of artificial illumination assessment and the principles of its hygienic regulation.

You should have the following skills:
- To determine and assess the geometrical indices of natural lighting in different premises.
- To measure and assess the lighting using a luxmeter, the daylight factor (DF) determination and their
hygienic assessment.
- To assess the regimen of premises insolation
- To measure the illuminance and brightness, and other indices using instrumental and calculating
methods.
- To give a comprehensive hygienic assessment of the artificial illumination of the premises and
workplaces, considering the type of visual work and premises’ function.
- To draw the motivated conclusions and make recommendations concerning the optimization of the
artificial illumination

Estimation of natural lighting

1. The geometrical method
1.1. Devices for measurement
1.2. Determination of the light coefficient (LC)
1.2.1. Characteristics of the windows in the room:
   number of windows
   their face
   shape of the windows
   height
1.2.2. The length of the floor in the room __________________________
the width of the floor in the room __________________________
the area of the floor __________________________

$$LC = \frac{area \text{ of \ glazed \ windows}}{area \text{ of \ floor}}$$

1.3. Determination of the angle of incidence (Fig. 1)

(Area 1)

AB is the distance from the working place to the lower line of the window ____________
BC is the height of the window ______________________________________________________
$$\frac{BC}{AB}$$ is $$\tan \alpha$$ ____________________________________________________________
angle $$\alpha$$ by the table is __________________________________________________________

1.4. Determination of the angle of opening (Fig. 2)

BD is distance between the line on the window glass from the opposite subject and the
lower line of window ____________________________________________________________
$$\frac{BD}{AB}$$ is $$\tan \gamma$$ ____________________________________________________________
- angle $$\gamma$$ (by the table)= ______________________
- angle of opening $$\beta$$ = angle $$\alpha$$ - angle $$\gamma$$ ______________________________

2. The technical lighting method
2.1. Determination of the coefficient of natural illumination (daylight factor)
$$E_1$$ is natural illumination inside (in luxes) on the working place____________________
$$E_2$$ is natural illumination outside (in luxes)____________________________________

$$CNI = \frac{E_1}{E_2} \cdot 100\%$$

3. Conclusion ____________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Estimation of artificial lighting

1. Devices for measuring the artificial lighting _________________________________

2. Measurement of the artificial lighting:
2.1. Measurement of the artificial lighting with help of the objective luxmeter
2.1.1. during the hours of darkness (without natural lighting) __________________________
2.1.2. in the conditions when windows are hidden with the help of dark blinds in the day time

2.2. The "Watts" calculated method:
2.2.1. the kind of sources of artificial lighting in the room ____________________________
2.2.2. the number of sources of artificial lighting in the room _________________________
2.2.3. the power of one lamp ___________________________________________________
2.2.4. the area of the floor in the class-room ________________________________
- the length of the floor ________________________________________________
- the width of the floor _____________________________________________

2.3. Calculation of the artificial lighting by the formula

\[ E = \frac{P \cdot n \cdot 10}{S \cdot K} = \]

where
E is artificial lighting in the room (in luxes)
P is the power of one lamp
n is the number of lamps
S is the area of the floor in the room
K is the coefficient of stand-by (1.3)
10 is recalculation of Watts into luxes (1 watt is equal 10 luxes)

3. Conclusion______________________________________________________________
______________________________________________________________________
______________________________________________________________________

Test questions

1. Hygienic requirements to natural lighting.
2. Factors which influence the natural lighting.
3. The natural lighting determination methods.
4. Light coefficient and the method of its determination.
5. The angle of incidence, hygienic standard and the method of its determination.
6. The angle of opening, hygienic standards and the method of its determination.
7. The coefficient of natural illumination, method of its determination, hygienic standards for different rooms.
8. Hygienic requirements to artificial lighting.
9. Sources of artificial lighting and their hygienic characteristics.
10. Systems of artificial lighting.
11. Methods of measurement of artificial lighting.
12. Rate setting of artificial lighting for different rooms.

Signature of the Teacher___________  Signature of the Student _____________
Subject 4. THE METHODS OF DETERMINING THE TEMPERATURE, HUMIDITY AND THE AIR MOVEMENT DIRECTION AND VELOCITY INDOORS AND THEIR HYGIENIC ASSESSMENT

Learning objective
- To substantiate the hygienic significance of microclimate for different premises (residential, public/social, industrial) and to master the measurement and hygienic assessment of its following parameters: air temperature, radiant temperature, relative humidity, air velocity.
- To master, complement and systematize the students’ knowledge about the hygienic significance of the atmospheric and indoor air movement direction and speed as the microclimate factor in residential, public and industrial premises.
- To master the methods of determination and hygienic assessment of the air movement direction and speed.

Basics
You should know:
- Definition of «microclimate» and factors, which influence its formation.
- Physiological basics of human heat exchange and thermoregulation, their dependence on the microclimate: physiological reactions in the comfortable or uncomfortable (hot or cold) microclimate.
- Hygienic significance of the atmospheric and indoor air, its role in the microclimate formation and mechanisms of the organism heat exchange.
- Methods and devices for determination of the air movement direction and speed outdoors and indoors.

You should have the following skills:
- To measure the indoor air temperature, radiant temperature, air humidity and to assess the temperature and humidity conditions of different premises (residential, public/social, industrial).
- To determine the air movement direction and speed, wind strength.
- To draw the hygienic conclusions and to assess the results of the outdoor and indoor air movement direction and speed measurement

1. Measurement of the air temperature in the class-room:
1.1. Devices which are used for the measurement ____________________________
1.2. The place of carrying out the measurement ____________________________
1.3. Points and results of the measurements along the horizontal and vertical line

\[
\begin{align*}
\text{t}_1(\text{h}=1.5\text{m}) &= \quad \text{°C} \\
\text{t}_2(\text{h}=0.2\text{m}) &= \quad \text{°C} \\
\text{t}_3(\text{h}=1.5\text{m}) &= \quad \text{°C} \\
\text{t}_4(\text{h}=0.2\text{m}) &= \quad \text{°C} \\
\text{t}_5(\text{h}=1.5\text{m}) &= \quad \text{°C} \\
\text{t}_6(\text{h}=0.2\text{m}) &= \quad \text{°C}
\end{align*}
\]

1.4. Calculation of the average temperature:
Total \( \sum t_6 = \)
\[
T_{av} = \frac{\sum t_6}{n} =
\]

Date _____
1.5. Calculation of the temperature differences.
- on the vertical line

\[ t_v = \frac{t_1 + t_3 + t_5}{3} - \frac{t_2 + t_4 + t_6}{3} = \]

- on the horizontal line

\[ t_h = \frac{t_5 + t_6}{2} - \frac{t_1 + t_2}{2} = \]

2. The measurement of the air humidity.
2.1. Devices which are used for the measurement of air humidity

2.2. Place of carrying out the measurement

2.3. The measurement of the relative humidity:
2.3.1. with the help of the hygrometer: \( R = \) \%
2.3.2. with the help of the psychrometer by the table:
- reading of the “dry” thermometer \( t_{d.t.} = \) °C
- reading of the “wet” thermometer \( t_{w.t.} = \) °C
- result by the table \( R = \) \%

3. Conclusion

4. The measurement of atmospheric pressure
4.1. The devices for the measurement
4.2. The place of carrying out the measurement
4.3. The result of the measurement
4.4. Conclusion

5. The measurement of air velocity outdoors
5.1. The devices for the measurement
5.2. The place of carrying out the measurements
5.3. The course of the work:

Indices of anemometer: before the measurement _______________________
after the measurement _______________________
the time of the measurement _______________________
Calculation the anemometer rotations number per second _______________________

5.4. Determining the air movement velocity by the graph ___________________

6.1. The devices for the measurement________________________________________

6.2. The place of carrying out the measurement________________________________

6.3. The course of the work:_________________________________________________

________________________________________________________________________

$t$ is the time when the alcohol falls down from 38° to 35° C __________________________

$F$ is the factor of catathermometer _____________________________________________

$Q_1$ is the average temperature of catathermometer _________________________________

$Q_2$ is the air temperature in the room ____________________________________________

H is cooling ability of air

$H = \frac{F}{t} = \frac{Q_1 - Q_2}{t}$

6.4. Determining of velocity of air movement $V$

6.4.1. by the table $\frac{H}{Q} =$ _____________________; \hspace{1cm} $V =$____________________

6.4.2. by the formula

$V = \left(\frac{H}{Q} - 0,20\right)^2 = \_______________$ for the air movement less than 1 m/s

$V = \left(\frac{H}{Q} - 0,13\right)^2 = \_______________$ for the air movement more than 1 m/s

6.5. Conclusion_____________________________________________________________

Graph for determining the air movement velocity

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{air_movement_graph.png}
\caption{Graph for determining the air movement velocity from 0.3 to 1 m/s and from 1 to 5 m/s.}
\end{figure}
7. Hygienic estimation of the air movement direction

**Situational task**

In the given place the wind blows over the year:
North wind was blowing for 90 days,
North-West wind was blowing for 45 days,
West wind was blowing for 30 days,
South-West wind was blowing for 40 days,
South wind was blowing for 30 days,
South-East wind was blowing for 30 days,
East wind was blowing for 30 days,
North-East wind was blowing for 45 days,
Days without wind - 25.

Draw the "wind-rose"
S: 1 cm corresponds to 20 days

Answer the following questions:
1. What wind direction prevails in this place?
2. Where must living zone be built?
3. Where must industrial enterprises be built?

Conclusion ____________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

**Test questions**

1. The mechanism of thermoregulation in the human organism and ways of heat transfer.
2. Influence and prophylaxis of high and low temperature of the environment on the human organism.
3. The rules for measuring air temperature indoors.
4. Influence of high and low temperature with high humidity on the human organism.
5. Prophylaxis of low and high humidity affects on the human organism.
6. The kinds of air humidity.
7. The method of measuring absolute and relative air humidity.
8. Physiological and hygienic significance of atmospheric pressure.
9. Low and high atmospheric pressure, its influence on the human organism.
10. The method of measurement of atmospheric pressure. Devices for its measurement.
11. Physiological and hygienic significance of air movement.
12. The method of measurement of air velocity outdoors. Devices for its measurement.

Signature of the Teacher ____________  Signature of the Student ____________
Subject 5. METHODS OF HYGIENIC ESTIMATION OF COMPLEX INFLUENCE OF THE MICROCLIMATE ON THE HUMAN HEAT EXCHANGE

Learning objective
- To master the methods of the hygienic assessment of the effects of microclimate on human heat exchange using subjective and objective physiological parameters.
- To master the objective methods of assessment of the effects of microclimate on human heat exchange using the effective (ET), the equivalent-effective (EET), resultant temperatures (RT)’ nomograms, the catathermometer method and the organism heat balance calculation.

Basics
You should know:
- Main thermodynamical and physiological principles of human heat-exchange and thermoregulation (at the basic level of biophysics, biochemistry and physiology knowledge).
- Hygienic significance of microclimate in different types of premises, its variants and characteristics.
- Influence of comfortable and uncomfortable (hot and cold) microclimate on human body.
- Subjective and objective characteristics of the organism heat balance.

You should have the following skills:
- To measure and assess the microclimate characteristics (air temperature, radiant temperature, air humidity and air movement).
- To measure and assess the influence of the microclimate on physiological parameters of the organism heat exchange and thermoregulation (respiratory rate, heartbeat rate, blood pressure, body and skin temperature, sweating intensity, skin electroconductivity), to evaluate the subjective temperature sensation of the patient, using his physiological and psychoemotional reactions.

Situational tasks

Task #1
The indoor air temperature is 25°C according to the dry thermometer and 19°C according to the wet thermometer of the Assman’s psychrometer, the indoor air movement is 1 m/sec. Determine the indoor equivalent-effective temperature and make a conclusion about the organism heat balance.

Task #2
The indoor air temperature is 30°C according to the dry thermometer of the Assman’s psychrometer, indoor air movement is 0.8 m/sec, the absolute humidity is 12 Hg mm, the average radiant temperature is 25°C. A man works physically hard. Determine the indoor resultant temperature and make a conclusion about the organism heat balance.
Consultant #3

Give the hygienic estimation of the microclimate in a class-room:
- the average temperature is 22°C,
- the difference of the temperature on a vertical is 5.5°C, on a horizontal is 2°C,
- reading of the dry thermometer of the psychrometer is 21°C,
- reading of the wet thermometer is 18°C;
- the period of time when the alcohol falls down in the catathermometer from 38°C to 35°C is 128 seconds,
- the factor of the catathermometer (F) is 615.

Consultant #4

Give the hygienic estimation of the microclimate in a secondary school gym:
- the average temperature is 19°C, the difference of the temperature on a vertical is 2°C, on a horizontal is 3.5°C;
- the reading of the dry thermometer of the psychrometer is 20°C, the reading of the wet thermometer is 12°C;
- the period of time when alcohol falls down in the catathermometer from 38°C to 35°C is 1 min 42 sec,
- the factor of the catathermometer (F) is 615.
Task #5

Give the hygienic estimation of the microclimate of a therapeutic ward for adults. It is characterized by the following parameters:
- the average temperature is 24°C,
- the temperature difference on a vertical is 3°C, the temperature difference on horizontal is 1.5°C;
- reading of the dry thermometer of the Assman's psychrometer is 24°C,
- reading of the wet thermometer is 17°C;
- the period of time when alcohol falls down in a catathermometer from 38 °C to 35°C is 133 seconds,
- the factor of the catathermometer (F) is 615.

Test questions

1. The factors, forming the microclimate.
2. Kinds of the microclimate.
3. Physiological principles of the heat exchange in the human being and its connection to the microclimate of the environment.
4. Complex influence of physical factors of the atmospheric air on the heat exchange in the human being.
5. The cooling microclimate and its influence on the human organism. Meteorological conditions that cause the cooling.
6. The heating microclimate and its influence on the human organism. Conditions that cause the heating.
7. General methods of hygienic study and estimation of the microclimate in the rooms. Norms of the temperature, humidity and velocity of air movement in dwellings, hospital rooms, class-rooms, and so on.
8. The assessment methods of the indoor microclimate influence on humans: the catathermometer method, the methods of effective, equivalent-effective, resultant temperature nomograms, their comparative hygienic characteristics.

Signature of the Teacher_____________Signature of the Student_____________
Learning objective
- To get familiar with the factors and indicators of air pollution for indoor residence and manufacture areas.
- To master the methods of hygienic assessment of the air purity and efficiency of the indoor ventilation.

Basics
You should know:
- Physiological and hygienic significance of the air components and their influence on the human health and sanitary conditions.
- Sources and indicators of communal, domestic, public and industrial air pollution, their hygienic regulations.
- Indoor air circulation. Types and classification of the indoor ventilation, main parameters of the ventilation efficiency.

You should have the following skills:
- Determining of the carbon dioxide concentration in the air and assessment of the indoor air purity.
- Calculating of the required and actual volume and rate of the indoor ventilation.

1. Determination of carbon dioxide in the air:
1.1. The method of determination of carbon dioxide in the air

1.2. The principle of the method

1.3. Chemical reaction

1.4. Chemical reagents and laboratory utensils

1.5. The course of work
1.5.1. Air sampling for the experiment

1.5.2. Reduction of the air volume under study to the normal conditions by the formula

$$V_{760}^0 = \frac{V'}{(1 + \alpha T)} \cdot \frac{B}{760}$$

The air temperature

The atmospheric pressure
1.5.3. Absorption of carbon dioxide from the tested volume of air by Na$_2$CO$_3$

1.5.4. Determination of secondary titer of Na$_2$CO$_3$ (after absorption)

1.5.5. Determination of primary titer of Na$_2$CO$_3$ (before absorption)

1.6. Calculation of the amount of carbon dioxide in the tested air by the formula

$$X = \frac{(V_1 - V_2) \cdot 0.044 \cdot 0.508 \cdot 1000}{V_0 - 10} =$$

1.7. Conclusion

2. Hygienic estimation of ventilation of rooms

2.1. Measurement of the volume of the class-room:
   - the length of the class-room (l)____________________
   - the width of the class-room (w)____________________
   - the height of the class-room (h)____________________

   $$V_1 = l \cdot w \cdot h =$$

2.2. The number of students in the class-room (n) ________________________________

2.3. Measurement of the ventilation volume ($V_2$) by the formula

$$V_2 = \frac{22.6 \cdot n}{1 - 0.3} =$$

where:
22.6 l/m$^3$ is the amount of carbon dioxide one man exhales in one hour,
1 ‰ is the permissible level of carbon dioxide in the class-room,
0.3 ‰ is the amount of carbon dioxide in the atmosphere

2.4. Measurement of the air movement ratio in the class-room by the formula

$$K = \frac{V_2}{V_1} =$$

where $K$ is the air movement ratio,
$V_1$ is volume of the class-room,
$V_2$ is volume of air ventilation.

2.5. Conclusion
3. Solution of the situational tasks

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Test questions

1. Physiological, hygienic and pathologic significance of carbon dioxide.
2. Sources of carbon dioxide in the air.
4. The method of carbon dioxide determination in the air.
5. Hygienic standards of carbon dioxide in the air of different rooms.
6. The volume of ventilation and the method of its determination.
7. The air movement ratio in the room and the method of its determination.

Signature of the Teacher__________      Signature of the Student__________

20
Subject 7. METHODS OF HYGIENIC ESTIMATION OF NOISE AND VIBRATION

Learning objective
- To strengthen and enlarge theoretical knowledge of students about noise and vibration as elements of industrial environment and their influence on organism and health.
- To master techniques and means of measurement and hygienic assessment of noise and vibration parameters

Basics
You should know:
- Fundamentals of anatomy and physiology of auditory analyzer.
- Physical fundamentals of acoustics and vibration.
- Classification and fundamentals of noise and vibration source.
- Biological effect of noise and vibration, and prevention of their negative influence on human organism.

You should have the following skills:
- Using noise dosimeter and noise and vibration spectrum analyzer.
- Detecting the threshold of audibility using an audiometer.

1.1. The device for noise measurement

1.2. Place for the measurement

1.3. Result of the measurement

<table>
<thead>
<tr>
<th>Pitch of noise (in Hertz)</th>
<th>31.5</th>
<th>63</th>
<th>125</th>
<th>250</th>
<th>500</th>
<th>1000</th>
<th>2000</th>
<th>4000</th>
<th>8000</th>
<th>General level of noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of noise on the working place</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.4. The permissible levels of noise on working places:

<table>
<thead>
<tr>
<th>Pitch of noise (in Hertz)</th>
<th>31.5</th>
<th>63</th>
<th>125</th>
<th>250</th>
<th>500</th>
<th>1000</th>
<th>2000</th>
<th>4000</th>
<th>8000</th>
<th>General level of noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working places of mental workers</td>
<td>86</td>
<td>71</td>
<td>61</td>
<td>54</td>
<td>49</td>
<td>45</td>
<td>42</td>
<td>40</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Working places of people doing physical work</td>
<td>107</td>
<td>95</td>
<td>87</td>
<td>82</td>
<td>78</td>
<td>75</td>
<td>73</td>
<td>71</td>
<td>69</td>
<td>80</td>
</tr>
</tbody>
</table>
1.5. Draw the graph of the on-site noise level

![Graph of noise level on the working place]

1.6. Make up a hygienic conclusion about the on-site noise level

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. Estimation of vibration.
2.1. The device for vibration measurement ____________________________________________

*Situational task*

The underground is placed at the distance of 25 m from foundation of the building. The results of measurement of vibration on the ground floor in the building are:

<table>
<thead>
<tr>
<th>Pitch of vibration in Hertz</th>
<th>2</th>
<th>4</th>
<th>8</th>
<th>16</th>
<th>31.5</th>
<th>68</th>
</tr>
</thead>
<tbody>
<tr>
<td>General vibration on the ground floor in dB</td>
<td>86</td>
<td>79</td>
<td>69</td>
<td>70</td>
<td>67</td>
<td>65</td>
</tr>
<tr>
<td>Hygienic standard of vibration by vibrospeed in dB</td>
<td>79</td>
<td>73</td>
<td>61</td>
<td>61</td>
<td>67</td>
<td>67</td>
</tr>
</tbody>
</table>
2.5 Graph of the vibration on the ground floor

2.6 Conclusion

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Test questions

1. Physical characteristics of noise.
2. Sources of noise.
3. Classification of noise.
5. The method and the devices for measurement of noise.
7. Vibration and its physical character.
8. Classification of vibration.
9. Sources of vibration.
11. The devices and the methods for vibration measurement.

Signature of the Teacher__________  Signature of the Student__________
Subject 8. THE METHOD OF HYGIENIC ESTIMATION OF LIVING CONDITIONS IN A FLAT AND A HOSTEL

Learning objective
- To master the knowledge about the forms and methods of sanitary inspection, the visual inspection of the object, object exploitation elements, the usage of the organoleptic research methods and description

Basics
You should know:
- Hygienic requirements to placement, internal design and hygienic regime of a flat and a hostel.

You should have the following skills:
- Carrying out sanitary inspection of a flat and a hostel,
- Performing the act of sanitary inspection with a conclusion.

Act of sanitary inspection of a flat

1. Address of the flat
   1.1. Flat # __________________________________________________________
   1.2. House # ______________________________________________________
   1.3. Street ___________________________ _______________________________

2. The number of floors in the building __________________________________

3. Material of the building ____________________________________________

4. The neighboring buildings and a distance to them ______________________

5. A distance to the road_______________________________________________

6. Sources of air pollution and distance to them ___________________________

7. Green plantations

8. At what floor this flat is placed _______________________________________

9. Who lives in this flat________________________________________________

10. The number of rooms______________________________________________

11. Names of rooms and their orientation and area _________________________

12. The total area of the flat____________________________________________

13. The useful area____________________________________________________

14. The living space for one person ______________________________________

15. The volume counted for one person____________________________________

16. Remodelling of the flat______________________________________________

17. Dampness in the flat and its reasons ___________________________ (present or absent)

18. Isolation of the flat from noise______________________________________ (good or not good)
18.1. Sources of noise

19. Floors in different rooms

20. Materials and condition of the windows and doors

21. Microclimate in different rooms

<table>
<thead>
<tr>
<th>1. Living-room</th>
<th>Air temperature</th>
<th>Air humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Corridor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Bath-room</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Kitchen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Bedroom</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

22. Natural lighting in the flat

<table>
<thead>
<tr>
<th>Name of the room</th>
<th>Area of the floor</th>
<th>Number of windows</th>
<th>Length of windows</th>
<th>Width of windows</th>
<th>Area of one window</th>
<th>Area of all windows</th>
<th>Glass area of all windows</th>
<th>Light coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living-room</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bedroom</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kitchen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corridor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

23. Artificial lighting

23.1. Sources of artificial lighting

23.2. Amount of artificial lighting (by the calculated method «Watts»)

24. Ventilation of different rooms

25. Heating system

26. Water supply

26.1. Cold water supply

26.2. Hot water supply

27. Place for laundry

28. Sewage system

29. The diseases that the persons living in this flat have
Act of sanitary inspection of a hostel

1. Address__________________________________________________

2. Territory____________________________________________________

3. Park_______________________________

4. Yard_______________________________

5. Surrounding objects and distance to them_____________________________

5.1. Industrial enterprises____________________________________

5.2. Dusty and noisy roads____________________________________

5.3. Other sources of air pollution________________________________

6. How many people can live in the hostel_____________________________

7. How many people live at present___________________________________

8. Who lives in this hostel________________________________________

9. How many of them living alone____________________________________

10. Distance from the hostel to the work (study) place________________

11. Ways of transport__________________________________________

12. Time taken for the way to/from the work (study) place________________

13. The hostel occupies (number of buildings, stories and others)__________________

14. Internal design____________________________________________

14.1. Bedroom: face_________________________________________

    length________________________ width________________________

    area of the floor________________ counted for one person________________

    light coefficient________________

    artificial lighting________________

14.2. The study room

    face_________________________________________

    length________________________ width________________________

    area of the floor________________ counted for one person________________

    light coefficient________________

    artificial lighting________________

15. The kitchen for individual cooking_________________________________

15.1. The refrigerator________________________________________

16. Area of physical training____________________________________

__________________________________________________________

________________________________________________________________________
17. Recreation and reading room

18. Bath-room and shower-stalls

18.1. After how many days bed sheets are changed

19. Club

20. Assembly room

21. Store-room

22. Toilets

23. Heating of the hostel
   23.1. System
   23.2. Air temperature

24. Water supply
   24.1. Sewers
   24.2. Boiler
   24.3. Supply of boiled water
   24.4. Boiled water storage

25. Ventilation of premises
   25.1. Natural ventilation
   25.2. Cross ventilation is possible or not

26. Additional information

Conclusion

Test questions
1. Hygienic requirements to the placement of the housing in the city.
2. Hygienic requirements to the construction of flats and hostels.
3. Peculiarities of internal design of flats and hostels.
4. Hygienic requirements to microclimate and illumination in a flat and hostels; hygienic standards of this parameters.
5. Hygienic character of the heating system in the housing unit.
6. Hygienic character of water supply and sewage system in the housing unit.
7. Noise in the housing unit, its sources and methods of protection from noise.
6. Reasons of dampness in the housing unit and its prophylaxis.

Signature of the Teacher ___________    Signature of the Student ___________
Subject 9. THE METHOD OF SANITARY-TOPOGRAPHICAL INSPECTION OF WATER SUPPLY SOURCES AND SAMPLING OF WATER FOR BACTERIOLOGICAL AND SANITARY-CHEMICAL ANALYSIS

Learning objective

- To master the technique of sanitary inspection of water supply sources and water sampling for bacteriological and sanitary-and-chemical analysis.

Basics

You should know:
- Hygienic significance of water (physiologic, endemic, epidemiological, toxicological, balneal, climate and weather-forming, economical and domestic, pertaining to national economy).
- Classification of water supply sources and their hygienic characteristics.

You should have the following skills:
- Carrying out sanitary inspection of water supply sources.
- Defining sampling places and obtain water samples for analysis, to know how to fill in an accompanying form.
- Defininge the discharge (output) of water supply sources.

Situational task

There is a mine well in a courtyard of dwelling house in the village of Pavlovka of the Bogodukov District. The contour of the district has a natural bevel from the west to the east. There is an out-of-doors toilet at a distance of 30 meters from the well and higher on a surface relief. The dwelling house is placed at 25 meters to the north from the well. There is a fruit garden whose bed-rock is annually dressed with organic fertilizers at 35 meters from the well to the south. The walls of the well are new, wooden. There is a "clay lock" around the well. The well has a cover, but there is no canopy. The water from the well is taken with a bucket for common use. The depth of the well to the bottom is 15 meters. The depth to the surface of water is 10 meters.
1. Possible sources of water pollution in the well

2. Possible paths of pollutants passing to the well:

3. Measures for improvement of the water source

Situational task

The village of Ivanovka of Donetsk Region is at the distance of 170 meters from the bank of the Olkovskiy reservoir. On the southern coast of the reservoir in the immediate proximity to it there are two populated areas. At 30 meters from the bank a collective poultry farm is placed, that uses part of the water surface for breeding ducks. At the distance of 50 meters to the west from the poultry farm there is the collective-farm's garage and at 100 meters to the west there is a depot of mineral fertilizers, part of which is stored in the open air.

In the given district the southwest wind prevails. The construction of a drinking water-pipe for the village of Ivanovka is planned. The water intake will be placed at the distance of 200 meters to the east of the poultry farm and of 3 meters from the bank.
1. Possible pollutants of water in the reservoir:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. Possible ways of pollution ingress to the reservoir:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

3. Correctness of the choice of place for the water intake:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

4. Measures for improvement of water in the reservoir:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Describe the procedure of water sampling for physico-chemical and bacteriological analysis:

1. From an open flowing water source (river):

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. From an open source with stagnant water (lake, reservoir):

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

3. From an artesian well:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

4. From a mine well:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Subject 10. THE METHODS OF DRINKING WATER QUALITY IMPROVEMENT. PURIFICATION.

Learning objective
- To learn the classification of conventional and special methods of water quality improvement, technology of their implementation on main facilities of water supply system.

Basics
You should know:
- The methods of drinking water quality improvement,
- The methods of drinking water purification.

You should have the following skills:
- Determining the doze of coagulant for purification of water,
- Estimating the results of purification.

1. Sampling of water for determination of the coagulant doze for its purification.
A sample of water (quantity is 1000 ml) was taken_________________________ (date)
by a laboratory assistant from the reservoir. It is situated _________________________

The air temperature is ____________, the atmospheric pressure is ___________.
Precipitation is absent (or there is some precipitation) ___________________________
2. The method of drinking water coagulation with the help of aluminium sulphate

2.1. The principle of the method

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2.2. Chemical reactions

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2.3. Chemical reagents and laboratory utensils

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2.4. The course of the work:

2.4.1. Determination of carbonic water hardness

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2.4.2 Calculation of quantity of 1% of aluminium sulphate in solution for the experiment

<table>
<thead>
<tr>
<th>Number of the glass</th>
<th>Carbonic water hardness (degrees)</th>
<th>Experimental coagulation of water</th>
<th>Al₂(SO₄)₃</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>mg/dm³ of water</td>
<td>mg/200ml of water</td>
</tr>
<tr>
<td></td>
<td>1°</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.4.3. Experimental coagulation

________________________________________________________________________
________________________________________________________________________

2.5. Conclusion

________________________________________________________________________
________________________________________________________________________

3. The method of coagulation with the help of iron sulfate

3.1. The principle of the method

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
3.2. Chemical reactions

3.3. Chemical reagents and laboratory utensils

3.4. The course of the work:
3.4.1. Conditions of experimental coagulation with the help of iron sulfate

<table>
<thead>
<tr>
<th>Number of the glass</th>
<th>FeSO₄</th>
<th>Active chlorine</th>
<th>Chloride of lime</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mg/L of water</td>
<td>mg / 200 ml of water</td>
<td>ml /200 ml of water</td>
</tr>
<tr>
<td>1.</td>
<td>100</td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>200</td>
<td>40</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>300</td>
<td>60</td>
<td>6</td>
</tr>
</tbody>
</table>

3.4.2. Experimental coagulation

3.5. Conclusion

Test questions
1. The methods of drinking water quality improvement and their hygienic characteristics.
2. The methods of drinking water purification and their hygienic characteristics.
3. The principle of coagulation of drinking water by aluminum sulfate.
4. The principle of coagulation of drinking water by iron sulfate.

Signature of the Teacher__________ Signature of the Student ___________

33
Learning objective
- To learn the methods of water disinfection, their classification, hygienic characteristic.

Basics
You should know:
- The notion and methods of drinking water disinfection.
- Water chlorination, methods of chlorination and reagents, which are used for this purpose, disadvantages of chlorination.
- Water disinfection by ozone treatment and treatment with ultraviolet rays, their hygienic characteristics.

You should have the following skills:
- Determining the doze of active chlorine and chloride of lime for disinfection of drinking water.

1. Essence of drinking water disinfection

The methods of water disinfection:
physical: ________________________________
chemical: ________________________________

the methods of water chlorination:

Experimental work
Determining of chloride of lime doze for water disinfection
1. Sampling of water for experimental disinfection.
A sample of water (quantity is 6000 ml) was taken___________________________(date)
by a laboratory assistant from a mine well. It is situated in ___________________
The air temperature is _____________, the atmospheric pressure is _________.
Precipitation is absent (or there is some precipitation) __________________________

2. The method of disinfection of drinking water with normal doses of chlorine
2.1. The principle of the method ________________________________
___________________________________________________________

2.2. The chemical mechanism of disinfection___________________________
____________________________________

2.3. Chemical reagents and laboratory utensils_____________________________
2.4. The stages of the work.
2.4.1. Determining of active chlorine content in chloride of lime
2.4.2. Preparation of 1% of chloride of lime in solution for the experiment:

2.4.3. Calculation of quantity of 1% chloride of lime in solution for the experiment
Bottle I – 
Bottle II –
Bottle III –

2.4.4. Experimental chlorination of drinking water

2.4.5. Determination of residual chlorine in disinfected water

2.5. Calculation of chlorine dose for disinfection

<table>
<thead>
<tr>
<th>№</th>
<th>Content of active chlorine</th>
<th>Amount of Na₂S₂O₃ (for titration)</th>
<th>Residual chlorine</th>
<th>Chlorine absorption</th>
<th>Dose of active chlorine</th>
<th>Dose of chlorine of lime</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mg/L</td>
<td>ml of 1% sol/L</td>
<td>ml/200</td>
<td>ml/L</td>
<td>mg/L</td>
<td>mg/L</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Conclusion

Test questions
1. The notion and methods of disinfection of drinking water and their hygienic characteristics.
2. The notion of a “dose of active chlorine” for disinfection of drinking water, and “chlorine absorption”.
3. The principle of chlorination of water with usual doses of active chlorine. The chemical reaction and reagents.
4. The water disinfection technique with usual doses of active chlorine.
5. Residual chlorine in water, its hygienic significance and the method of determination.

Signature of the Teacher __________________ Signature of the Student ________________
Subject 12. THE METHOD OF HYGIENIC ESTIMATION OF DRINKING WATER QUALITY BASED ON THE RESULTS OF LABORATORY ANALYSIS (centralized water supply)

Learning objective
- Tomaster requirements to drinking water quality and hygienic importance of some of its indices.
- To acquire the method of the analysis reading and drinking water quality assessment for centralized water supply.

Basics
You should know:
- Hygienic indices and standards of drinking water quality (physical, organoleptic, chemical composition) and pollution indices (chemical, bacteriological – both direct and indirect), their scientific substantiation.
- Concept and characteristics of centralized (domestic and drinking water pipeline) water supply system.
- Set of measures during sanitary inspection of water pipeline main facilities exploitation (individual components of water pipeline and water supply network).

You should have the following skills:
- To state a hygienic value of drinking water quality according to the results of sanitary inspection of the water supply source and results of the laboratory analysis of water at centralized water supply system.
- To state a hygienic value of different methods of water quality improvement and exploitation efficiency of individual structures and facilities, used for this purpose.
- To develop a complex of measures to improve water quality and to prevent diseases caused by poor water quality.

Act
of the sanitary and hygienic estimation of drinking water quality
(the scheme of estimation)

1. The general conclusion about the quality of drinking water under study. Is the water drinkable or not?
2. Do all properties of this drinking water satisfy the Hygienic State Standard (or Hygienic Norms) or not?
3. Is there any pollution of the drinking water with organic substances?
4. Are there any organic substances of animal or plant origin?
5. When was the drinking water polluted?
6. What are the sources of pollution of the drinking water? Make up a general hygienic characteristics of the placement of the water supply source.
7. Are there any changes of mineral composition of the drinking water? Show the signs.
8. What hygienic and sanitary measures must be taken for improving quality of the drinking water, of the water-supply source and surrounding territory?

Situational task
Sanitary-topographical description of a water supply source: in the town of Kahovka a hospital for 300 beds will be built. There are 200 000 men in this town. The hospital will take the drinking water from a water-pipe. The water-pipe takes water from a borehole. The depth of the borehole is 30 m. For the current sanitary inspection, some water was taken for a sanitary test from the water pipe.
Analysis of the water

**Organoleptic properties**
- Color is colourless
- Taste is refreshing
- Aftertaste is 2 points
- Sediment is absent

**Physical properties**
- Temperature is 7°C
- Quantity of color is 20°
- Transparency is 50 cm
- Feculence is 0.5 NUF

**Chemical composition**
- Permanganate oxidability is 5 mg/dm³
- Ammonia is 0.1 mg/dm³
- Nitrites is 0.01 mg/dm³
- Nitrates is 35 mg/dm³
- Sulfates is 270 mg/dm³
- Chlorides is 300 mg/dm³
- Dry residue is 1100 mg/dm³
- General hardness is 8 mmol/dm³
- Iron is 0.3 mg/dm³
- Zinc is 1 mg/dm³
- Fluoride is 2 mg/dm³
- Manganese is 0.03 mg/dm³
- Copper is 1 mg/dm³
- Arsenic is 0.0001 mg/dm³
- Lead is 0.001 mg/dm³

**Bacteriological indices**
- Total microbial number is 90
- Coli-index is 0

Make up a hygienic conclusion about the drinking water quality under study and possibility of its use for drinking purposes
Situational task

Sanitary-topographical description of water supply source: the settlement of the Kharkov Region takes running water from a borehole. The depth of the borehole is 170 m. The water runs into the tank tower before it gets a water-pipe. The tank tower is covered with rust. For the current sanitary inspection, a sanitary test of the drinking water from the water tap was made.

Analysis of the water

**Organoleptic properties**

- Color is yellow brown
- Aftertaste is 3 points
- Smell is 2 points
- Sediment is considerable

**Physical properties**

- Temperature is 9°C
- Quantity of color is 30°
- Transparency is 20 cm
- Feculence is 3.5 NUF

**Chemical composition**

- Permanganate oxidability is 8 mg/dm³
- Ammonia is 1.3 mg/dm³
- Nitrites is 0.03 mg/dm³
- Nitrates is 31 mg/dm³
- Sulfates is 150 mg/dm³
- Chlorides is 230 mg/dm³
- Dry residue is 760 mg/dm³
- General hardness is 6.7 mmol/dm³
- Iron is 0.8 mg/dm³
- Zinc is 1.5 mg/dm³
- Fluoride is 1 mg/dm³

**Bacteriological indices**

- Total microbial number is 120
- Coli-index is 3

Make up a hygienic conclusion about the drinking water quality under study and possibility of its use for drinking purposes
Test questions

1. Sources of water in nature, their hygienic character.
2. Systems of water supply.
3. Hygienic requirements to drinking water quality for the centralized water supply.
4. Chemical indices of water pollution and their hygienic norms.
5. Indices of mineral composition of water and their hygienic standards.
7. The methods of drinking water quality improvement.

Signature of the Teacher_____________  Signature of the Student _______________
Subject 13. THE METHOD OF HYGIENIC ESTIMATION OF DRINKING WATER QUALITY BASED ON THE RESULTS OF LABORATORY ANALYSIS (decentralized water supply).

Learning objective
- To master knowledge about requirements to drinking water quality and hygienic importance of some of its indices.
- To master the method of the analysis reading and drinking water quality assessment for decentralized water supply system.

Basics
You should know:
- Hygienic indices and standards of drinking water quality (physical, organoleptic, chemical composition) and pollution indices (chemical, bacteriological – both direct and indirect), their scientific substantiation for decentralized (wells, groundwater intake structures, catchments) water supply.
- Concept and characteristics of decentralized water supply system.
- Set of measures during sanitary inspection of exploitation of main facilities of decentralized water supply system.

You should have the following skills:
- To state a hygienic value of drinking water quality according to the results of sanitary inspection of the source of water supply and the results of the laboratory analysis of water at decentralized water supply system.
- To state a hygienic value of different methods of water quality improvement and exploitation efficiency of individual structures and facilities, used for this purpose.
- To elaborate the complex of measures to improve water quality and to prevent diseases caused by poor water quality.

Act
of the sanitary and hygienic estimation of drinking water quality
(the scheme of estimation)
1. The general conclusion about the quality of the drinking water under study. Is the water drinkable or not?
2. Do all properties of this drinking water satisfy the Hygienic State Standard (or Hygienic Norms) or not?
3. Is there any pollution of the drinking water with organic substances?
4. Are there any organic substances of animal or plant origin?
5. When was the drinking water polluted?
6. What are the sources of pollution of the drinking water? Make up a general hygienic characteristic of the placement of the water supply source.
7. Are there any changes of mineral composition of the drinking water? Show the signs.
8. What hygienic and sanitary measures must be taken for improving the quality of the drinking water, of the water-supply source and surrounding territory?
Situational task

Sanitary-topographical description of a water supply source.
There is a well on the territory of the cottage in the suburb of Kharkov. The depth of the well is 6 m. Its framework is in good repair. There is a lid and a pail for common use. There is a "clay lock" around the well. There is a compost heap at 20 meters distance from the well and public convenience at 40 meters distance from the well.

Analysis of the water

Organoleptic properties
Color is yellow
Taste is 3 points
Smell is 3 points

Physical properties
Quantity of color is 30°
Feculence is 2.8 NUF
Sediment is plentiful

Bacteriological indices
Total microbial number is 430
Coli-index is 12

Chemical composition
Permanganate oxidability is 7.5 mg/dm³
Ammonia is 3.0 mg/dm³
Nitrites is 12 mg/dm³
Nitrates is 60 mg/dm³
Sulfates is 230 mg/dm³
Chlorides is 250 mg/dm³
Dry residue is 780 mg/dm³
General hardness is 5.5 mmol/dm³
Iron is 0.3 mg/dm³
Fluorine is 0.9 mg/dm³

Make up a hygienic conclusion about the drinking water quality under study and possibility of its use for drinking purposes

_______________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________
Situational task 2

Sanitary and topographical description of a water supply source.
There is a well at 50 m distance from the sea. The depth of the well is 10 m. The framework of the well is wooden and in good repair. The framework of the well is 0.8 m height. The ground around the well is sand. There is a lid and a pail for common use. A holiday house takes this water for drinking and domestic purposes. For the current sanitary inspection, some drinking water was taken from it for analysis.

Analysis of the water

<table>
<thead>
<tr>
<th>Organoleptic properties</th>
<th>Chemical composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taste is salty</td>
<td>Oxidation is 6.5 mg/dm³</td>
</tr>
<tr>
<td>Aftertaste is 3 points</td>
<td>Ammonia is 1.0 mg/dm³</td>
</tr>
<tr>
<td>Smell is 3 points</td>
<td>Nitrites is 0.01 mg/dm³</td>
</tr>
<tr>
<td></td>
<td>Nitrates is 27 mg/dm³</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical properties</th>
<th>Sulfates is 650 mg/dm³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature is 12°C</td>
<td>Chlorides is 400 mg/dm³</td>
</tr>
<tr>
<td>Quantity of color is 25°</td>
<td>Dry residue is 1350 mg/dm³</td>
</tr>
<tr>
<td>Feculence is 1.2 NUF</td>
<td>General hardness is 15 mgequiv/dm³</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bacteriological indices</th>
<th>Manganese is 0.8 mg/dm³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total microbial number is 200</td>
<td>Fluorine is 1.4 mg/dm³</td>
</tr>
<tr>
<td>E.coli and pathogenic bacteria are absent in 1 dm³</td>
<td></td>
</tr>
</tbody>
</table>

Make up a hygienic conclusion about the drinking water quality under study and possibility of its use for drinking purposes
Test questions

1. Sources of water in nature.
2. Systems of water supply.
3. Hygienic requirements to drinking water quality for decentralized water supply.
4. Chemical indices of water pollution and their hygienic standards.
5. Bacteriological indices of drinking water.
6. The methods of drinking water quality improvement.
7. Hygienic requirement to the wells.

Signature of the Teacher_________ Signature of the Student ___________

Subject 14. METHODS OF HYGIENIC ESTIMATION OF SOIL ACCORDING TO SANITARY EXAMINATION OF THE LAND PARCEL AND RESULTS OF LABORATORY ANALYSIS OF SAMPLES

Learning objective
- To understand hygienic, epidemic and endemic importance of soil.
- To master the methods of sanitary examination of the territory and soil sampling for laboratory analysis.
- To master the method of assessment of the soil pollution level and degree of its danger for people’s health on the basis of the sanitary examination of the land parcel, and the results of soil samples’ laboratory analysis.

Basics
You should know:
- Hygienic, epidemic and endemic importance of soil.
- Indices and the scale for assessment of sanitary condition of soil.
- Importance of soil as the medium for domestic and industrial waste treatment.

You should have the following skills:
- Carrying out the sanitary examination of the land parcel considering its function (territory of child institution, hospital, sewage treatment plant etc.).
- Determining sampling points and to take soil samples for sanitary-hygienic, bacteriological and helminthological analyses.
- Stating a hygienic value of the sanitary condition of the soil on the basis of sanitary examination of land parcel and results of laboratory analysis.

1. Sampling of soil for analysis.
The sample of soil was taken by laboratory assistant __________________________

__________________________ for analysis in quantity ____________________________

Where
2. The results of analysis

2.1. Determination of soil humidity by the formula

\[ X = \frac{20 - y}{20} \cdot 100 = \]

where \( x \) is soil humidity in %

\( 20 \) is the weight of soil before draying

\( y \) is the weight of soil after draying

2.2. Determination of soil porosity by the formula

\[ P = \frac{(a + b - c) \cdot 100}{a} = \]

where \( P \) is soil porosity in %

\( a \) is the value of soil for analysis in cm\(^3\)

\( b \) is the value of water in cm\(^3\)

\( c \) is the value of soil with water in cm\(^3\)

2.3. Determination of ammonia in the soil.

2.3.1 the method of determination

2.3.4 chemical reagents and laboratory utensils

2.3.5 the course of the work:

- preparation of colorimetric scale

<table>
<thead>
<tr>
<th>Number of tube</th>
<th>Standard reagent NH(_4)Cl</th>
<th>Distilled water</th>
<th>Selenetic salt</th>
<th>Nessler's reagent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 ml</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2 ml</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3 ml</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4 ml</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5 ml</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- treatment of tested soil

2.3.6 calculation of amount of ammonia in tested soil

\[ X = \frac{a \cdot 100}{10} = \]

where : \( x \) is the amount of ammonia in tested soil,

\( a \) is the amount of ammonia in the tube, where the color is equal to the color of tested tube

\( 10 \) is the weight of soil sample for analysis

Conclusion
2.4. Situational task

In the outskirts of a settlement a land of 3 ha of the former cultivation area is assigned for construction of a new boarding school. During the sanitary examination of the land no sources of pollution were discovered. The relief has a slope in the southern direction. At the distance of 20 m from the northern border of the land an unequipped dump of domestic waste was found, which is at the distance of 100-130 m from the people houses. In the center of the land a soil sample of 40×20 m size was taken by “envelope” technique. 1 kg of soil was taken at each sampling point.

Laboratory analysis data:

Soil physical properties: physical sand (particles of the size bigger than 0.01 mm) – 85%, foreign impurities – up to 9%.

Sanitary-chemical criteria of epidemic safety: ammonia nitrogen – 45 mg/100 g, organic nitrogen – 0.6 mg/100 g, nitrates – 0.5 mg/100 g, nitrites – 3.3 mg/100 g, chlorides – 75 mg/100 g, Khlebnikoff’s sanitary number – 0.78.

Sanitary-microbiological criteria of epidemic safety: microbial number – 5 x 10^5, coli-titer is 0.01, titer of anaerobes is 0.001, eggs of helminthes – 7 in 1 kg of soil, number of larvae and chrysalides of flies – 5 on 0.25 m².

Draw up a valid report about the sanitary condition of soil and make recommendations concerning the assignment of the land for school building

Solution of situational task

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

Conclusion

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

Test questions

1. Hygienic significance of soil.
2. Chemical composition of soil and its significance in spreading the endemic diseases.
3. Sampling of soil for analysis.
5. Physical properties of soil.
7. Sanitary-hygienic estimation of soil based on the laboratory analysis.

Signature of the Teacher ____________ Signature of the Student ____________
HYGIENE OF NUTRITION

Subject 15. METHODS OF STUDY AND HYGIENIC ESTIMATION OF COLLECTIVE NUTRITION ADEQUACY

Learning objective
- To master the method of hygienic estimation of collective nutrition (by the data of weekly menu).

Basics
You should know:
- Types of nutrition, their hygienic character
- Physiological and hygienic requirements to rational nutrition
- Groups of population for nutritional norms
- Hygienic ground of rational nutrition
- Physiological and hygienic requirements and nutritional principles of compilation of daily and weekly menu

You should have the following skills:
- Estimating quantitative and qualitative adequacy of a nutrition
- Making the menu for a week
- Stating hygienic estimation of the menu using an algorithm
- Offering measures on hygienic correction of the menu

Situational task
Make up hygienic estimation of a menu per week for persons in recreation centre by this scheme (answer all questions)

The scheme of hygienic estimation of a menu

1. Variety of food-stuffs per week and per day.
2. Ratio of the liquid (first) and concentrated (second) courses during a day.
3. Some meals contain dishes, cooked from identical or the same products.
4. Presence of dishes stimulating appetite at each meal.
5. Alternation of cereals and vegetable garnishes for meals during each day and week.
6. Day by day alternation of the first spicy and neutral courses.
7. Variety of dessert courses for meals.
8. Keeping rules of limited repetition of identical courses within one week.
9. Distribution of courses for meals every day.
10. Conclusion

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

________________________________________________________________________
<table>
<thead>
<tr>
<th></th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Breakfast</strong></td>
<td>Mashed potatoes with a cutlet</td>
<td>Mushroom soup</td>
<td>Regular coffee</td>
<td>Curds with sour cream</td>
<td>Mashed potatoes</td>
<td>Macaroni with meat</td>
<td>Boiled eggs</td>
</tr>
<tr>
<td></td>
<td>Bread and butter</td>
<td>Milk</td>
<td>Cheese</td>
<td>Borsch with meat</td>
<td>Juice</td>
<td>Stewed apple</td>
<td>Mashed potatoes</td>
</tr>
<tr>
<td></td>
<td>Cheese</td>
<td>Bread and butter</td>
<td></td>
<td>Tea</td>
<td>Stewed apple</td>
<td>Milk</td>
<td>Milk</td>
</tr>
<tr>
<td></td>
<td>Tea</td>
<td></td>
<td></td>
<td>Bread</td>
<td>Bread</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dinner</strong></td>
<td>Borsch with meat</td>
<td>Fish soup</td>
<td>Stewed meat with vegetables</td>
<td>Fish soup</td>
<td>Borsch with meat</td>
<td>Macaroni with meat</td>
<td>Borsch with meat</td>
</tr>
<tr>
<td></td>
<td>Stewed cabbage</td>
<td>Stew with mashed potatoes</td>
<td>Baked apples</td>
<td>Fried fish with mashed potatoes</td>
<td>Stew</td>
<td>Juice</td>
<td>Mashed potatoes with meat</td>
</tr>
<tr>
<td></td>
<td>Milk</td>
<td>Apple juice</td>
<td></td>
<td></td>
<td>Black coffee</td>
<td>Bread</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bread</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Supper</strong></td>
<td>Rice cereal with milk</td>
<td>Mashed potatoes with a cutlet</td>
<td>Porridge with milk</td>
<td>Porridge with milk and fruit</td>
<td>Crab salad</td>
<td>Potato soup</td>
<td>Macaroni with a cutlet</td>
</tr>
<tr>
<td></td>
<td>Omelette</td>
<td>Bread and butter</td>
<td>Tea</td>
<td>Tea</td>
<td>Semolina with milk</td>
<td>Mashed potatoes with meat</td>
<td>Black coffee</td>
</tr>
<tr>
<td></td>
<td>Black coffee</td>
<td></td>
<td>Sour milk</td>
<td>Bread</td>
<td></td>
<td>Sour milk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bread</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Test questions

1. Biological essence of nutrition.
2. Classification of food nutrients and food products.
3. Types of nutrition.
4. Hygienic requirements to rational nutrition.
5. Hygienic requirements to a menu for a week.
6. The main criteria of qualitative variety of nutrition in a menu for a week.
7. Distribution of first, second and third courses in a menu for a week.
8. Principle of variety of food-stuffs during a week.
9. Right alternation of cereals and vegetable garnishes, spicy and neutral courses and dessert courses in a menu.

Signature of the Teacher__________  Signature of the Student _________
Subject 16. THE CALCULATION METHOD OF INDIVIDUAL NUTRITION ADEQUACY ESTIMATION

Learning objective
- To master the methods of medical control of the energy expenditure and nutrition in different social and professional, sex and age population groups.
- To master methods of determination of individual or organized collective actual nutrition and its adequacy to the energy expenditure and nutrient needs.

Basics
You should know:
- Physiological basics of metabolism in the human organism.
- Physiological and hygienic characteristic of the basal metabolism and specific-dynamic effect of food.
- Dependence of the human energy metabolism on climate and weather conditions, microclimate, emotional stress and physical load.
- Rational nutrition as the basis of the sufficient energy supply for the human organism.
- Hygienic requirements to chemical composition and caloric content of the ration for different professional groups

You should have the following skills:
- Monitoring the daily activity of an individual or a group with similar daily routine and nutrition.
- Using directive, reference materials, formulas, tables, perform the necessary calculations (analyses).
- Calculating chemical composition and caloric content of the ration, to estimate the results

Situational task
Give hygienic estimation of daily ration of a 30-year-old nurse, her weight is 65kg.

Chemical composition and caloric content of the daily ration:
Animal proteins = 30,4 g  Phosphorus = 800 mg  Vitamin B\textsubscript{6} = 1.5 mg
Vegetable proteins = 20 g  Magnesium = 300 mg  Niacinum =10 mg
Animal fats = 80 g  Iron= 12 mg  Caloricity of breakfast = 504kcal
Vegetable fats = 15 g  Vitamin C = 40 mg  Caloricity of dinner = 670kcal
Simple saccharum = 125 g  Vitamin A = 0.5 mg  Caloricity of supper = 1032 kcal
Starch = 152 g  Vitamin B\textsubscript{1} =0.7 mg  Caloricity of animal origin = 913.7 kcal
Calcium = 500 mg  Vitamin B\textsubscript{2} = 1.1 mg

Determine the professional group of the nurse and hygienic norms of caloric value, proteins, fats and others by the tables
<table>
<thead>
<tr>
<th></th>
<th>Estimated index</th>
<th>The actual content in the ration</th>
<th>Physiological standard</th>
<th>Discrepancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Total caloric value (kcal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Calories of an animal origin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Kcals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) % to total caloric value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Proteins (gram)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Animal proteins</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) grams</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) % to total quantity of proteins</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Caloric value at the expense of proteins</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Kcals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) % to total caloric value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Fats (gram)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Vegetable fats</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) grams</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) % to total quantity of fats</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Caloric value at the expense of fats</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Kcals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) % to total caloric value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Carbohydrates (gram)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Simple saccharum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) grams</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) % to total quantity of carbohydrates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Caloric value at the expense of carbohydrates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Kcals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) % to total caloric value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Ratio between proteins, fats and carbohydrates (gram)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Vitamins (mg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) B₁</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) B₂</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>d) B₆</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>e) PP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>f) C</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Mineral substances (mg)
- Calcium
- Phosphorus
- Magnesium
- Iron

### Caloricity of breakfast
- a) Kcals
- b) % to total caloric value of ration

### Caloricity of dinner
- a) Kcals
- b) % to total caloric value of ration

### Caloricity of supper
- a) Kcals
- b) % to total caloric value of ration

Conclusion

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________
Test questions

1. The essence of the quantitative adequacy law.
2. The main components of human power inputs.
3. The essence of the qualitative adequacy law.
4. Coefficient of physical activity of different professional groups and its significance.
5. Proteins in nutrition, their physiological functions and daily need. The method of calculation of a daily necessity in proteins.
6. Fats in nutrition, their physiological functions and daily need. The method of calculation of a daily necessity in fats.
7. Carbohydrates in nutrition, their physiological functions and daily need. The method of calculation of a daily necessity in carbohydrates.
8. Physiological functions and hygienic standard of vitamins.
10. Rational correction of proteins, fats and carbohydrates in daily ration.
11. Rational correction of proteins and fats of animal and vegetable origin and simple saccharums and starch in the ration.
12. Rational distribution of daily calories of the ration according to the daily meals.

Signature of the Teacher ___________  Signature of the Student ___________
**Subject 17. METHOD OF DETERMINATION AND HYGIENIC ESTIMATION OF NUTRITIOUS STATUS BY THE INDEX OF VITAMIN PROVISION OF THE ORGANISM**

**Learning objective**
- To master the methods of detection and assessment of the vitamin sufficiency in the organism and the methods and measures of hypo- and avitaminosis prevention.

**Basics**

You should know:
- Classification and physiological significance of vitamins in the organism.
- The most frequently occurring hypovitaminosis states in cases of both individual and collective nutrition. Their causes.
- Avitaminosis and their clinical characteristics.
- Hygienic principles of prophylaxis of hypovitaminosis and avitaminosis.

You should have the following skills:
- Detecting the hypo- and avitaminosis in cases of both individual and collective nutrition.
- Organizing the hypovitaminosis prevention measures and assess their effectiveness.
- Revealing the deficit of vitamins in the human organism by determining of the quantity of vitamin C in urine and to estimate the results.

1. Urine sampling for analysis.
The second sample of urine was taken by laboratory assistant from _______ children in a boarding-school _______________________________________________________________________

2. Determination of vitamin C in urine
2.1. The method of determination_________________________________________
2.2. The principle of the method___________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
2.3. Chemical reaction of determination_____________________________________
________________________________________________________________________
________________________________________________________________________
2.4. Chemical reagents for determination of vitamin C and laboratory utensils
________________________________________________________________________
________________________________________________________________________
2.5. The course of the work.
2.5.1. the "direct" experiment

Result of the "direct" experiment $X_d$

2.5.2 the "blind" experiment

Result of the "blind" experiment $X_b$

2.5.3. correction factor for Thilman’s reagent titer $K$

2.6. Calculation of daily excretion of vitamin C in urine by the formula

$$DE = \frac{(X_d - X_b) \cdot K \cdot 0.088 \cdot 1150}{5} = - \text{-------------------------} = \text{ (mg/day)}$$

where

0.088 – equivalent of Thilman’s reagent (1 ml of 0.001N solution) by ascorbic acid;

1150 – average daily diuresis (ml)

5 – volume of urine under study (ml)

3. Conclusion

Test questions

1. The physiological role of vitamins and hygienic norms in daily ration.

2. Main food sources of vitamin C in nutrition.

3. Etiology, pathogenesis, clinical picture of avitaminosis and hypovitaminosis C.

4. The methods of vitamin C sufficiency control in the human organism.

5. The method of vitamin C determination in urine (by Thilman’s reagent).

6. The methods of prophylaxis of avitaminosis and hypovitaminosis C.

Signature of the Teacher ___________ Signature of the Student ___________
**Subject 18. METHODS OF EXPERT ASSESSMENT OF FOOD PRODUCTS ACCORDING TO THEIR LABORATORY ANALYSES**

**Learning objective**
- To master the methods of food products quality and freshness assessment according to their organoleptic criteria and laboratory analyses results.

**Basics**

You should know:
- Organoleptic criteria of food products quality and freshness.
- Principles of hygienic regulation of the food products quality and freshness.
- Full-value indices and deterioration indices of main food products.

You should have the following skills:
- Sampling the products and ready meals, to send them to a laboratory for analysis, fill in the accompanying form.
- Assessing the organoleptic quality and deterioration indices of food products.
- Using the State Standards and other normative documents during the assessment of the results of food products and ready meals laboratory analysis. Making the expert conclusion according to these results.

**Determination of main properties of milk quality**

1. Sampling of milk for analysis.
The sample of milk was taken by the ____________________________ (who)
from __________________________________________________________ (where, when)
for analysis in quantity __________________________
Producer ______________________________________________________
Shelf life _______________________________________________________

2. The results of the analysis:
2.1. Organoleptical properties:
2.1.1. color _______________________________________________________
2.1.2. smell _____________________________________________________
2.1.3. taste _____________________________________________________
2.1.4. aftertaste _________________________________________________
2.1.5. consistence _______________________________________________
2.1.6. mechanical admixture _______________________________________
2.2. Physical properties:
2.2.1. temperature ______________________________________________
2.2.2. Density (by reading of lactodensimeter) \( q \)____________________
    Density (with correction for temperature) \( q_t \)_____________________
2.3. Chemical composition:
2.3.1. acidity
    ________________________________________________________________
    ________________________________________________________________
    ________________________________________________________________
quantity of fats \( F \)

\[ X = \frac{4.8F + A}{4} + 0.5 = \left( \frac{F + 0.5}{4} \right) = (\%) \]

where \( A \) – specific gravity of the milk (only two last figures)
\( F \) – quantity of fats (\%)

2.4. Falsification of milk:
2.4.1 Determination of soda

2.4.2 Determination of starch

2.5. Bacteriological indices:
2.5.1 microbial number
2.5.2. coli-titer
2.5.3. titer of pathogenic microbes

3. Conclusion:

Hygienic estimation of bread quality

1. Sampling of bread for analysis
   The sample of bread _______ was taken by the _______
   (sort of bread) (who)
   from _______ (where, when)
   for analysis in quantity _______
   Producer _______

2. The results of the analysis:
2.1 outward appearance:
2.1.1 surface
2.1.2 color
2.1.3. crust
2.1.4. shape
2.2. State of the crumb:
2.2.1 quality of baked through
2.2.2 elasticity
2.2.3 freshness

2.3. Determination of organoleptic properties:
2.3.1. taste
2.3.2 aftertaste
2.3.3 smell

2.4. Determination of physical properties:
2.4.1 porosity

2.4.2 humidity

2.5. Determination of chemical properties:
2.5.1 acidity

3. Conclusion:

Hygienic estimation of meat quality

1. Sampling of meat for analysis
The sample of meat ____________ was taken by the ____________
(pork, beef or other) (who)
from ________________ (where, when)
for analysis in quantity ________________

2. The results of the analysis:
2.1 outward appearance and color of surface ________________

2.2 consistence ________________
2.3. smell ____________________________________________________________

2.4. state of muscles ________________________________________________

2.5 state of fat _______________________________________________________

2.6 state of tendons _________________________________________________

2.7 transparency and smell of broth ____________________________________

2.8 The chemical analysis for freshness of meat
2.8.1 determination of ammonia ________________________________________

2.8.2 determination of hydrogen sulfide _________________________________

2.9 Helminthological analysis
2.9.1 analysis for measles (pork measles) _______________________________
2.9.2 analysis for trichinella (porkworm) ________________________________

3. Conclusion:
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

Test questions
1. Nutritious value of milk.
2. The main hygienic requirements to the milk quality.
3. The methods of determination of organoleptic indices of milk quality.
4. The methods of determination of physical and chemical indices of milk quality.
5. The methods of determination of bacteriological indices of milk quality.
6. The methods of determination of the falsification of milk (by soda and starch).
7. Nutritious value of bread.
9. The methods of determination of organoleptic properties of bread.
10. The methods of determination of physical properties of bread.
11. The methods of determination of chemical properties of bread.
13. Hygienic demands to meat quality.
15. The chemical analysis for freshness of meat.
16. The methods of bacteriological and helminthological inspection of meat.

Signature of the Teacher__________ Signature of the Student ____________
Subject 19. THE INVESTIGATION METHOD OF FOOD POISONINGS OF MICROBIAL ETIOLOGY

Learning objective
- To master the knowledge on food poisonings, their etiology, clinic, methods of investigation, general and specific prophylaxis.

Basics
You should know:
- Definition of “food poisonings” and their classification.
- The food poisoning etiology, pathogenesis, clinic and prevention.
- Sanitary-hygienic characteristic of food poisonings of microbial etiology and their prophylaxis

You should have the following skills:
- Determining the type of food poisoning and its cause, to provide the medical help in its cases.
- Organizing, investigation and determination the cause (food product or meal) of food poisoning of microbial nature.
- Organizing preventive measures for the elimination of the food poisoning causes and food poisoning prevention.
- Performing the act of food poisoning investigation (food product or dish)

Situational task 1
The students living in the neighboring rooms of a hostel became sick. During the investigation it was established, that the disease began on 12.09.20__ after a "beer" party where one of the students brought a dried fish bought in the spontaneous market near the underground. Except for the fish, the young men ate chips and crackers, got in at kiosk. Out of 6 participants, 2 persons were sick. At night, 5 hours after the fish had been eaten, all of them had nausea, headache, stomach ache, dryness in the mouth, and one of the students had numerous vomiting. Next day sharp deterioration of sight, hallucination, infringement of swallowing were noted. One of the students had full speech disturbance (aphonia). The body temperature was normal. At 12 o'clock in the afternoon both victims in a grave condition were hospitalized.

The act of the food poisoning investigation

1. The date (year, month, date) of a food poisoning ________________________________
2. The number of sick people ________________________________________________
3. Contingent of sick people ________________________________________________
4. Their address ____________________________________________________________
5. Main clinical symptoms of the disease _______________________________________
   _______________________________________________________________________
   _______________________________________________________________________
6. Duration of the disease, its seriousness _______________________________________
   _______________________________________________________________________
7. The number of hospitalized persons _______________________________________
8. The number of persons who have sick-leave certificates _________________________
9. Detailed information about sick people food intake during the last two days

10. How many hours passed between the last meal and the first symptoms of the disease?

11. Possible reasons of the disease: what are the most probable products that could cause this disease?

12. The supposed nature (origin) of disease (microbial or non-microbial)

13. Sanitary characteristics of cooking conditions (quality of products, their storage conditions, transportation, and so on)

14. What food and products must be withdrawn from use and sent for laboratory analysis?

15. What discharges from the patients should be investigated?

16. After determining the reasons of the disease its liquidation measures should be outlined

17. The final conclusion about the nature (origin) of the disease, its reasons, liquidation measures and prophylaxis can be drawn after receiving the laboratory analysis results
Situational task 2
The disease began on 17.11.20__ after celebrating a birthday in a student's group for which the cream cake, some chocolates and oranges were bought at a confectionery shop. In 2 hours out of 10 persons, who participated in the tea-drinking, 6 felt sudden deterioration of health, fever, nausea, a sharp pain in the upper part of the stomach. With 2 girls unrestrained vomiting and diarrhea were marked. One of them was has been delivered to hospital in a condition of a collapse by the ambulance. With the others the condition started to improve and in 6-8 hours the symptoms of the disease were over.

The act
of the food poisoning investigation

1. The date (year, month, date) of a food poisoning ________________________________
2. The number of sick people ________________________________
3. Contingent of sick people ________________________________
4. Their address ________________________________
5. Main clinical symptoms of the disease ________________________________
6. Duration of the disease, its seriousness ________________________________
7. The number of hospitalized persons ________________________________
8. The number of persons who have sick-leave certificates ________________________________
9. Detailed information about sick people food intake during the last two days ________________________________
10. How many hours passed between the last meal and the first symptoms of the disease? ________________________________
11. Possible reasons of the disease: what are the most probable products that could cause this disease? ________________________________
12. The supposed nature (origin) of disease (microbial or non-microbial) ________________________________
13. Sanitary characteristics of cooking conditions (quality of products, their storage conditions, transportation, and so on) ________________________________
14. What food and products must be withdrawn from use and sent for laboratory analysis?
_______________________________________________________________________________
_______________________________________________________________________________

15. What discharges from the patients should be investigated?
_______________________________________________________________________________
_______________________________________________________________________________

16. After determining the reasons of the disease its liquidation measures should be outlined
_______________________________________________________________________________
_______________________________________________________________________________

17. The final conclusion about the nature (origin) of the disease, its reasons, liquidation measures and prophylaxis can be drawn after receiving the laboratory analysis results
_______________________________________________________________________________
_______________________________________________________________________________

Test questions
1. The notion of food poisonings and their classification.
2. The main features of food poisoning.
3. The causes of food toxic infections.
4. The sanitary and epidemiological character of toxicoinfections and their prophylaxis.
5. The sanitary and epidemiological character of food toxicoinfections caused by spore-producing microorganisms and their prophylaxis.
6. The sanitary and epidemiological character of staphylococcus toxicosis and its prophylaxis.
7. The sanitary and epidemiological character of botulism and its prophylaxis.
8. Mycotoxicosis, their classification and prophylaxis

Signature of the Teacher__________  Signature of the Student __________
Date____

Subject 20. THE INVESTIGATION METHOD OF FOOD POISONINGS OF NON-MICROBIAL ETIOLOGY

Learning objective
- To master the knowledge on food poisonings, their etiology, clinic, methods of investigation, general and specific prophylaxis.

Basics
You should know:
- The classification of food poisonings of non-microbial etiology.
- Sanitary-hygienic characteristic of food poisonings of non-microbial etiology and their prophylaxis.

You should have the following skills:
- Determining the type of food poisoning and its cause, provide the medical help in such cases.
- Organizing, investigating and determining the cause (food product or meal) of food poisoning of non-microbial nature.
- Organizing preventive measures for the elimination of the food poisoning causes and food poisoning prevention.
- Performing the act of food poisoning investigation (food product or dish).

Situational task 1
In a family, of 4 persons, consisting of the parents and two children (2 and 6 years of age), in October, 10th, 20__, the husband, the wife and the senior child became simultaneously sick. The disease began 10 hours after the dinner where menu consisted of the vegetable soup, home made pickled mushrooms, beefsteak with rice, cherry juice and bread. The younger child ate only a vegetable soup, mashed potatoes and juice. He sickness was manifested in the sharp form. Symptoms of the disease: numerous vomiting, pains in epigastric area, frequent liquid stool of mucinous-watery character, unrestrained thirst. Body temperature of the adults - mild pyrexia, of the child - 37,7°C.
All the patients were hospitalized to the regional hospital on11.10.20__. The condition of the sick adults was serious, the child’s - the heaviest. By the evening of October, 12th the child developed spasms and he died from sharp cardiovascular insufficiency. The condition of the adults at the moment of research remains serious, non-stable. Intensive therapy is conducted.

The act of the food poisoning investigation

1. The date (year, month, date) of a food poisoning _________________________________
2. The number of sick people ___________________________________________________
3. Contingent of sick people ___________________________________________________
4. Their address ______________________________________________________________
5. Main clinical symptoms of the disease_________________________________________
   _______________________________________________________________________
6. Duration of the disease, its seriousness_________________________________________
   _______________________________________________________________________
7. The number of hospitalized persons

8. The number of persons who have sick-leave certificates

9. Detailed information about sick people food intake during the last two days

10. How many hours passed between the last meal and the first symptoms of the disease?

11. Possible reasons of the disease: what are the most probable products that could cause this disease?

12. The supposed nature (origin) of disease (microbial or non-microbial)

13. Sanitary characteristics of cooking conditions (quality of products, their storage conditions, transportation, and so on)

14. What food and products must be withdrawn from use and sent for laboratory analysis?

15. What discharges from the patients should be investigated?

16. After determining the reasons of the disease its liquidation measures should be outlined

17. The final conclusion about the nature (origin) of the disease, its reasons, liquidation measures and prophylaxis can be drawn after receiving the laboratory analysis results
Situational task 2

In the family of three people, consisting of a husband, a wife (37 and 35 years of age correspondingly) and an 11-year-old child, on December 9th, 20___ the wife and the child became sick. The onset of the disease in the child was 30 minutes after supper. Menu consisted of fried fish (tuna) with mashed potatoes, cabbage salad, bread, tea and a cream cakes. The symptoms of the disease: reddening of the face with sensation of heat, a headache, nausea, a stomach ache, diarrhea, tachycardia (110 ictus/min), nettle-rash on the body. The wife developed similar, but less expressed symptoms an hour after supper. The father who only drank tea with the cake at supper, didn’t have any symptoms. The ambulance surgeon established after the examination the child’s and her mother’s arterial pressure was low (80/50 and 85/55 mm Hg accordingly) and for specification of the preliminary diagnosis proposed hospitalization which the patients refused. The doctor performed gastric lavage in the victims and prescribed the reception of the activated coal. Besides, injections of a Dimedrol (for the mother) and Tavegyl (for the daughter), were made. The condition of patients started to improve and by the morning of December, 10th the most part of symptoms of disease disappeared.

<table>
<thead>
<tr>
<th>The act of the food poisoning investigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The date (year, month, date) of a food poisoning</td>
</tr>
<tr>
<td>2. The number of sick people</td>
</tr>
<tr>
<td>3. Contingent of sick people</td>
</tr>
<tr>
<td>4. Their address</td>
</tr>
<tr>
<td>5. Main clinical symptoms of the disease</td>
</tr>
<tr>
<td>6. Duration of the disease, its seriousness</td>
</tr>
<tr>
<td>7. The number of hospitalized persons</td>
</tr>
<tr>
<td>8. The number of persons who have sick-leave certificates</td>
</tr>
<tr>
<td>9. Detailed information about sick people food intake during the last two days</td>
</tr>
<tr>
<td>10. How many hours passed between the last meal and the first symptoms of the disease?</td>
</tr>
<tr>
<td>11. Possible reasons of the disease: what are the most probable products that could cause this disease?</td>
</tr>
<tr>
<td>12. The supposed nature (origin) of disease (microbial or non-microbial)</td>
</tr>
</tbody>
</table>
13. Sanitary characteristics of cooking conditions (quality of products, their storage conditions, transportation, and so on) ____________________________________________

14. What food and products must be withdrawn from use and sent for laboratory analysis?
___________________________________________________________________________
___________________________________________________________________________

15. What discharges from the patients should be investigated? _______________________
___________________________________________________________________________

16. After determining the reasons of the disease its liquidation measures should be outlined ____________________________
___________________________________________________________________________

17. The final conclusion about the nature (origin) of the disease, its reasons, liquidation measures and prophylaxis can be drawn after receiving the laboratory analysis results __________________________________________
___________________________________________________________________________

Test questions
1. The classification of food poisonings of non-microbial nature.
2. The poisonings by poisonous plants and animal tissues.
3. The poisonings by the products of the plants and animal tissues which are poisoned in certain conditions.
4. The poisonings with chemical substances.
5. The poisonings of non-identified origin.
6. The measurements for prophylaxis of food poisonings of non-microbial nature.

Signature of the Teacher__________  Signature of the Student ___________
HYGIENE OF LABOUR

Date ______

Subject 21. METHODS OF INVESTIGATION AND HYGIENIC ESTIMATION OF DUSTINESS AND CHEMICAL POLLUTION OF AIR IN THE WORK AREA

Learning objective
- To master the knowledge of air pollution sources of industrial premises (dust and harmful chemical substances)
- To master the basic methods of sampling the work area air for the sanitary-chemical analysis
- To master the main methods of sanitary and chemical analysis of the air samples.
- To master the techniques of the qualitative and quantitative analysis of dust content of air and a technique of definition of carbon monoxide and sulphureous gas concentration in the air of industrial premises

Basics
You should know:
- chemical composition of air
- hygienic and pathogenic significance of separative pollutants of air in working zone.
- hygienic character of dust, its sources and classifications, influence of dust on the human body,
- methods and devices for determination of dust,
- sources of carbon monoxide and sulfurous gas,
- measures of dust control.
- Fundamentals of Ukrainian legislation in the field of protection of air in working zone.

You should have the following skills:
- Calculating the amount of dust in air
- Determining carbon monoxide and sulfurous gas in air
- Estimating the results of analysis.
- Substantiating and carrying out sanitary and hygienic measures regarding safe working conditions.

Determination and hygienic estimation of dustiness in air

Situational task 1
A sample of dust was taken by the method of sedimentation on the porcelain cup of area 20 cm² placed on the roof of a house, which is located on the lee from cement works.
Date of experiment
Weight of covering glass before dust sampling is 155 mg.
Weight of covering glass after dust sampling is 158 mg.
Duration of experiment is 24 hours.
1.1. Devices for determination ____________________________________________
2.1. The principle of determination_________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
1.3. Date of the determination _____________________________________________
1.4. Area of the covering glass___________________________________________
1.5. Weight of the covering glass before sampling of dust_____________________
1.6. Weight of the covering glass after sampling of dust_______________________
1.7. Calculate quantity of dust settled from the atmospheric air:

1.7.1. in g / m² • 24 hours

1.7.2. in t / km² • 1 year

Conclusion ____________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

**Situational task 2**

A sample of dust was taken by the method of aspiration on AFA filter in the industrial area of the city. The air was aspirated through the filter with velocity of 10 L/m. The time of the exposition was 30 min. The weight of AFA filter before the dust sampling was 67 mg. The weight of AFA filter after the dust sampling was 67.5 mg. Temperature of the air at the moment of dust sampling was 27 °C, the atmospheric pressure was 751 mm Hg.

2.1. Devices for determination__________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2.2. Place of the experiment__________________________________________

2.3. Results of determination:

2.3.1 weight of the filter AFA before dust sampling P₁____________________________

2.3.2 weight of the filter AFA after dust sampling P₂____________________________

2.3.3 velocity of the air movement with help of device____________________________

2.3.4 time of the exposition______________________________________________

2.3.5 volume of tested air____________________________

2.3.6 air temperature at the moment of determination________________________

2.3.7 atmospheric pressure at the moment of determination______________________

2.3.8 reduction of the volume of the tested air to normal condition by the formula

\[
V'_{760} = \frac{V'}{1 + \alpha a} \cdot \frac{B}{760} = \text{______________} = \text{______________} =
\]

2.3.9. Calculation of dust concentration in air in mg/m³

\[
X = \frac{(P₁ - P₂) \cdot 1000}{V'_{760}}
\]

3. Conclusion __________________________________________________________
________________________________________________________________________
________________________________________________________________________

**Situational task 3**

There are the following dust particles on the filter AFA:

Dust particles of size to 2 µ = 30.
Dust particles of size from 2 to 4 µ = 35.
Dust particles of size from 4 to 6 µ = 40.
Dust particles of size from 6 to 10 µ = 25.
Dust particles of size from 10 µ and more in 10.
Calculate the dust formula and give the conclusion about the degree of dust dispersion.

**Dust formula**

<table>
<thead>
<tr>
<th>Size of dust particles</th>
<th>to 2 µ</th>
<th>from 2 to 4 µ</th>
<th>from 4 to 6 µ</th>
<th>from 6 to 10 µ</th>
<th>more than 10 µ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity of dust particles (in absolute figures)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusion

________________________________________________________________________________________

________________________________________________________________________________________


**3. Hygienic characteristics of main industrial air pollutants.**

**3.1. Carbon monoxide**

3.1.1. The sources of carbon monoxide in the industrial air

________________________________________________________________________________________

________________________________________________________________________________________

3.1.2. Influence of carbon monoxide on the human organism

________________________________________________________________________________________

________________________________________________________________________________________


**3.2. Sulfurous gas**

3.2.1. The sources of sulfurous gas in the industrial air

________________________________________________________________________________________

________________________________________________________________________________________

3.2.2. Influence of sulfurous gas on the human organism

________________________________________________________________________________________

________________________________________________________________________________________


**Practical work**

**Determination of the carbon monoxide**

3.1. Devices for determination

3.2. The method of determination

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________
3.3. The principle of the method

3.4. The course of the work
3.4.1. preparation of indicator tubes for analysis

3.4.2. aspiration of tested air through the indicator tubes

3.4.3. visual colorimetry

3.5 Calculation
\[ C = \frac{\alpha \cdot 1000}{n} \]

where
- \( C \) is quantity of carbon monoxide in air,
- \( n \) is number of aspirations,
- 1000 is recalculation in 1 m\(^3\)
- \( \alpha \) is amount CO on the indicator tube.

3.6. Conclusion

Test questions
1. Hygienic significance of chemical composition of air.
2. Carbon monoxide as an air pollutant, the sources of carbon monoxide in the air, its toxic effect and allowed concentration.
4. Sulfurous gas as an air pollutant, the sources of sulfurous gas in the air, its toxic effect and allowed concentration.
5. Prophylaxis of unfavorable influence of carbon monoxide and sulfurous gas on the organism.

Signature of the Teacher ___________  Signature of the Student ___________
Learning objective

- To learn about general hazards caused by industrial environment and occupational injuries and diseases as their consequences.
- To learn about methods and techniques for determination of the most common types of occupational hazards and their impact on employees’ organism and health; about legislative, administrative, technical measures for health protection and prevention of occupational diseases.

Basics

You should know:
- Fundamentals of Ukrainian legislation in the field of hygiene and labour protection.
- Classification and characteristics of occupational hazards.
- Physiologic, biochemical and pathophysiological signs and characteristics of organism’s response to occupational hazards.
- Method of investigation and measures of prophylaxis of occupational diseases and occupational poisonings

You should have the following skills:
- Determining basic agents of industrial environment and work process that may have negative impact on the employees, revealing and assessing the signs of such impact on organism.
- Substantiating and carrying out sanitary and hygienic measures regarding safe working conditions.
- Performing the act of investigation with a conclusion and recommendations for prophylaxis of occupational diseases and poisonings.

Situational task

The results of complex investigation of working conditions at the metallurgical factory 2010 June, 25.

1. Determining of industrial microclimate.
   1.1 The air temperature is 30°C
   1.2 Readings of wet thermometer of psychrometer is 14 °C
   1.3 Readings of catathermometer:
      1.3.1. Factor of catathermometer (F) = 600
      1.3.2. The time of spirit dropping from + 38°C till 35°C (T) = 2 min 17 sec.
      1.3.3. Atmospheric pressure (B) = 763 mm Hg

2. Measuring the noise
   The level of noise = 85 dBA

3. Determination of dust quantity in air:
   Weight of filter before analysis (P₁) = 130 mg
   Weight of filter after analysis (P₂) = 130.7 mg
   The time of exposition (a) = 25 min
   Velocity of aspiration (b) = 5 l per min

4. Determination of chemical composition of air:
   4.1 Concentration of carbon monoxide = 30 mg/m³
   4.2 Concentration of sulphureous gas = 7.5 mg/m³
It’s necessary to determine parameters of industrial conditions at the workplace and to make up hygienic estimation of them.

Solution of the task

1. Determination of relative humidity of air by the table in %

2. Determination of velocity of air movement by the formula:

\[ H = \frac{F}{T} \]

\[ Q = Q_1 - Q_2 = \]

\[ V = \left( \frac{H}{Q} - 0,20 \right)^2 \]

Where

- H is cooling ability of air.
- F is factor of catathermometer.
- T is the time of spirit dropping from +38°C till +35°C
- \( Q_1 \) - average temperature of catathermometer
- \( Q_2 \) - air temperature at the working place

3. Determination of dust in the air

3.1 Calculate of volume of tested air

3.2 Reduce the tested volume of air to normal conditions by the table and formula

\[ V'_{760} = \frac{V}{(1 + \alpha r)} \cdot \frac{B}{760} = \]

3.3 Calculate dust quantity in the air

\[ K = \frac{(P_2 - P_1) \cdot 1000}{V'_{760}} = \]

4. Compare of the results of determination and calculation of physical and chemical parameters of industrial conditions with hygienic standards and make up the conclusion

4.1 What are the unfavorable factors of industrial conditions?
4.2 What occupational diseases may occur in these conditions?

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

4.3 Measures for prophylaxis of occupational diseases

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________


Test questions

1. Classification of unfavorable industrial factors of physical origin
2. Industrial noise and its classification.
3. Noise disease, its pathogenesis, clinical symptoms and prophylaxis.
4. Industrial vibration, its classification.
5. Vibration disease, its pathogenesis, clinical symptoms and prophylaxis.
7. Diseases, connected with unfavorable microclimate and their prophylaxis.
8. Industrial dust and its classification. Sources of dust at the industrial enterprises.

Signature of the Teacher ____________  Signature of the Student ____________
Learning objective

- To acquire knowledge about the effect of occupational hazards on workers’ health as well as regulations and procedure of investigation concerning occupational diseases and poisonings, proper paperwork.
- To substantiate and take the indispensable therapeutic and prophylactic measures.

Basics

You should know:
- Fundamentals of toxicology of chemical compounds – routes of penetration into organism, their transformation, mechanism of action, excretion.
- Methods and techniques of intoxication prophylaxis, basic criteria of hygienic standardization of chemical compounds in the working zone air, in the other environments.

You should have the following skills:
- Recognizing and investigating cases of poisonings and diseases having chemical character, using appropriate normative and directive documentation.
- Recommending and taking prophylactic measures regarding occupational diseases and poisonings, assessing their effectiveness.
- Drawing up the documents concerning investigation of the cases of occupational poisonings and diseases properly.

Situational problem

Four workers of a machine-building shop of an engineering plant referred to the plant polyclinic one hour before the end of their work shift complaining of heaviness in the head, headache in the regions of the temples and forehead, tinnitus, a sense of weakness, rapid pulse, nausea.

Before seeking medical advice, two workers vomited.

On examination, a factory's sectorial doctor objectively revealed that the mucosa and skin integuments of the sick workers were markedly pink, the pulse rate was 110-120 beats per minute, the respiratory rate was 30-35 respirations per minute. A neurologist, invited for consultation, revealed an increase of tendon reflexes and tremor of fingers of stretched arms in all the patients.

All sick workers were released from their work, two persons with the most expressed signs were admitted to the plant hospital.

As a result of an investigation of this case of a mass acute disease carried on by a sanitation physician for occupational hygiene in the presence of the motor-testing shop manager and the chief of the safety engineering section of the plant before the beginning of the second shift, the following facts were revealed:
- All workers started their work in time at the beginning of the first shift.
- The workers were testers of tractor engines and operated engine-test beds, on which ready engines were tested in different modes of operation. Simultaneously, 10 engines are tested at the shop. One bed is operated by two workers.
- Usually the course of an operational check consists of the following stages: the engines are filled up with diesel fuel, started and work according to the program of testing in different modes (unloaded, usual and forced). The workers are directly near the test beds and with the help of special devices register the course of engine testing.
• The main unfavorable factors in this work are industrial noise (up to 95 dBA) and air pollution in the work area with exhaust fumes of engines in operation.
• The shop is equipped with plenum-exhaust ventilation. Besides, each bed has local ventilation for removing exhaust fumes from the air of the work area. In order to protect the organ of hearing, the workers use anti-noise earphones.
• On the day when there was the case of a mass disease of the employees, 30 minutes after the end of the dinner break the local ventilation on one of the beds went out of service. The work was not stopped though the employees were informed that it was inadmissible to carry out engine testing with faulty ventilation.
• The foreman of the test section did not inform the shop manager about the malfunction of the ventilation on one of the work places and allowed to go on with the testing.
• The work was stopped only one hour before the end of the shift when two workers who operated the engine-test bed with faulty ventilation and two workers who were engaged the nearby bed state of health had to leave their places of work and turn to the doctor of their plant outpatient clinic.

Task:
1) On the basis of the information given in the situational problem draw a record of investigation of the occupational poisoning according to the suggested form.
2) Make initial diagnosis of the occupational poisoning of the workers.
3) List the laboratory tests which should be made in order to specify the diagnosis of the given occupational poisoning.

Ministry of Public Health of Ukraine
Range ..................................................................................................................................................
City ..................................................................................................................................................
District ............................................................................................................................................

The act of sanitary investigation of occupational poisoning
This act was made 20 ... by doctor in hygiene of labor.................................................................

At investigation were present ............................................................................................................

1.Name of the enterprise ..................................................................................................................

2.Address of the enterprise ..........................................................................................................

3.Name of the shop .........................................................................................................................

4.Date of rise of the disease 20 year ............................................................................................

75
5. The circumstances of the occupational poisoning rise: 

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

6. The causes of the disease: 

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

7. The list of persons who fell ill: 

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

8. The measures of liquidation of the disease and terms of their fulfillment: 

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

The signatures of the participants of the investigation:

The doctor in hygiene of labor: 

The representative trade union: 

Give the conclusion by results of the decision of situational task: 
It is necessary to take into account:
1. The beginning of the work: 

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

2. The character of the work and equipment: 

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
3. The character of the technological process

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

4. The main unfavorable factors of the technological process

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

5. The sanitary measures at the work

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

6. Organization of labor at the industrial enterprise

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

7. The instructions about dangers of the work

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

8. The order of the administrative control

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
9. Data about breakdown in technological process

10. Data about breakage of sanitary and technological equipment

**Test questions**

1. Classification of industrial poisons.
2. Basic ways how industrial poisons enter human organism.
3. The basic mechanism, which determines a toxic transformation of a human organism.
4. Destiny of industrial poisons in a human organism.
5. Cumulation of industrial poisons in a human organism and its significance in the development of occupational poisoning.
6. The ways of industrial poison elimination from a human organism.
7. Definition of marginal concentrations of industrial poison in the working area air.
8. The procedure of hygienic investigation of cases of occupational poisonings.
9. The documents filled in in the case of the occupational poisoning.

Signature of the Teacher__________    Signature of the Student ___________
HYGIENE OF CHILDREN AND TEENAGERS

Subject 24. METHODS OF STUDY OF CHILDRENS' HEALTH UNDER INFLUENCE OF ENVIRONMENTAL FACTORS. THE METHODS OF STUDY

Learning objective

- To strengthen the theoretical knowledge about environmental factors and conditions that influence the formation of children’s health.
- To master the methods of study of the children and teenagers health and physical development.

Basics

You should know:
- Principal factors of environmental and social conditions of life, which influence the health of children and adolescents.
- Main patterns of growth, development and peculiarities of morphological and functional state of the child’s and teenager’s organism.
- Methods of studying of physical development of children and teenagers

You should have the following skills:
- Determining the health groups, somatometric, somatoscopic and physiometric indices of the children’s and adolescents’ physical development.
- Measuring main parameters of physical development of a child and a teenager

CARD

of physical development of a child and a teenager (student)

1. General data
1.1. First and second name ________________________________________________
1.2. Sex ______________________________________________________________
1.3. Age (date of birth) __________________________________________________
1.4. Nationality _________________________________________________________
1.5. Address ___________________________________________________________
1.6. Place of studying ___________________________________________________
1.7. Data about the parents:
   Mother’s profession and place of mother’s work __________________________
   Father’s profession and place of father’s work __________________________
1.8. Living conditions (presence of a separate room, a separate bed, a desk for study)
   ___________________________________________________________________
   ___________________________________________________________________
1.9. Character of nourishment (good, bad, satisfactory) ______________________
1.10. Diseases at past time ________________________________________________
1.11. Presence of chronic diseases at present _________________________________

______________________________________________________________________
2. Somatoscopic data
2.1 Constitutional type
2.2 Skeleton
2.3 Development of the musculature
2.4 Fat deposit
2.5 Color of mucosa and skin, elasticity of skin
2.6 The form of the thorax
2.7 Posture
2.8 The form of the legs
2.9 Foot-print
2.10 Sexual development

3. Somatometric data
3.1. The stature
   upright_________________________ in sitting position_______________________
3.2. The weight_______________________
3.3. The circumference of thorax
3.3.1 at maximum inspiration ________________________________
3.3.2 at maximum expiration ________________________________
3.3.3 at rest________________________________________________
3.4. The circumference of the head___________________________

4. Physiometric data
4.1. The vital capacity of lungs_______________________________
4.2. The muscular force of hands: right ___________ left ___________
4.3. The muscular force of the trunk___________________________
4.4. Pulse___________________________________________
4.5. Blood pressure_____________________________________
4.6. Respiration (number in 1 min)__________________________

Conclusion___________________________________________________________________________
__________________________________________________________________________________

Test questions
1. The methods of studying of physical development of children and teenagers and their essence.
2. The methods of measurement of stature in children and teenagers (upright and sitting); the instruments used for these measurements.
3. The methods of measurement of circumference of the thorax, head, abdomen, etc; the instruments used for these purposes.
4. The methods of measurement of weight in children and teenagers; the instruments used for this purpose.
5. The methods of measurement of muscular force in the hands and trunk.
6. The methods of determination of somatoscopic parameters of the body (posture, development of muscles, the thorax form, development of fatty tissues, degree of sexual development)

Signature of the Teacher___________ Signature of the Student ____________

80
Subject № 25: METHODS OF ESTIMATION OF PHYSICAL DEVELOPMENT OF CHILDREN AND TEENAGERS.

Learning objective
- To strengthen theoretical knowledge about main criteria and indices of the children and adolescents health and development.
- To master methods of complex assessment of the children and adolescents health and physical development.

Basics
You should know:
- Methods of estimation of physical development of children and teenagers.

You should have the following skills:
- Estimating the physical development of a child and a group of children using different methods.

Situational task 1

To estimate the physical development of a 12 year-old girl using the method of "signal deviation". The stature of the girl is 138 cm, the weight is 40.6 kg, the circumference of the thorax is 61.89 cm

<table>
<thead>
<tr>
<th>Parameter of physical development</th>
<th>Value for the child A</th>
<th>Standard value of parameter M</th>
<th>Difference Δ</th>
<th>σ</th>
<th>Signal deviation Δ / σ</th>
<th>Estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>stature</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>circumference of the thorax</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusion


Situational task 2

Draw a profile of physical development for a nine year-old boy if it is known that he has deviation by stature + 1.3σ, by weight - 0.9σ, by circumference of the thorax - 1.2σ

Stature

<table>
<thead>
<tr>
<th>-3σ</th>
<th>-2σ</th>
<th>-1σ</th>
<th>M</th>
<th>+1σ</th>
<th>+2σ</th>
<th>+3σ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Weight

<table>
<thead>
<tr>
<th>-3σ</th>
<th>-2σ</th>
<th>-1σ</th>
<th>M</th>
<th>+1σ</th>
<th>+2σ</th>
<th>+3σ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Circumference of the thorax

<table>
<thead>
<tr>
<th>-3σ</th>
<th>-2σ</th>
<th>-1σ</th>
<th>M</th>
<th>+1σ</th>
<th>+2σ</th>
<th>+3σ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Situational task 3

To give the hygienic estimations of physical development of a 7 (seven) year-old girl with the help of a "Regression scale by the stature".

Stature of the girl is 128 cm
Weight is 24 kg
Circumference of the thorax is 59 cm

<table>
<thead>
<tr>
<th>Parameter of physical development</th>
<th>Value for the child A</th>
<th>Standard value of parameter by Regression scale M</th>
<th>Difference $\Delta$</th>
<th>$\sigma_R$</th>
<th>$\Delta / \sigma_R$</th>
<th>Estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>stature</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>circumference of the thorax</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusion __________________________________________________________

____________________________________________________________________

____________________________________________________________________

Test questions

1. The methods of estimation of children’s' and teenagers' physical development.
2. The essence of the "sigmal deviation" method.
3. The essence of the graphical method.
4. The essence of "regression scale" method by stature.
5. The essence of the complex method of estimation of physical development.
6. Groups of physical development of children and teenager, when you estimate them by the method of "sigmal deviation", by the method of "regression scale by stature", by the complex method

Signature of the Teacher_____________  Signature of the Student _____________
Subject № 26: THE METHOD OF HYGIENIC ESTIMATION
OF THE SECONDARY SCHOOL DESIGN, PROVISION AND
MAINTENANCE.

Learning objective
- To strengthen the theoretical knowledge about the significance of optimal hygienic conditions
  maintenance during organization the educational process for preservation and strengthening of
  schoolchildren health, prevention of “school diseases”.
- To become familiar with methods of hygienic assessment of the land plot and the building of
  educational establishment, its main premises (school class), inspection of conditions for the
  schoolchildren, the implementation and substantiation of hygienic recommendations for improvement of
  the training and education organization.
- To master the method of hygienic assessment of school furniture.

Basics
You should know:
- Peculiarities of main environmental factors and conditions of training and education, which influence
  the children and adolescents health.
- Health disorders and diseases caused by the influence of environmental conditions, training and
  education.
- Hygienic requirements to the land plot and the building, planning, sanitary and technical infrastructure
  (microclimate parameters, illumination, ventilation, water-supply etc.) of main premises of training and
  educational establishments.

You should have the following skills:
- Drawing up the plan of inspection of training premise and filling in appropriate papers (sanitary
  description, sanitary inspection act, hygienic conclusion).
- Researching the temperature regimen, humidity and air movement, illumination, calculating the required
  and actual ventilation volume and rate (air exchange rate).
- Determining main parameters of school furniture, carrying out the school desk marking.
- Working out and substantiating preventive recommendations concerning improvement of sanitary and
  hygienic conditions of the pupils.

Act
of sanitary and hygienic inspection of secondary school
I, student (doctor in hygiene of children and teenagers) ________________________________
conducted sanitary - hygienic inspection of secondary school № __________________________
1. General information
1.1 The name of secondary school________________________________________________________
1.2 Address of secondary school________________________________________________________
1.3 Number of pupils in the school______________________________________________________
1.4 Radius of service of the school________________________________________________________
2. Sanitary inspection of the situational plan of the school
1.5 2.1 Location of the school in the city _______________________________________________
2.2 The surrounding objects and distance to them__________________________________________

Date ________
2.3 Sources of the environmental pollution and distance to them

3. Sanitary inspection of the general plan of the school
3.1 The shape of the plot of the school
3.2 Length of the plot
3.3 Width of the plot
3.4 The area of the plot
3.5 Presence and names of zones on the territory of school plot

3.6 Number of entrances to the territory of the school
3.7 The percentage of building of the territory
3.8 The percentage and location of green plantation

4. Hygienic character of school building
4.1 Distance of school building from the road "red line"
4.2 Orientation of the school building front
4.3 Number of stories
4.4 Location of the rooms on the stories
4.4.1 On the ground floor there are
4.4.2 On the first floor there are
4.4.3 On the second floor there are

4.5 Water supply and sewerage system at the school
4.6 Heating system of the school building
4.7 Character of the corridor
4.7.1 Type of the corridor
4.7.2 Length of the corridor
4.7.3 Width of the corridor
4.7.4 The corridor area
4.7.5 The corridor area per one pupil
4.7.6 The characteristic of natural lighting of the corridor
- number of windows
- height of the window
- width of the window
- the window area
- area of all windows (without the frame)
- lighting coefficient in the corridor

4.8. Character of the class-room
4.8.1 length of the class-room
4.8.2 width of the class-room
4.8.3 the class-room area
4.8.4 the class-room area per one pupil
4.8.5 natural lighting in the class-room:
- number of windows
- height of the window
- width of the window
- window area
- area of all windows (without the frame)
- lighting coefficient
4.8.6 microclimate in the class-room:
- air temperature
- air humidity
- velocity of air movement

4.9. Characteristics of the gymnasium:
4.9.1 gymnasium is situated on
4.9.2 length the gymnasium
4.9.3 width the gymnasium
4.9.4 floor area
4.9.5 floor area per one pupil
4.9.6 lighting coefficient
4.9.7 artificial lighting
4.9.8 microclimate in the gymnasium:
- air temperature
- relative humidity
- velocity of air movement
4.9.9 cloak-room for the gymnasium
4.9.10 shower-bath for the gymnasium

4.10. Characteristics of the workshop
4.10.1 length
4.10.2 width
4.10.3 floor area
4.10.4 floor area per one pupil
4.10.5 microclimate in the workshop:
- air temperature
- air humidity
- velocity of air movement
5. Additional information

___________________________________________________
_________________________________________________
______________________________________________

6. Conclusion

_________________________________________________
_________________________________________________
_________________________________________________

Scheme of internal design of the school building

Test questions

1. Hygienic requirements to the placement of schools in the city.
2. Hygienic requirements to the plot area.
3. Hygienic requirements to a school building.
4. Set of rooms in a school and their location on the stories.
5. Hygienic requirements to a class-room and its equipment.
6. Hygienic requirements to a gymnasium and its equipment.
7. Hygienic requirements to a workshop and its equipment.
8. Organization of physical training in a school.
9. Organization of pupils' work in a workshop.

Signature of the Teacher_________________ Signature of the Student ___________
Subject № 27: METHODS OF STUDYING AGE PSYCHICAL AND PHYSIOLOGICAL PECULIARITIES IN CHILDREN AND TEENAGERS. HYGIENIC ESTIMATION OF THE EDUCATIONAL AND UPBRINGING REGIMEN OF DIFFERENT CHILDREN’S GROUPS.

Learning objective
- To become familiar with methods of studying age psychological and physiological peculiarities of the organism of children and adolescents.
- To master the method of examination of children’s functional preparedness to studying at school.
- To master methods of making hygienic assessment of day regimen and time-table for different age pupils.
- To become acquainted with the method of hygienic assessment of organization of the pupils’ extra-curricular activities and free time.

Basics
You should know:
- Anatomical and physiological, psychological and physiological peculiarities of the child and adolescent organism of different age and sex.
- Medical, physiological, psychological and pedagogic assessment criteria of the child development level.
- Methods of studying of functional state of the child and adolescent organism.
- Health disorders and diseases caused by irrational organization of training and education.
- Hygienic requirements to organization of training and education, making up of time-table, organization and carrying out of the lesson, organization of the pupils’ extra-curricular activities and free time.

You should have the following skills:
- Identifying psychological and physiological peculiarities of the child’s and adolescent’s organism depending on age.
- Carrying out the hygienic assessment of functional preparedness of children to training at school.
- Performing the hygienic assessment of day regimen, time-table, school textbooks and manuals, organization and carrying out of the lesson and pupils’ extra-curricular activities and free time.

The scheme of hygienic estimation of the school time-table

1. The number of school shifts
2. The beginning of classes of the first shift
3. The end of classes of the first shift
4. The beginning of classes of the second shift
5. The end of the classes of the second shift
(You should calculate the end of the classes by yourself. For this purpose, you should sum up the time of all lessons and all breaks.)
6. The number of breaks and their duration
7. The number of lessons a day: minimal _______ maximal _______
8. The number of lessons a week
9. Study time a day: minimal _______ maximal _______
10. Study time a week
11. The number of lessons of physical training a week
On what days and at what time are there the lessons of physical training?__________
12. The number of industrial arts lessons a week
13. On what days and at what time are there the lessons of labor?

10. The number of double lessons
On what day, at what time and in what subjects are these double lessons a week?

---

### School time-table

<table>
<thead>
<tr>
<th>Monday</th>
<th>Thursday</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tuesday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wednesday</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>
Physiological curve of working capacity
(I – period of work initialization; II – period of high constant working capacity, III – period of decreasing of working capacity; a – zone of partial compensation; b – zone of final outburst; c – zone of progressive fall of working capacity)

The “Rank scale” of school subjects difficulty after Sivkov

<table>
<thead>
<tr>
<th>Name of subject</th>
<th>Level of difficulty in points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics, Russian for national schools</td>
<td>11</td>
</tr>
<tr>
<td>Foreign languages</td>
<td>10</td>
</tr>
<tr>
<td>Physics and chemistry</td>
<td>9</td>
</tr>
<tr>
<td>History</td>
<td>8</td>
</tr>
<tr>
<td>Native language and literature</td>
<td>7</td>
</tr>
<tr>
<td>Geography and biology</td>
<td>6</td>
</tr>
<tr>
<td>Physical training</td>
<td>5</td>
</tr>
<tr>
<td>Drafting</td>
<td>4</td>
</tr>
<tr>
<td>Industrial arts</td>
<td>3</td>
</tr>
<tr>
<td>Drawing</td>
<td>2</td>
</tr>
<tr>
<td>Singing</td>
<td>1</td>
</tr>
</tbody>
</table>
15. Draw a graph of distribution of school subjects according to the «Rank scale» of school subjects difficulty " for every weekday.

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16. Distribution of school subjects according to the «Rank scale» of their difficulty for a week

![Graph](image-url)
Test questions

1. The physiological curve of the working ability and its substantiation.
2. The main peculiarities of educational process at school.
3. Regimen of a day. Principles of the day regimen construction.
4. Hygienic requirements to the day regimen.
5. Hygienic requirements to the school time-table.
6. The "Rank scale" of difficulty of the school subjects.

Signature of the Teacher__________  Signature of the Student ___________
### INFORMATION AND REFERENCE MATERIALS

Determination of the relative humidity based on the Assmann psychrometer data, %

<table>
<thead>
<tr>
<th>Dry thermometer reading, °C</th>
<th>10.0</th>
<th>11.0</th>
<th>12.0</th>
<th>13.0</th>
<th>14.0</th>
<th>15.0</th>
<th>16.0</th>
<th>17.0</th>
<th>18.0</th>
<th>19.0</th>
<th>20.0</th>
<th>21.0</th>
<th>22.0</th>
<th>23.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.0</td>
<td>46</td>
<td>54</td>
<td>63</td>
<td>71</td>
<td>81</td>
<td>90</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.0</td>
<td>39</td>
<td>47</td>
<td>55</td>
<td>64</td>
<td>72</td>
<td>81</td>
<td>90</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.0</td>
<td>34</td>
<td>41</td>
<td>49</td>
<td>56</td>
<td>65</td>
<td>73</td>
<td>82</td>
<td>91</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.0</td>
<td>29</td>
<td>36</td>
<td>43</td>
<td>50</td>
<td>58</td>
<td>66</td>
<td>74</td>
<td>82</td>
<td>91</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.0</td>
<td>24</td>
<td>30</td>
<td>37</td>
<td>44</td>
<td>52</td>
<td>60</td>
<td>68</td>
<td>76</td>
<td>84</td>
<td>92</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.0</td>
<td>20</td>
<td>26</td>
<td>32</td>
<td>39</td>
<td>46</td>
<td>53</td>
<td>60</td>
<td>67</td>
<td>75</td>
<td>83</td>
<td>91</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.0</td>
<td>16</td>
<td>22</td>
<td>28</td>
<td>34</td>
<td>40</td>
<td>47</td>
<td>54</td>
<td>61</td>
<td>68</td>
<td>75</td>
<td>82</td>
<td>90</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>23.0</td>
<td>13</td>
<td>18</td>
<td>24</td>
<td>30</td>
<td>36</td>
<td>42</td>
<td>48</td>
<td>55</td>
<td>62</td>
<td>69</td>
<td>76</td>
<td>83</td>
<td>90</td>
<td>98</td>
</tr>
<tr>
<td>24.0</td>
<td>15</td>
<td>20</td>
<td>26</td>
<td>31</td>
<td>37</td>
<td>43</td>
<td>49</td>
<td>55</td>
<td>62</td>
<td>69</td>
<td>76</td>
<td>83</td>
<td>90</td>
<td>98</td>
</tr>
<tr>
<td>25.0</td>
<td>17</td>
<td>22</td>
<td>27</td>
<td>33</td>
<td>38</td>
<td>44</td>
<td>50</td>
<td>57</td>
<td>63</td>
<td>70</td>
<td>77</td>
<td>84</td>
<td>91</td>
<td>98</td>
</tr>
<tr>
<td>26.0</td>
<td>14</td>
<td>19</td>
<td>24</td>
<td>29</td>
<td>34</td>
<td>40</td>
<td>46</td>
<td>52</td>
<td>58</td>
<td>64</td>
<td>71</td>
<td>77</td>
<td>84</td>
<td>91</td>
</tr>
<tr>
<td>27.0</td>
<td>16</td>
<td>21</td>
<td>25</td>
<td>30</td>
<td>36</td>
<td>41</td>
<td>47</td>
<td>52</td>
<td>58</td>
<td>64</td>
<td>71</td>
<td>77</td>
<td>84</td>
<td>91</td>
</tr>
<tr>
<td>28.0</td>
<td>13</td>
<td>17</td>
<td>22</td>
<td>26</td>
<td>31</td>
<td>36</td>
<td>42</td>
<td>46</td>
<td>52</td>
<td>58</td>
<td>65</td>
<td>71</td>
<td>77</td>
<td>84</td>
</tr>
<tr>
<td>29.0</td>
<td>14</td>
<td>18</td>
<td>22</td>
<td>27</td>
<td>33</td>
<td>37</td>
<td>42</td>
<td>46</td>
<td>52</td>
<td>58</td>
<td>65</td>
<td>71</td>
<td>77</td>
<td>84</td>
</tr>
<tr>
<td>30.0</td>
<td>15</td>
<td>19</td>
<td>24</td>
<td>29</td>
<td>33</td>
<td>37</td>
<td>42</td>
<td>46</td>
<td>52</td>
<td>58</td>
<td>65</td>
<td>71</td>
<td>77</td>
<td>84</td>
</tr>
<tr>
<td>31.0</td>
<td>16</td>
<td>21</td>
<td>25</td>
<td>29</td>
<td>33</td>
<td>36</td>
<td>40</td>
<td>46</td>
<td>52</td>
<td>58</td>
<td>65</td>
<td>71</td>
<td>77</td>
<td>84</td>
</tr>
</tbody>
</table>

### Table of tangents

<table>
<thead>
<tr>
<th>( \text{tg} \alpha )</th>
<th>( \angle \alpha^0 )</th>
<th>( \text{tg} \alpha )</th>
<th>( \angle \alpha^0 )</th>
<th>( \text{tg} \alpha )</th>
<th>( \angle \alpha^0 )</th>
<th>( \text{tg} \alpha )</th>
<th>( \angle \alpha^0 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0175</td>
<td>1</td>
<td>0.2867</td>
<td>16</td>
<td>0.6009</td>
<td>31</td>
<td>1.0355</td>
<td>46</td>
</tr>
<tr>
<td>0.0349</td>
<td>2</td>
<td>0.3057</td>
<td>17</td>
<td>0.6249</td>
<td>32</td>
<td>1.1106</td>
<td>48</td>
</tr>
<tr>
<td>0.0524</td>
<td>3</td>
<td>0.3249</td>
<td>18</td>
<td>0.6494</td>
<td>33</td>
<td>1.1918</td>
<td>50</td>
</tr>
<tr>
<td>0.0699</td>
<td>4</td>
<td>0.3443</td>
<td>19</td>
<td>0.6745</td>
<td>34</td>
<td>1.2799</td>
<td>52</td>
</tr>
<tr>
<td>0.0875</td>
<td>5</td>
<td>0.3640</td>
<td>20</td>
<td>0.7002</td>
<td>35</td>
<td>1.3764</td>
<td>54</td>
</tr>
<tr>
<td>0.1051</td>
<td>6</td>
<td>0.3839</td>
<td>21</td>
<td>0.7265</td>
<td>36</td>
<td>1.4826</td>
<td>56</td>
</tr>
<tr>
<td>0.1228</td>
<td>7</td>
<td>0.4040</td>
<td>22</td>
<td>0.7536</td>
<td>37</td>
<td>1.6003</td>
<td>58</td>
</tr>
<tr>
<td>0.1405</td>
<td>8</td>
<td>0.4245</td>
<td>23</td>
<td>0.7813</td>
<td>38</td>
<td>1.732</td>
<td>60</td>
</tr>
<tr>
<td>0.1584</td>
<td>9</td>
<td>0.4452</td>
<td>24</td>
<td>0.8098</td>
<td>39</td>
<td>1.881</td>
<td>62</td>
</tr>
<tr>
<td>0.1763</td>
<td>10</td>
<td>0.4663</td>
<td>25</td>
<td>0.8391</td>
<td>40</td>
<td>2.050</td>
<td>64</td>
</tr>
<tr>
<td>0.1944</td>
<td>11</td>
<td>0.4877</td>
<td>26</td>
<td>0.8693</td>
<td>41</td>
<td>2.246</td>
<td>66</td>
</tr>
<tr>
<td>0.2126</td>
<td>12</td>
<td>0.5095</td>
<td>27</td>
<td>0.9004</td>
<td>42</td>
<td>2.475</td>
<td>68</td>
</tr>
<tr>
<td>0.2309</td>
<td>13</td>
<td>0.5317</td>
<td>28</td>
<td>0.9325</td>
<td>43</td>
<td>2.747</td>
<td>70</td>
</tr>
<tr>
<td>0.2493</td>
<td>14</td>
<td>0.5543</td>
<td>29</td>
<td>0.9657</td>
<td>44</td>
<td>3.078</td>
<td>72</td>
</tr>
<tr>
<td>0.2679</td>
<td>15</td>
<td>0.5774</td>
<td>30</td>
<td>1.0000</td>
<td>45</td>
<td>3.487</td>
<td>74</td>
</tr>
</tbody>
</table>
Calculations for the formula of the air movement speed less than 1 m/sec considering the allowance for temperature

<table>
<thead>
<tr>
<th>(H/Q)</th>
<th>10</th>
<th>12.5</th>
<th>15</th>
<th>17.5</th>
<th>20</th>
<th>22.5</th>
<th>25</th>
<th>26</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.044</td>
<td>0.047</td>
<td>0.051</td>
<td>0.059</td>
</tr>
<tr>
<td>0.28</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.049</td>
<td>0.051</td>
<td>0.061</td>
<td>0.070</td>
</tr>
<tr>
<td>0.29</td>
<td>0.041</td>
<td>0.050</td>
<td>0.051</td>
<td>0.060</td>
<td>0.067</td>
<td>0.076</td>
<td>0.085</td>
<td>0.089</td>
</tr>
<tr>
<td>0.30</td>
<td>0.051</td>
<td>0.060</td>
<td>0.065</td>
<td>0.073</td>
<td>0.082</td>
<td>0.091</td>
<td>0.101</td>
<td>0.104</td>
</tr>
<tr>
<td>0.31</td>
<td>0.061</td>
<td>0.070</td>
<td>0.079</td>
<td>0.088</td>
<td>0.098</td>
<td>0.107</td>
<td>0.116</td>
<td>0.119</td>
</tr>
<tr>
<td>0.32</td>
<td>0.076</td>
<td>0.085</td>
<td>0.094</td>
<td>0.104</td>
<td>0.113</td>
<td>0.124</td>
<td>0.136</td>
<td>0.140</td>
</tr>
<tr>
<td>0.33</td>
<td>0.091</td>
<td>0.101</td>
<td>0.110</td>
<td>0.119</td>
<td>0.128</td>
<td>0.140</td>
<td>0.153</td>
<td>0.159</td>
</tr>
<tr>
<td>0.34</td>
<td>0.107</td>
<td>0.115</td>
<td>0.129</td>
<td>0.139</td>
<td>0.148</td>
<td>0.160</td>
<td>0.174</td>
<td>0.179</td>
</tr>
<tr>
<td>0.35</td>
<td>0.127</td>
<td>0.136</td>
<td>0.145</td>
<td>0.154</td>
<td>0.167</td>
<td>0.180</td>
<td>0.196</td>
<td>0.203</td>
</tr>
<tr>
<td>0.36</td>
<td>0.142</td>
<td>0.151</td>
<td>0.165</td>
<td>0.19</td>
<td>0.192</td>
<td>0.206</td>
<td>0.220</td>
<td>0.225</td>
</tr>
<tr>
<td>0.37</td>
<td>0.163</td>
<td>0.172</td>
<td>0.185</td>
<td>0.198</td>
<td>0.212</td>
<td>0.226</td>
<td>0.266</td>
<td>0.245</td>
</tr>
<tr>
<td>0.38</td>
<td>0.183</td>
<td>0.197</td>
<td>0.210</td>
<td>0.223</td>
<td>0.239</td>
<td>0.249</td>
<td>0.240</td>
<td>0.273</td>
</tr>
<tr>
<td>0.39</td>
<td>0.208</td>
<td>0.222</td>
<td>0.232</td>
<td>0.244</td>
<td>0.257</td>
<td>0.274</td>
<td>0.266</td>
<td>0.301</td>
</tr>
<tr>
<td>0.40</td>
<td>0.229</td>
<td>0.242</td>
<td>0.256</td>
<td>0.269</td>
<td>0.287</td>
<td>0.305</td>
<td>0.293</td>
<td>0.330</td>
</tr>
<tr>
<td>0.41</td>
<td>0.254</td>
<td>0.267</td>
<td>0.282</td>
<td>0.299</td>
<td>0.314</td>
<td>0.330</td>
<td>0.323</td>
<td>0.364</td>
</tr>
<tr>
<td>0.42</td>
<td>0.280</td>
<td>0.293</td>
<td>0.311</td>
<td>0.325</td>
<td>0.343</td>
<td>0.361</td>
<td>0.349</td>
<td>0.386</td>
</tr>
<tr>
<td>0.43</td>
<td>0.310</td>
<td>0.324</td>
<td>0.342</td>
<td>0.356</td>
<td>0.373</td>
<td>0.392</td>
<td>0.379</td>
<td>0.417</td>
</tr>
<tr>
<td>0.44</td>
<td>0.340</td>
<td>0.354</td>
<td>0.368</td>
<td>0.385</td>
<td>0.401</td>
<td>0.417</td>
<td>0.410</td>
<td>0.449</td>
</tr>
<tr>
<td>0.45</td>
<td>0.366</td>
<td>0.381</td>
<td>0.398</td>
<td>0.412</td>
<td>0.429</td>
<td>0.449</td>
<td>0.445</td>
<td>0.478</td>
</tr>
<tr>
<td>0.46</td>
<td>0.396</td>
<td>0.415</td>
<td>0.429</td>
<td>0.446</td>
<td>0.465</td>
<td>0.483</td>
<td>0.471</td>
<td>0.508</td>
</tr>
<tr>
<td>0.47</td>
<td>0.427</td>
<td>0.445</td>
<td>0.464</td>
<td>0.482</td>
<td>0.500</td>
<td>0.518</td>
<td>0.501</td>
<td>0.544</td>
</tr>
<tr>
<td>0.48</td>
<td>0.468</td>
<td>0.480</td>
<td>0.499</td>
<td>0.513</td>
<td>0.531</td>
<td>0.551</td>
<td>0.537</td>
<td>0.579</td>
</tr>
<tr>
<td>0.49</td>
<td>0.503</td>
<td>0.516</td>
<td>0.535</td>
<td>0.556</td>
<td>0.571</td>
<td>0.590</td>
<td>0.572</td>
<td>0.615</td>
</tr>
<tr>
<td>0.50</td>
<td>0.539</td>
<td>0.557</td>
<td>0.571</td>
<td>0.589</td>
<td>0.604</td>
<td>0.622</td>
<td>0.608</td>
<td>0.651</td>
</tr>
<tr>
<td>0.51</td>
<td>0.574</td>
<td>0.593</td>
<td>0.607</td>
<td>0.628</td>
<td>0.648</td>
<td>0.666</td>
<td>0.640</td>
<td>0.691</td>
</tr>
<tr>
<td>0.52</td>
<td>0.615</td>
<td>0.633</td>
<td>0.644</td>
<td>0.665</td>
<td>0.683</td>
<td>0.701</td>
<td>0.684</td>
<td>0.727</td>
</tr>
<tr>
<td>0.53</td>
<td>0.656</td>
<td>0.674</td>
<td>0.688</td>
<td>0.705</td>
<td>0.724</td>
<td>0.742</td>
<td>0.720</td>
<td>0.768</td>
</tr>
<tr>
<td>0.54</td>
<td>0.696</td>
<td>0.715</td>
<td>0.729</td>
<td>0.746</td>
<td>0.764</td>
<td>0.783</td>
<td>0.760</td>
<td>0.808</td>
</tr>
<tr>
<td>0.55</td>
<td>0.737</td>
<td>0.755</td>
<td>0.770</td>
<td>0.790</td>
<td>0.827</td>
<td>0.827</td>
<td>0.801</td>
<td>0.851</td>
</tr>
<tr>
<td>0.56</td>
<td>0.788</td>
<td>0.801</td>
<td>0.815</td>
<td>0.833</td>
<td>0.851</td>
<td>0.867</td>
<td>0.844</td>
<td>0.894</td>
</tr>
<tr>
<td>0.57</td>
<td>0.834</td>
<td>0.852</td>
<td>0.867</td>
<td>0.882</td>
<td>0.898</td>
<td>0.915</td>
<td>0.933</td>
<td>0.940</td>
</tr>
<tr>
<td>0.58</td>
<td>0.879</td>
<td>0.898</td>
<td>0.912</td>
<td>0.929</td>
<td>0.941</td>
<td>0.959</td>
<td>0.972</td>
<td>0.977</td>
</tr>
<tr>
<td>0.59</td>
<td>0.930</td>
<td>0.943</td>
<td>0.957</td>
<td>0.971</td>
<td>0.985</td>
<td>1.001</td>
<td>1.018</td>
<td>1.023</td>
</tr>
<tr>
<td>0.60</td>
<td>0.981</td>
<td>0.994</td>
<td>1.008</td>
<td>1.022</td>
<td>1.033</td>
<td>1.044</td>
<td>1.056</td>
<td>1.060</td>
</tr>
</tbody>
</table>
Nomogram of the effective temperature determination

Standards of the general artificial illumination

<table>
<thead>
<tr>
<th>Premises</th>
<th>The smallest illumination, lux</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Luminescent lamps</td>
</tr>
<tr>
<td>Rooms and kitchens of dwelling houses</td>
<td>75</td>
</tr>
<tr>
<td>Classrooms</td>
<td>300</td>
</tr>
<tr>
<td>Rooms of technical drawing</td>
<td>500</td>
</tr>
<tr>
<td>School workshops</td>
<td>300</td>
</tr>
<tr>
<td>Public reading halls</td>
<td>300</td>
</tr>
<tr>
<td>Operating and sectional rooms</td>
<td>300</td>
</tr>
<tr>
<td>Delivery room, dressing ward, manipulation room</td>
<td>400</td>
</tr>
<tr>
<td>Pre-operative room</td>
<td>300</td>
</tr>
<tr>
<td>Surgeon’s, obstetritian-gynecologist’s, pediatrician’s, infectionist’s, dentist’s room</td>
<td>500</td>
</tr>
<tr>
<td>X-ray room</td>
<td>-</td>
</tr>
<tr>
<td>Functional diagnostics room</td>
<td>-</td>
</tr>
<tr>
<td>Wards for newly-born babies, postoperative rooms</td>
<td>150</td>
</tr>
</tbody>
</table>
Nomogram of the resultant temperature determination
(a – during light work; b – during hard work)
Coefficients for conversion the air volumes to their values in standard conditions

<table>
<thead>
<tr>
<th>Temperature, °C</th>
<th>1 + at</th>
<th>Temperature, °C</th>
<th>1 + at</th>
<th>Atmospheric pressure, Hg mm.</th>
<th>B 760</th>
<th>Atmospheric pressure, Hg mm.</th>
<th>B 760</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>0.98535</td>
<td>16</td>
<td>1.0586</td>
<td>741</td>
<td>0.975</td>
<td>761</td>
<td>1.0013</td>
</tr>
<tr>
<td>-3</td>
<td>0.9890</td>
<td>17</td>
<td>1.0623</td>
<td>742</td>
<td>0.976</td>
<td>762</td>
<td>1.0026</td>
</tr>
<tr>
<td>-2</td>
<td>0.9927</td>
<td>18</td>
<td>1.0660</td>
<td>743</td>
<td>0.978</td>
<td>763</td>
<td>1.0039</td>
</tr>
<tr>
<td>-1</td>
<td>0.9963</td>
<td>19</td>
<td>1.0696</td>
<td>744</td>
<td>0.979</td>
<td>764</td>
<td>1.0053</td>
</tr>
<tr>
<td>0</td>
<td>1.000</td>
<td>20</td>
<td>1.0733</td>
<td>745</td>
<td>0.980</td>
<td>765</td>
<td>1.0066</td>
</tr>
<tr>
<td>1</td>
<td>1.0037</td>
<td>21</td>
<td>1.0770</td>
<td>746</td>
<td>0.982</td>
<td>766</td>
<td>1.0079</td>
</tr>
<tr>
<td>2</td>
<td>1.0073</td>
<td>22</td>
<td>1.0806</td>
<td>747</td>
<td>0.983</td>
<td>767</td>
<td>1.0092</td>
</tr>
<tr>
<td>3</td>
<td>1.0010</td>
<td>23</td>
<td>1.0843</td>
<td>748</td>
<td>0.984</td>
<td>768</td>
<td>1.0105</td>
</tr>
<tr>
<td>4</td>
<td>1.0147</td>
<td>24</td>
<td>1.0880</td>
<td>749</td>
<td>0.986</td>
<td>769</td>
<td>1.0118</td>
</tr>
<tr>
<td>5</td>
<td>1.0183</td>
<td>25</td>
<td>1.0917</td>
<td>750</td>
<td>0.987</td>
<td>770</td>
<td>1.0132</td>
</tr>
<tr>
<td>6</td>
<td>1.0220</td>
<td>26</td>
<td>1.0953</td>
<td>751</td>
<td>0.988</td>
<td>771</td>
<td>1.0145</td>
</tr>
<tr>
<td>7</td>
<td>1.0257</td>
<td>27</td>
<td>1.0990</td>
<td>752</td>
<td>0.989</td>
<td>772</td>
<td>1.0158</td>
</tr>
<tr>
<td>8</td>
<td>1.0293</td>
<td>28</td>
<td>1.1027</td>
<td>753</td>
<td>0.991</td>
<td>773</td>
<td>1.0171</td>
</tr>
<tr>
<td>9</td>
<td>1.0330</td>
<td>29</td>
<td>1.1063</td>
<td>754</td>
<td>0.992</td>
<td>774</td>
<td>1.0184</td>
</tr>
<tr>
<td>10</td>
<td>1.0367</td>
<td>30</td>
<td>1.1100</td>
<td>755</td>
<td>0.993</td>
<td>775</td>
<td>1.0197</td>
</tr>
<tr>
<td>11</td>
<td>1.0403</td>
<td>31</td>
<td>1.1137</td>
<td>756</td>
<td>0.995</td>
<td>776</td>
<td>1.0211</td>
</tr>
<tr>
<td>12</td>
<td>1.0440</td>
<td>32</td>
<td>1.1173</td>
<td>757</td>
<td>0.996</td>
<td>777</td>
<td>1.0224</td>
</tr>
<tr>
<td>13</td>
<td>1.0476</td>
<td>33</td>
<td>1.1210</td>
<td>758</td>
<td>0.997</td>
<td>778</td>
<td>1.0237</td>
</tr>
<tr>
<td>14</td>
<td>10513</td>
<td>34</td>
<td>1.1247</td>
<td>759</td>
<td>0.999</td>
<td>779</td>
<td>1.0250</td>
</tr>
<tr>
<td>15</td>
<td>10550</td>
<td>35</td>
<td>1.1283</td>
<td>760</td>
<td>1.000</td>
<td>780</td>
<td>1.0263</td>
</tr>
</tbody>
</table>

Air temperature in dwelling
(for cold period of year)

<table>
<thead>
<tr>
<th>Premises</th>
<th>Air temperature, °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living room (in flat and hostel)</td>
<td>18-20</td>
</tr>
<tr>
<td>Kitchen</td>
<td>18</td>
</tr>
<tr>
<td>Bath-room and shower-stall</td>
<td>25</td>
</tr>
<tr>
<td>Cloak-room</td>
<td>16-18</td>
</tr>
<tr>
<td>Toilet with bath-room</td>
<td>25</td>
</tr>
<tr>
<td>Wash-room</td>
<td>18</td>
</tr>
<tr>
<td>Hall, corridor</td>
<td>16</td>
</tr>
<tr>
<td>Premises for rest and study in a hostel</td>
<td>18</td>
</tr>
<tr>
<td>Isolation ward in a hostel</td>
<td>20</td>
</tr>
<tr>
<td>Administrative room in a hostel</td>
<td>18</td>
</tr>
</tbody>
</table>

96
## Hygienic Standards of drinking water quality

according to State Sanitary Rules and Norms 2.2.4-171-10

“Hygienic Requirements of Drinking water destined for person’ consumption”

### 1. Sanitary-chemical indices

#### Organoleptic and physical properties

<table>
<thead>
<tr>
<th>Index</th>
<th>Hygienic norm for water-pipe</th>
<th>for wells and capitation of springs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smell (at 20° C and 60° C)</td>
<td>not more than 2 points</td>
<td>not more than 3 points</td>
</tr>
<tr>
<td>Taste and aftertaste (at 20° C)</td>
<td>not more than 2 points</td>
<td>not more than 3 points</td>
</tr>
<tr>
<td>Color quantity</td>
<td>not more than 20°</td>
<td>not more than 35°</td>
</tr>
<tr>
<td>Feculence</td>
<td>not more than 1.0 NUF</td>
<td>not more than 3.5 NUF</td>
</tr>
</tbody>
</table>

#### Physico-chemical indices

<table>
<thead>
<tr>
<th>Index</th>
<th>Hygienic norm for water-pipe</th>
<th>for wells and capitation of springs</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>6.5-8.5</td>
<td>6.5-8.5</td>
</tr>
<tr>
<td>Iron (Fe)</td>
<td>not more than 0.2 mg/dm³</td>
<td>not more than 1.0 mg/dm³</td>
</tr>
<tr>
<td>General hardness</td>
<td>not more than 7.0 mmol/ dm³</td>
<td>not more than 10.0 mmol/ dm³</td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>not more than 0.05 mg/dm³</td>
<td>not more than 0.5 mg/dm³</td>
</tr>
<tr>
<td>Copper (Cu²⁺)</td>
<td>not more than 1.0 mg/dm³</td>
<td>not determined</td>
</tr>
<tr>
<td>Polylphosphates (by PO₄³⁻)</td>
<td>not more than 3.5 mg/dm³</td>
<td>not determined</td>
</tr>
<tr>
<td>Sulphates (SO₄²⁻)</td>
<td>not more than 250 mg/dm³</td>
<td>not more than 500 mg/dm³</td>
</tr>
<tr>
<td>Dry residue</td>
<td>not more than 1000 mg/dm³</td>
<td>not more than 1500 mg/dm³</td>
</tr>
<tr>
<td>Residual uncombined chlorine</td>
<td>not more than 0.5 mg/dm³</td>
<td>not more than 0.5 mg/dm³</td>
</tr>
<tr>
<td>Chlorides (Cl⁻)</td>
<td>not more than 250 mg/dm³</td>
<td>not more than 350 mg/dm³</td>
</tr>
<tr>
<td>Zinc (Zn²⁺)</td>
<td>not more than 1.0 mg/dm³</td>
<td>not determined</td>
</tr>
</tbody>
</table>

#### Microbiological indices

<table>
<thead>
<tr>
<th>Index</th>
<th>Hygienic norm for water-pipe</th>
<th>for wells and capitation of springs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total microbial number</td>
<td>not more than 100 CFU/cm³</td>
<td>not determined</td>
</tr>
<tr>
<td>E.coli</td>
<td>absence in 100 cm³</td>
<td>absence in 100 cm³</td>
</tr>
<tr>
<td>Entherococci</td>
<td>absence in 100 cm³</td>
<td>not determined</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>absence in 100 cm³</td>
<td>not determined</td>
</tr>
<tr>
<td>Pathogenic entherobacteria</td>
<td>absence in 1 dm³</td>
<td>absence in 1 dm³</td>
</tr>
<tr>
<td>Coliphage</td>
<td>absence in 100 cm³</td>
<td>absence in 100 cm³</td>
</tr>
<tr>
<td>Entheroviruses, adenoviruses</td>
<td>absence in 100 cm³</td>
<td>absence in 100 cm³</td>
</tr>
<tr>
<td>and so on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pathogenic intestinal protozoa</td>
<td>absence in 50 dm³</td>
<td>absence in 50 dm³</td>
</tr>
<tr>
<td>intestinal helmints</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Toxicological indices

<table>
<thead>
<tr>
<th>Index</th>
<th>Hygienic norm for water-pipe</th>
<th>Hygienic norm for wells and captation of springs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum (Al)</td>
<td>not more than 0.2 mg/dm³</td>
<td>not determined</td>
</tr>
<tr>
<td>Ammonia</td>
<td>not more than 0.5 mg/dm³</td>
<td>not more than 2.6 mg/dm³</td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>not more than 0.001 mg/dm³</td>
<td>not determined</td>
</tr>
<tr>
<td>Silicon (Si)</td>
<td>not more than 10 mg/dm³</td>
<td>not determined</td>
</tr>
<tr>
<td>Arsenic (As)</td>
<td>not more than 0.01 mg/dm³</td>
<td>not determined</td>
</tr>
<tr>
<td>Molybdenum (Mo)</td>
<td>not more than 0.07 mg/dm³</td>
<td>not determined</td>
</tr>
<tr>
<td>Nitrites (by NO₃⁻)</td>
<td>not more than 50 mg/dm³</td>
<td>not more than 50 mg/dm³</td>
</tr>
<tr>
<td>Nitrites (NO₂⁻)</td>
<td>not more than 0.5 mg/dm³</td>
<td>not more than 3.3 mg/dm³</td>
</tr>
<tr>
<td>Residual ozone (O₃)</td>
<td>0.1-0.3 mg/dm³</td>
<td>not determined</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>not more than 0.0005 mg/dm³</td>
<td>not determined</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>not more than 0.01 mg/dm³</td>
<td>not determined</td>
</tr>
<tr>
<td>Fluoride (F⁻)</td>
<td>I and II climatic zone - not more than 1.5 mg/dm³</td>
<td>not more than 1.5 mg/dm³</td>
</tr>
<tr>
<td></td>
<td>III climatic zone - not more than 1.2 mg/dm³</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IV climatic zone - not more than 0.7 mg/dm³</td>
<td></td>
</tr>
<tr>
<td>Residual polyacrylamide</td>
<td>not more than 2.0 mg/dm³</td>
<td>not determined</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>not more than 0.05 mg/dm³</td>
<td>not determined</td>
</tr>
<tr>
<td>Chloroform</td>
<td>not more than 60 mg/dm³</td>
<td>not determined</td>
</tr>
<tr>
<td>Permanganate oxidability</td>
<td>not more than 5.0 mg/dm³</td>
<td>not more than 5.0 mg/dm³</td>
</tr>
</tbody>
</table>

## Scale for assessment of sanitary state of soil*

<table>
<thead>
<tr>
<th>Danger level</th>
<th>Level of pollution</th>
<th>Coli titer</th>
<th>Anaerobe titer</th>
<th>Number of eggs of helminthes in 1 kg of soil</th>
<th>Number of larvae and chrysalides of flies on 0.25 m²</th>
<th>Sanitary number of Khlebnikoff’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe</td>
<td>Pure</td>
<td>1.0 and more</td>
<td>0.1 and more</td>
<td>0</td>
<td>0</td>
<td>0.98-1.0</td>
</tr>
<tr>
<td>Relatively safe</td>
<td>Slightly polluted</td>
<td>1.0-0.01</td>
<td>0.1-0.01</td>
<td>less than 10</td>
<td>single specimen</td>
<td>0.86-0.98</td>
</tr>
<tr>
<td>Dangerous</td>
<td>Polluted</td>
<td>0.01-0.001</td>
<td>0.01-0.0001</td>
<td>11-100</td>
<td>10-25</td>
<td>0.70-0.86</td>
</tr>
<tr>
<td>Very dangerous</td>
<td>Heavily polluted</td>
<td>0.001 and less</td>
<td>0.0001 and less</td>
<td>more than 100</td>
<td>25 and more</td>
<td>&lt;0.70</td>
</tr>
</tbody>
</table>

*Under condition of soil sampling in the depth of 0-20 cm
# Professional groups of workers

<table>
<thead>
<tr>
<th>1&lt;sup&gt;st&lt;/sup&gt; group</th>
<th>Workers occupied with mental work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Engineers, teachers, physicians (except surgeons), chiefs of enterprises, scientific workers, secretaries, students, managers of industrial enterprises, literature workers, businessmen, controllers, laboratory assistants.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2&lt;sup&gt;nd&lt;/sup&gt; group</th>
<th>Workers occupied with light physical work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coaches, workers of automatic industrial process, clothing-industry workers, agronomists, salespeople, stock-breeders, junior nurses, trainers, nurses.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3&lt;sup&gt;rd&lt;/sup&gt; group</th>
<th>Workers occupied with not hard work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drivers, cooks, shoe-makers, surgeons, fitters, adjusters, chemists, textile-workers, workers of public nutrition, salespeople in food shops, water-transport workers, railway men.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4&lt;sup&gt;th&lt;/sup&gt; group</th>
<th>Workers occupied with hard physical work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dockers, builders, metallurgists, riggers, miners, steel-makers, foundry men.</td>
</tr>
</tbody>
</table>
### Daily caloric value and quantity of proteins, fats and carbohydrates for different professional groups of population (men)

<table>
<thead>
<tr>
<th>Professional groups</th>
<th>Coefficient of physical activity</th>
<th>Age (years)</th>
<th>Caloricity (Kcal)</th>
<th>Proteins (g)</th>
<th>Fats (g)</th>
<th>Carbohydrates (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>1.4</td>
<td>18-29</td>
<td>2450</td>
<td>67</td>
<td>37</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30-39</td>
<td>2300</td>
<td>63</td>
<td>35</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40-59</td>
<td>2100</td>
<td>58</td>
<td>32</td>
<td>58</td>
</tr>
<tr>
<td>II</td>
<td>1.6</td>
<td>18-29</td>
<td>2800</td>
<td>77</td>
<td>42</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30-39</td>
<td>2650</td>
<td>73</td>
<td>40</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40-59</td>
<td>2500</td>
<td>69</td>
<td>38</td>
<td>69</td>
</tr>
<tr>
<td>III</td>
<td>1.9</td>
<td>18-29</td>
<td>3300</td>
<td>91</td>
<td>50</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30-39</td>
<td>3150</td>
<td>87</td>
<td>48</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40-59</td>
<td>2950</td>
<td>81</td>
<td>45</td>
<td>82</td>
</tr>
<tr>
<td>IV</td>
<td>2.3</td>
<td>18-29</td>
<td>3900</td>
<td>107</td>
<td>59</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30-39</td>
<td>3700</td>
<td>102</td>
<td>56</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40-59</td>
<td>3500</td>
<td>96</td>
<td>53</td>
<td>97</td>
</tr>
</tbody>
</table>

### Daily caloric value and quantity of proteins, fats and carbohydrates for different professional groups of population (women)

<table>
<thead>
<tr>
<th>Professional groups</th>
<th>Coefficient of physical activity</th>
<th>Age (years)</th>
<th>Caloricity (Kcal)</th>
<th>Proteins (g)</th>
<th>Fats (g)</th>
<th>Carbohydrates (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>1.4</td>
<td>18-29</td>
<td>2000</td>
<td>55</td>
<td>30</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30-39</td>
<td>1900</td>
<td>52</td>
<td>29</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40-59</td>
<td>1800</td>
<td>50</td>
<td>28</td>
<td>51</td>
</tr>
<tr>
<td>II</td>
<td>1.6</td>
<td>18-29</td>
<td>2200</td>
<td>61</td>
<td>34</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30-39</td>
<td>2150</td>
<td>59</td>
<td>32</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40-59</td>
<td>2100</td>
<td>58</td>
<td>32</td>
<td>59</td>
</tr>
<tr>
<td>III</td>
<td>1.9</td>
<td>18-29</td>
<td>2600</td>
<td>72</td>
<td>40</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30-39</td>
<td>2550</td>
<td>72</td>
<td>39</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40-59</td>
<td>2500</td>
<td>69</td>
<td>38</td>
<td>70</td>
</tr>
<tr>
<td>IV</td>
<td>2.2</td>
<td>18-29</td>
<td>3050</td>
<td>84</td>
<td>46</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30-39</td>
<td>2950</td>
<td>81</td>
<td>45</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40-59</td>
<td>2850</td>
<td>78</td>
<td>43</td>
<td>79</td>
</tr>
</tbody>
</table>
### Daily need of vitamins for different professional groups of population (men)

<table>
<thead>
<tr>
<th>Professional groups</th>
<th>Coefficient of physical activity</th>
<th>Vitamins</th>
<th>E</th>
<th>D</th>
<th>A</th>
<th>B₁</th>
<th>B₂</th>
<th>B₆</th>
<th>PP</th>
<th>Folat</th>
<th>B₁₂</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>mg</td>
<td>mcg</td>
<td>mcg</td>
<td>mg</td>
<td>mg</td>
<td>mg</td>
<td>mg</td>
<td>mcg</td>
<td>mcg</td>
<td>mg</td>
</tr>
<tr>
<td>I</td>
<td>1.4</td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.6</td>
<td>2.0</td>
<td>2.0</td>
<td>22</td>
<td>250</td>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.6</td>
<td>2.0</td>
<td>2.0</td>
<td>22</td>
<td>250</td>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.6</td>
<td>2.0</td>
<td>2.0</td>
<td>22</td>
<td>250</td>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td>II</td>
<td>1.6</td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.6</td>
<td>2.0</td>
<td>2.0</td>
<td>22</td>
<td>250</td>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.6</td>
<td>2.0</td>
<td>2.0</td>
<td>22</td>
<td>250</td>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.6</td>
<td>2.0</td>
<td>2.0</td>
<td>22</td>
<td>250</td>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td>III</td>
<td>1.9</td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.6</td>
<td>2.0</td>
<td>2.0</td>
<td>22</td>
<td>250</td>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.6</td>
<td>2.0</td>
<td>2.0</td>
<td>22</td>
<td>250</td>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.6</td>
<td>2.0</td>
<td>2.0</td>
<td>22</td>
<td>250</td>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td>IV</td>
<td>2.3</td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.6</td>
<td>2.0</td>
<td>2.0</td>
<td>22</td>
<td>250</td>
<td>3</td>
<td>80</td>
</tr>
</tbody>
</table>

### Daily need of vitamins for different professional groups of population (women)

<table>
<thead>
<tr>
<th>Professional groups</th>
<th>Coefficient of physical activity</th>
<th>Vitamins</th>
<th>E</th>
<th>D</th>
<th>A</th>
<th>B₁</th>
<th>B₂</th>
<th>B₆</th>
<th>PP</th>
<th>Folat</th>
<th>B₁₂</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>mg</td>
<td>Mcg</td>
<td>mcg</td>
<td>mg</td>
<td>mg</td>
<td>mg</td>
<td>mg</td>
<td>mcg</td>
<td>mcg</td>
<td>mg</td>
</tr>
<tr>
<td>I</td>
<td>1.4</td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.3</td>
<td>1.6</td>
<td>1.8</td>
<td>16</td>
<td>200</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.3</td>
<td>1.6</td>
<td>1.8</td>
<td>16</td>
<td>200</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.3</td>
<td>1.6</td>
<td>1.8</td>
<td>16</td>
<td>200</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>II</td>
<td>1.6</td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.3</td>
<td>1.6</td>
<td>1.8</td>
<td>16</td>
<td>200</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.3</td>
<td>1.6</td>
<td>1.8</td>
<td>16</td>
<td>200</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.3</td>
<td>1.6</td>
<td>1.8</td>
<td>16</td>
<td>200</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>III</td>
<td>1.9</td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.3</td>
<td>1.6</td>
<td>1.8</td>
<td>16</td>
<td>200</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.3</td>
<td>1.6</td>
<td>1.8</td>
<td>16</td>
<td>200</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.3</td>
<td>1.6</td>
<td>1.8</td>
<td>16</td>
<td>200</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>IV</td>
<td>2.2</td>
<td></td>
<td>15</td>
<td>2.5</td>
<td>1000</td>
<td>1.3</td>
<td>1.6</td>
<td>1.8</td>
<td>16</td>
<td>200</td>
<td>3</td>
<td>70</td>
</tr>
</tbody>
</table>
### Daily need of mineral substances for the different professional groups of population (men)

<table>
<thead>
<tr>
<th>Professional groups</th>
<th>Coefficient of physical activity</th>
<th>Mineral substances</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ca (mg) P (mg) Mg (mg) Fe (mg) F (mg) Zn (mg) I (mg) Se (mcg)</td>
</tr>
<tr>
<td>I</td>
<td>1.4</td>
<td>1200 1200 400 15 0.75 15 0.15 70</td>
</tr>
<tr>
<td>II</td>
<td>1.6</td>
<td>1200 1200 400 15 0.75 15 0.15 70</td>
</tr>
<tr>
<td>III</td>
<td>1.9</td>
<td>1200 1200 400 15 0.75 15 0.15 70</td>
</tr>
<tr>
<td>IV</td>
<td>2.3</td>
<td>1200 1200 400 15 0.75 15 0.15 70</td>
</tr>
</tbody>
</table>

### Daily need of mineral substances for the different professional groups of population (women)

<table>
<thead>
<tr>
<th>Professional groups</th>
<th>Coefficient of physical activity</th>
<th>Mineral substances</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ca (mg) P (mg) Mg (mg) Fe (mg) F (mg) Zn (mg) I (mg) Se (mcg)</td>
</tr>
<tr>
<td>I</td>
<td>1.4</td>
<td>1100 1200 350 17 0.75 12 0.15 50</td>
</tr>
<tr>
<td>II</td>
<td>1.6</td>
<td>1100 1200 350 17 0.75 12 0.15 50</td>
</tr>
<tr>
<td>III</td>
<td>1.9</td>
<td>1100 1200 350 17 0.75 12 0.15 50</td>
</tr>
<tr>
<td>IV</td>
<td>2.2</td>
<td>1100 1200 350 17 0.75 12 0.15 50</td>
</tr>
</tbody>
</table>
### Chemical composition of same food products

*(per 100 g of products)*

<table>
<thead>
<tr>
<th>Products</th>
<th>Proteins, g</th>
<th>Fats, g</th>
<th>Carbohydrates, g</th>
<th>Caloric value</th>
<th>Vitamins, mg</th>
<th>Minerals, mg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B1</td>
</tr>
<tr>
<td>Rice</td>
<td>7.3</td>
<td>2.0</td>
<td>63.1</td>
<td>284</td>
<td>-</td>
<td>0.52</td>
</tr>
<tr>
<td>Peas</td>
<td>23.0</td>
<td>1.2</td>
<td>53.3</td>
<td>303</td>
<td>-</td>
<td>0.81</td>
</tr>
<tr>
<td>Haricot beans</td>
<td>22.3</td>
<td>1.7</td>
<td>54.5</td>
<td>309</td>
<td>-</td>
<td>0.50</td>
</tr>
<tr>
<td>Flour wheaten the highest quality</td>
<td>10.3</td>
<td>0.9</td>
<td>74.2</td>
<td>327</td>
<td>-</td>
<td>0.17</td>
</tr>
<tr>
<td>Flour wheaten the 1 sort</td>
<td>10.6</td>
<td>1.3</td>
<td>73.2</td>
<td>329</td>
<td>-</td>
<td>0.25</td>
</tr>
<tr>
<td>Rye flour</td>
<td>8.9</td>
<td>1.7</td>
<td>73.0</td>
<td>325</td>
<td>-</td>
<td>0.25</td>
</tr>
<tr>
<td>Buckwheat (serial)</td>
<td>9.5</td>
<td>1.9</td>
<td>72.2</td>
<td>326</td>
<td>-</td>
<td>0.42</td>
</tr>
<tr>
<td>Millet</td>
<td>12.0</td>
<td>2.9</td>
<td>69.3</td>
<td>334</td>
<td>-</td>
<td>0.62</td>
</tr>
<tr>
<td>Macaroni highest quality</td>
<td>10.4</td>
<td>0.9</td>
<td>75.2</td>
<td>332</td>
<td>-</td>
<td>0.17</td>
</tr>
<tr>
<td>Macaroni I sort</td>
<td>10.7</td>
<td>1.3</td>
<td>74.2</td>
<td>333</td>
<td>-</td>
<td>0.25</td>
</tr>
<tr>
<td>Rye-bread</td>
<td>6.5</td>
<td>1.0</td>
<td>40.1</td>
<td>190</td>
<td>-</td>
<td>0.18</td>
</tr>
<tr>
<td>Wheaten bread II sort</td>
<td>8.1</td>
<td>1.2</td>
<td>46.6</td>
<td>220</td>
<td>-</td>
<td>0.23</td>
</tr>
<tr>
<td>Long loaf wheaten of I sort</td>
<td>7.9</td>
<td>1.0</td>
<td>51.9</td>
<td>236</td>
<td>-</td>
<td>0.16</td>
</tr>
<tr>
<td>Sugar biscuit highest quality</td>
<td>7.5</td>
<td>11.8</td>
<td>74.4</td>
<td>417</td>
<td>traces</td>
<td>0.08</td>
</tr>
<tr>
<td>Ban biscuit</td>
<td>10.4</td>
<td>5.2</td>
<td>76.2</td>
<td>376</td>
<td>traces</td>
<td>0.08</td>
</tr>
<tr>
<td>Puff-pastry with cream</td>
<td>5.4</td>
<td>38.6</td>
<td>46.4</td>
<td>544</td>
<td>0.15</td>
<td>0.04</td>
</tr>
<tr>
<td>Sponge cake</td>
<td>4.7</td>
<td>20.0</td>
<td>49.8</td>
<td>386</td>
<td>0.07</td>
<td>0.10</td>
</tr>
<tr>
<td>Pasteurized milk</td>
<td>2.8</td>
<td>3.2</td>
<td>4.7</td>
<td>58</td>
<td>0.02</td>
<td>0.03</td>
</tr>
<tr>
<td>Cream with fat of 20%</td>
<td>2.8</td>
<td>20.0</td>
<td>3.6</td>
<td>205</td>
<td>0.15</td>
<td>0.03</td>
</tr>
<tr>
<td>Products</td>
<td>Proteins, g</td>
<td>Fats, g</td>
<td>Carbohydrates, g</td>
<td>Caloric value</td>
<td>Vitamins, mg</td>
<td>Minerals, mg</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------------</td>
<td>---------</td>
<td>------------------</td>
<td>---------------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B1</td>
</tr>
<tr>
<td>Fatty curds (cottage cheese)</td>
<td>14.0</td>
<td>18.0</td>
<td>1.3</td>
<td>226</td>
<td>0.10</td>
<td>0.05</td>
</tr>
<tr>
<td>Not fatty curds (cottage cheese)</td>
<td>18.0</td>
<td>0.6</td>
<td>1.5</td>
<td>86</td>
<td>traces</td>
<td>0.04</td>
</tr>
<tr>
<td>Fatty kefir</td>
<td>2.8</td>
<td>3.2</td>
<td>4.1</td>
<td>59</td>
<td>0.02</td>
<td>0.03</td>
</tr>
<tr>
<td>Not salt butter</td>
<td>0.6</td>
<td>82.5</td>
<td>0.9</td>
<td>748</td>
<td>0.50</td>
<td>traces</td>
</tr>
<tr>
<td>Russian cheese</td>
<td>23.4</td>
<td>30.0</td>
<td>-</td>
<td>371</td>
<td>0.26</td>
<td>0.04</td>
</tr>
<tr>
<td>Cheese with fat of 40% (processed)</td>
<td>23.0</td>
<td>19.0</td>
<td>-</td>
<td>270</td>
<td>-</td>
<td>0.01</td>
</tr>
<tr>
<td>Ice cream</td>
<td>3.3</td>
<td>10.0</td>
<td>19.8</td>
<td>176</td>
<td>0.04</td>
<td>0.03</td>
</tr>
<tr>
<td>Margarine</td>
<td>0.3</td>
<td>82.3</td>
<td>1.0</td>
<td>746</td>
<td>0.4</td>
<td>traces</td>
</tr>
<tr>
<td>Mayonnaise</td>
<td>3.1</td>
<td>67.0</td>
<td>2.6</td>
<td>627</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mutton of the I category</td>
<td>16.3</td>
<td>15.3</td>
<td>-</td>
<td>203</td>
<td>-</td>
<td>0.08</td>
</tr>
<tr>
<td>Beef of the I category</td>
<td>18.9</td>
<td>12.4</td>
<td>-</td>
<td>187</td>
<td>traces</td>
<td>0.06</td>
</tr>
<tr>
<td>Rabbit meat</td>
<td>20.7</td>
<td>12.9</td>
<td>-</td>
<td>199</td>
<td>-</td>
<td>0.08</td>
</tr>
<tr>
<td>Veal</td>
<td>19.7</td>
<td>1.2</td>
<td>-</td>
<td>90</td>
<td>traces</td>
<td>0.14</td>
</tr>
<tr>
<td>Doctor’s sausage</td>
<td>13.7</td>
<td>22.8</td>
<td>-</td>
<td>260</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Liver sausage</td>
<td>12.2</td>
<td>28.0</td>
<td>-</td>
<td>301</td>
<td>-</td>
<td>0.25</td>
</tr>
<tr>
<td>Chicks of the I and of the II category</td>
<td>18.2</td>
<td>18.4</td>
<td>0.7</td>
<td>241</td>
<td>0.07</td>
<td>0.07</td>
</tr>
<tr>
<td>Gooses of the I and of the II category</td>
<td>20.8</td>
<td>8.8</td>
<td>0.6</td>
<td>163</td>
<td>0.07</td>
<td>0.07</td>
</tr>
<tr>
<td>Ducks of the I and of the II category</td>
<td>15.2</td>
<td>39.0</td>
<td>-</td>
<td>412</td>
<td>0.02</td>
<td>0.08</td>
</tr>
<tr>
<td>Chicken eggs</td>
<td>12.7</td>
<td>11.5</td>
<td>0.7</td>
<td>157</td>
<td>0.35</td>
<td>0.07</td>
</tr>
<tr>
<td>Far-eastern flat-fish</td>
<td>15.7</td>
<td>3.0</td>
<td>-</td>
<td>90</td>
<td>-</td>
<td>0.06</td>
</tr>
<tr>
<td>Products</td>
<td>Proteins, g</td>
<td>Fats, g</td>
<td>Carbohydrates, g</td>
<td>Caloric value</td>
<td>Vitamins, mg</td>
<td>Minerals, mg</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------</td>
<td>---------</td>
<td>------------------</td>
<td>---------------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B1</td>
<td>B2</td>
</tr>
<tr>
<td>Bream</td>
<td>17.1</td>
<td>4.1</td>
<td>-</td>
<td>105</td>
<td>0.03</td>
<td>0.12</td>
</tr>
<tr>
<td>Burbot</td>
<td>18.8</td>
<td>0.6</td>
<td>-</td>
<td>81</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Marine perch</td>
<td>17.6</td>
<td>5.2</td>
<td>-</td>
<td>17</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fatty Atlantic herring</td>
<td>17.7</td>
<td>19.5</td>
<td>-</td>
<td>242</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Hake</td>
<td>16.6</td>
<td>2.2</td>
<td>-</td>
<td>86</td>
<td>-</td>
<td>0.12</td>
</tr>
<tr>
<td>Pike</td>
<td>18.8</td>
<td>0.7</td>
<td>-</td>
<td>82</td>
<td>-</td>
<td>0.11</td>
</tr>
<tr>
<td>Tinned foods</td>
<td>18.3</td>
<td>23.3</td>
<td>-</td>
<td>283</td>
<td>0.03</td>
<td>-</td>
</tr>
<tr>
<td>Tinned foods „Atlantic mackerel in oil”</td>
<td>13.1</td>
<td>25.1</td>
<td>-</td>
<td>278</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sprats in oil</td>
<td>17.4</td>
<td>32.4</td>
<td>0.4</td>
<td>364</td>
<td>-</td>
<td>0.05</td>
</tr>
<tr>
<td>Green peas</td>
<td>5.0</td>
<td>0.2</td>
<td>13.3</td>
<td>72</td>
<td>-</td>
<td>0.34</td>
</tr>
<tr>
<td>Potatoes</td>
<td>2.0</td>
<td>0.1</td>
<td>19.7</td>
<td>83</td>
<td>-</td>
<td>0.12</td>
</tr>
<tr>
<td>Spring onions (leaf)</td>
<td>1.3</td>
<td>-</td>
<td>4.3</td>
<td>22</td>
<td>-</td>
<td>0.02</td>
</tr>
<tr>
<td>Carrot yellow</td>
<td>1.3</td>
<td>0.1</td>
<td>7.0</td>
<td>33</td>
<td>-</td>
<td>0.16</td>
</tr>
<tr>
<td>Cucumbers (subsoil)</td>
<td>0.8</td>
<td>3.0</td>
<td>15</td>
<td>33</td>
<td>-</td>
<td>0.03</td>
</tr>
<tr>
<td>A green sweet pepper</td>
<td>1.3</td>
<td>4.7</td>
<td>23</td>
<td>-</td>
<td>0.06</td>
<td>0.10</td>
</tr>
<tr>
<td>A parsley (greens)</td>
<td>3.7</td>
<td>8.1</td>
<td>45</td>
<td>-</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Garden radish</td>
<td>1.2</td>
<td>4.1</td>
<td>20</td>
<td>-</td>
<td>0.01</td>
<td>0.04</td>
</tr>
<tr>
<td>Lettuce</td>
<td>1.5</td>
<td>12.2</td>
<td>14</td>
<td>-</td>
<td>0.03</td>
<td>0.08</td>
</tr>
<tr>
<td>Beetroot</td>
<td>1.7</td>
<td>10.8</td>
<td>48</td>
<td>-</td>
<td>0.02</td>
<td>0.04</td>
</tr>
<tr>
<td>Tomatoes (subsoil)</td>
<td>0.6</td>
<td>4.2</td>
<td>19</td>
<td>-</td>
<td>0.06</td>
<td>0.04</td>
</tr>
<tr>
<td>Garlic</td>
<td>6.5</td>
<td>21.2</td>
<td>106</td>
<td>-</td>
<td>0.08</td>
<td>0.08</td>
</tr>
<tr>
<td>Sorrel</td>
<td>1.5</td>
<td>5.3</td>
<td>28</td>
<td>-</td>
<td>0.19</td>
<td>0.10</td>
</tr>
<tr>
<td>Pickled cabbage</td>
<td>0.8</td>
<td>1.8</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pickled cucumbers</td>
<td>2.8</td>
<td>1.3</td>
<td>19</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mushrooms</td>
<td>0.9</td>
<td>0.4</td>
<td>3.2</td>
<td>19</td>
<td>-</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>27.6</td>
<td>68</td>
<td>10.0</td>
<td>209</td>
<td>-</td>
<td>0.27</td>
</tr>
<tr>
<td>Water-melon</td>
<td>0.7</td>
<td>9.2</td>
<td>38</td>
<td>-</td>
<td>0.04</td>
<td>0.03</td>
</tr>
<tr>
<td>Products</td>
<td>Proteins, g</td>
<td>Fats, g</td>
<td>Carbohydrates, g</td>
<td>Caloric value</td>
<td>Vitamins, mg</td>
<td>Minerals, mg</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------</td>
<td>---------</td>
<td>------------------</td>
<td>---------------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B&lt;sub&gt;1&lt;/sub&gt;</td>
</tr>
<tr>
<td>Pumpkin</td>
<td>1.0</td>
<td>-</td>
<td>6.5</td>
<td>29</td>
<td>-</td>
<td>0.05</td>
</tr>
<tr>
<td>Cherry</td>
<td>0.8</td>
<td>-</td>
<td>10.7</td>
<td>42</td>
<td>-</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>1.1</td>
<td>-</td>
<td>12.3</td>
<td>52</td>
<td>-</td>
<td>0.01</td>
</tr>
<tr>
<td>Pear</td>
<td>0.4</td>
<td>-</td>
<td>10.7</td>
<td>42</td>
<td>-</td>
<td>0.02</td>
</tr>
<tr>
<td>Gargen plum</td>
<td>0.8</td>
<td>-</td>
<td>9.9</td>
<td>43</td>
<td>-</td>
<td>0.06</td>
</tr>
<tr>
<td>Apples</td>
<td>0.4</td>
<td>-</td>
<td>11.3</td>
<td>46</td>
<td>-</td>
<td>0.01</td>
</tr>
<tr>
<td>Oranges</td>
<td>0.9</td>
<td>-</td>
<td>8.4</td>
<td>38</td>
<td>-</td>
<td>0.04</td>
</tr>
<tr>
<td>Lemons</td>
<td>0.9</td>
<td>-</td>
<td>3.6</td>
<td>31</td>
<td>-</td>
<td>0.04</td>
</tr>
<tr>
<td>Grapes</td>
<td>0.4</td>
<td>-</td>
<td>17.5</td>
<td>69</td>
<td>-</td>
<td>0.05</td>
</tr>
<tr>
<td>Strawberries</td>
<td>1.8</td>
<td>-</td>
<td>8.1</td>
<td>41</td>
<td>-</td>
<td>0.03</td>
</tr>
<tr>
<td>Gooseberries</td>
<td>0.7</td>
<td>-</td>
<td>9.9</td>
<td>44</td>
<td>-</td>
<td>0.01</td>
</tr>
<tr>
<td>Raspberries</td>
<td>0.8</td>
<td>-</td>
<td>9.0</td>
<td>41</td>
<td>-</td>
<td>0.02</td>
</tr>
<tr>
<td>Red currants</td>
<td>0.6</td>
<td>-</td>
<td>8.0</td>
<td>38</td>
<td>-</td>
<td>0.01</td>
</tr>
<tr>
<td>Black currants</td>
<td>1.0</td>
<td>-</td>
<td>8.0</td>
<td>40</td>
<td>-</td>
<td>0.02</td>
</tr>
<tr>
<td>Hips (dried fruits)</td>
<td>4.0</td>
<td>-</td>
<td>60.0</td>
<td>253</td>
<td>-</td>
<td>0.15</td>
</tr>
<tr>
<td>Black tea bags</td>
<td>20.0</td>
<td>-</td>
<td>6.9</td>
<td>109</td>
<td>-</td>
<td>0.07</td>
</tr>
<tr>
<td>Black coffee</td>
<td>13.9</td>
<td>14.4</td>
<td>4.1</td>
<td>223</td>
<td>-</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>15.0</td>
<td>3.6</td>
<td>7.0</td>
<td>119</td>
<td>-</td>
<td>0.10</td>
</tr>
<tr>
<td>Green peas</td>
<td>3.1</td>
<td>0.2</td>
<td>7.1</td>
<td>41</td>
<td>-</td>
<td>0.11</td>
</tr>
<tr>
<td>Tomato juice</td>
<td>1.0</td>
<td>-</td>
<td>3.3</td>
<td>18</td>
<td>-</td>
<td>0.01</td>
</tr>
<tr>
<td>Plum juice</td>
<td>0.3</td>
<td>-</td>
<td>16.1</td>
<td>65</td>
<td>-</td>
<td>0.02</td>
</tr>
<tr>
<td>Apple juice</td>
<td>0.5</td>
<td>-</td>
<td>11.7</td>
<td>47</td>
<td>-</td>
<td>0.01</td>
</tr>
<tr>
<td>Apple jam</td>
<td>0.4</td>
<td>-</td>
<td>65.3</td>
<td>247</td>
<td>-</td>
<td>0.01</td>
</tr>
<tr>
<td>Dried plum</td>
<td>2.3</td>
<td>-</td>
<td>65.6</td>
<td>264</td>
<td>-</td>
<td>0.1</td>
</tr>
<tr>
<td>Dried apples</td>
<td>3.2</td>
<td>-</td>
<td>68.0</td>
<td>273</td>
<td>-</td>
<td>0.02</td>
</tr>
</tbody>
</table>
Caloric value of different nutritious substances

<table>
<thead>
<tr>
<th>Name of nutritious substances</th>
<th>Caloric value of 1 g nutritious substances during its oxidation in the organism</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Proteins</td>
</tr>
<tr>
<td>2</td>
<td>Fats</td>
</tr>
<tr>
<td>3</td>
<td>Carbohydrates</td>
</tr>
</tbody>
</table>

Share of nutritious substances in daily ration

<table>
<thead>
<tr>
<th>Name of nutritious substances</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Proteins</td>
</tr>
<tr>
<td>2</td>
<td>Fats</td>
</tr>
<tr>
<td>3</td>
<td>Carbohydrates</td>
</tr>
<tr>
<td>Sum</td>
<td></td>
</tr>
</tbody>
</table>

Hygienic standard for milk

<table>
<thead>
<tr>
<th>Kind of milk</th>
<th>Acidity in %</th>
<th>Dry residue</th>
<th>Fatness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Whole</td>
<td>21</td>
<td>8.1</td>
<td>3.2</td>
</tr>
<tr>
<td>2 High fatness</td>
<td>20</td>
<td>7.8</td>
<td>6.0</td>
</tr>
<tr>
<td>3 Proteinized</td>
<td>25</td>
<td>10.5</td>
<td>2.5</td>
</tr>
<tr>
<td>4 Skim milk</td>
<td>21</td>
<td>8.1</td>
<td>-</td>
</tr>
<tr>
<td>5 Vitaminized, whole</td>
<td>21</td>
<td>8.1</td>
<td>3.2</td>
</tr>
<tr>
<td>6 Vitaminized, skim</td>
<td>21</td>
<td>8.1</td>
<td>-</td>
</tr>
</tbody>
</table>

The specification of quality of some grades of bread

<table>
<thead>
<tr>
<th>Name of bread</th>
<th>Porosity (%), not less</th>
<th>Humidity (%) of crumb, not more</th>
<th>Acidity (°), not more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheaten bread (higher grade)</td>
<td>72-74</td>
<td>43-44</td>
<td>3</td>
</tr>
<tr>
<td>Wheaten bread (first grade)</td>
<td>67-70</td>
<td>44-45</td>
<td>3</td>
</tr>
<tr>
<td>Rye bread</td>
<td>48</td>
<td>51</td>
<td>12</td>
</tr>
<tr>
<td>Reading of lactodensimeter</td>
<td>15</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>25.0</td>
<td>23.4</td>
<td>23.7</td>
<td>24.0</td>
</tr>
<tr>
<td>25.5</td>
<td>23.9</td>
<td>24.2</td>
<td>24.5</td>
</tr>
<tr>
<td>26.0</td>
<td>24.4</td>
<td>24.7</td>
<td>25.0</td>
</tr>
<tr>
<td>26.5</td>
<td>24.9</td>
<td>25.2</td>
<td>25.5</td>
</tr>
<tr>
<td>27.0</td>
<td>25.4</td>
<td>25.7</td>
<td>26.0</td>
</tr>
<tr>
<td>27.5</td>
<td>25.9</td>
<td>26.2</td>
<td>26.5</td>
</tr>
<tr>
<td>28.0</td>
<td>26.4</td>
<td>26.7</td>
<td>27.0</td>
</tr>
<tr>
<td>28.5</td>
<td>26.9</td>
<td>27.2</td>
<td>27.5</td>
</tr>
<tr>
<td>29.0</td>
<td>27.4</td>
<td>27.7</td>
<td>28.0</td>
</tr>
<tr>
<td>29.5</td>
<td>27.9</td>
<td>28.2</td>
<td>28.5</td>
</tr>
<tr>
<td>30.0</td>
<td>28.4</td>
<td>28.7</td>
<td>29.0</td>
</tr>
<tr>
<td>30.5</td>
<td>28.9</td>
<td>29.2</td>
<td>29.5</td>
</tr>
<tr>
<td>31.0</td>
<td>29.4</td>
<td>29.7</td>
<td>30.0</td>
</tr>
<tr>
<td>31.5</td>
<td>29.9</td>
<td>30.2</td>
<td>30.5</td>
</tr>
<tr>
<td>32.0</td>
<td>30.4</td>
<td>30.7</td>
<td>31.0</td>
</tr>
<tr>
<td>32.5</td>
<td>30.9</td>
<td>31.2</td>
<td>31.5</td>
</tr>
<tr>
<td>33.0</td>
<td>31.4</td>
<td>31.7</td>
<td>32.0</td>
</tr>
<tr>
<td>33.5</td>
<td>31.9</td>
<td>32.2</td>
<td>32.5</td>
</tr>
<tr>
<td>34.0</td>
<td>32.4</td>
<td>32.7</td>
<td>33.0</td>
</tr>
<tr>
<td>34.5</td>
<td>32.9</td>
<td>33.2</td>
<td>33.5</td>
</tr>
<tr>
<td>35.0</td>
<td>33.4</td>
<td>33.7</td>
<td>34.0</td>
</tr>
<tr>
<td>35.5</td>
<td>33.9</td>
<td>34.2</td>
<td>34.5</td>
</tr>
<tr>
<td>36.0</td>
<td>34.4</td>
<td>34.7</td>
<td>35.0</td>
</tr>
</tbody>
</table>
Zavialov’s table for determination of bread porosity

<table>
<thead>
<tr>
<th>Weight of 4 cylinders of bread (27 cm³ each)</th>
<th>Porosity, %</th>
<th>Weight of 3 cylinders of bread (27 cm³ each)</th>
<th>Porosity, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.9-83.6</td>
<td>35</td>
<td>51.0-50.1</td>
<td>50</td>
</tr>
<tr>
<td>83.5-82.3</td>
<td>36</td>
<td>50.0-49.1</td>
<td>51</td>
</tr>
<tr>
<td>82.2-81.0</td>
<td>37</td>
<td>49.0-48.1</td>
<td>52</td>
</tr>
<tr>
<td>81.0-79.8</td>
<td>38</td>
<td>48.0-47.1</td>
<td>53</td>
</tr>
<tr>
<td>79.7-78.5</td>
<td>39</td>
<td>47.0-46.1</td>
<td>54</td>
</tr>
<tr>
<td>78.4-77.2</td>
<td>40</td>
<td>46.0-45.1</td>
<td>55</td>
</tr>
<tr>
<td>77.1-75.9</td>
<td>41</td>
<td>45.0-44.1</td>
<td>56</td>
</tr>
<tr>
<td>75.8-74.6</td>
<td>42</td>
<td>44.0-43.1</td>
<td>57</td>
</tr>
<tr>
<td>74.5-73.3</td>
<td>43</td>
<td>43.0-42.1</td>
<td>58</td>
</tr>
<tr>
<td>73.2-72.0</td>
<td>44</td>
<td>42.0-41.1</td>
<td>59</td>
</tr>
<tr>
<td>71.9-70.7</td>
<td>45</td>
<td>41.0-40.4</td>
<td>60</td>
</tr>
<tr>
<td>70.6-69.4</td>
<td>46</td>
<td>39.3-39.0</td>
<td>61</td>
</tr>
<tr>
<td>69.3-68.1</td>
<td>47</td>
<td>38.8-38.0</td>
<td>62</td>
</tr>
<tr>
<td>68.0-66.8</td>
<td>48</td>
<td>37.9-36.8</td>
<td>63</td>
</tr>
<tr>
<td>66.7-65.5</td>
<td>49</td>
<td>36.7-35.8</td>
<td>64</td>
</tr>
<tr>
<td>65.4-64.2</td>
<td>50</td>
<td>37.5-34.9</td>
<td>65</td>
</tr>
<tr>
<td>64.1-62.9</td>
<td>51</td>
<td>34.8-33.9</td>
<td>66</td>
</tr>
<tr>
<td>62.8-61.6</td>
<td>52</td>
<td>33.8-32.9</td>
<td>67</td>
</tr>
<tr>
<td>61.5-60.5</td>
<td>53</td>
<td>32.8-31.9</td>
<td>68</td>
</tr>
<tr>
<td>60.4-59.2</td>
<td>54</td>
<td>31.8-30.9</td>
<td>69</td>
</tr>
<tr>
<td>59.1-57.9</td>
<td>55</td>
<td>30.8-29.9</td>
<td>70</td>
</tr>
<tr>
<td>57.8-56.6</td>
<td>56</td>
<td>29.8-28.9</td>
<td>71</td>
</tr>
<tr>
<td>56.5-55.3</td>
<td>57</td>
<td>28.8-27.9</td>
<td>72</td>
</tr>
<tr>
<td>55.2-54.0</td>
<td>58</td>
<td>27.8-26.9</td>
<td>73</td>
</tr>
<tr>
<td>53.9-52.7</td>
<td>59</td>
<td>26.8-25.8</td>
<td>74</td>
</tr>
</tbody>
</table>

Zavialov’s formula: \( P = 100 - 3.086 \cdot d \),
where \( P \) is required porosity; \( d \) is weight of one cylinder (27 cm³) of bread

Contents of essential amino acids in the meat of different animals

<table>
<thead>
<tr>
<th>Amino acids</th>
<th>Beef</th>
<th>Pork</th>
<th>Mutton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leucine</td>
<td>7.6</td>
<td>7.2</td>
<td>8.1</td>
</tr>
<tr>
<td>Isoleucine</td>
<td>5.7</td>
<td>5.7</td>
<td>5.4</td>
</tr>
<tr>
<td>Valine</td>
<td>5.3</td>
<td>5.5</td>
<td>5.4</td>
</tr>
<tr>
<td>Lysine</td>
<td>8.9</td>
<td>8.7</td>
<td>8.8</td>
</tr>
<tr>
<td>Methionine</td>
<td>2.5</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>Tryptophan</td>
<td>1.4</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Phenylalanine</td>
<td>4.2</td>
<td>4.2</td>
<td>4.3</td>
</tr>
<tr>
<td>Threonine</td>
<td>4.5</td>
<td>4.5</td>
<td>4.8</td>
</tr>
<tr>
<td>Arginine</td>
<td>6.4</td>
<td>6.4</td>
<td>6.2</td>
</tr>
<tr>
<td>Histidine</td>
<td>3.9</td>
<td>3.8</td>
<td>3.2</td>
</tr>
</tbody>
</table>
### Classification of meat

- Beef
- Mutton
- Poultry
- Wildfowl
- Pork
- Horse-flesh
- Veal

#### By the origin
- By the freshness degree
- Kind of meat
  - By possibility for use
    - Suitable
      - Conditionally suitable
    - Unsuitable

#### By thermal condition
- Fresh
- Cooling
- Over cooling
- Freezing
- Thawing

### The main causes of food toxicoinfections

<table>
<thead>
<tr>
<th>Sources of infectioning of food products</th>
<th>Disturbances of technological processes in food cooking</th>
<th>Disturbances of sanitary and hygienic conditions of storing and realization of food products</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sick animals.</td>
<td>1. Insufficient thermal treatment of food products</td>
<td>1. Delay in realization of ready food storing.</td>
</tr>
<tr>
<td>2. Polluted water.</td>
<td>(meat, fish, and so on).</td>
<td>2. Storage of ready food under high temperature conditions.</td>
</tr>
<tr>
<td>3. Polluted utensils.</td>
<td>2. Insufficient sterilization of tinned food.</td>
<td>3. Storage of boiled food in a thick layers.</td>
</tr>
<tr>
<td>4. Polluted equipment.</td>
<td>3. Insufficient pasteurization.</td>
<td>4. Storage of ready food under in-sanitary conditions.</td>
</tr>
<tr>
<td>5. Polluted apparatus.</td>
<td>4. A small quantity of preservatives (antiseptics,</td>
<td></td>
</tr>
<tr>
<td>6. Polluted transport.</td>
<td>sugar, vinegar, salt and others).</td>
<td></td>
</tr>
<tr>
<td>7. Polluted rooms of food department.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Infected food products.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Carriers of microbes: flies, etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Organoleptic performance of meat and subproducts

<table>
<thead>
<tr>
<th>Organoleptic parameters</th>
<th>Degrees of freshness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fresh</td>
</tr>
<tr>
<td></td>
<td>Fresh</td>
</tr>
<tr>
<td>Outward appearance and color of a surface carcass</td>
<td>Crust without withers, of acyanotic-red color or light pink, refrozen carcass - red color, fat of a pulp particularly painted in bright red color.</td>
</tr>
<tr>
<td>State of muscles on a section</td>
<td>Slightly wet, do not abandon a wet stain on a filter paper; color: a beef -from light-red up to dark red, pork - from light pink up to red, mutton - from red up to red - cherry, young mutton - pink</td>
</tr>
<tr>
<td>Consistence</td>
<td>On a section meat is hard and resilient, formed by pressing of a dactyl the fossa fast is aligned</td>
</tr>
<tr>
<td>Smell</td>
<td>Specific, inherent to each aspect of fresh meat</td>
</tr>
<tr>
<td>State of fat</td>
<td>Beef has white, yellowish or dark yellow color, the consistence is firm, at a compression is chipping; pork has white or light pink color, mild, elastic; mutton has white color, dense consistence. Fat should not have any smell of salting or rancidity</td>
</tr>
<tr>
<td>State of tendons</td>
<td>Tendons are resilient, dense; the surface of joints is sleek. Tendons of the refrozen meat are mild, chipping, of bright red color</td>
</tr>
<tr>
<td>Transparence and smell of a broth</td>
<td>Transparent, fragrant</td>
</tr>
</tbody>
</table>
CLASSIFICATION OF DUST

By the origin

- Dust of soil
- Dust of heating systems
- Dust of volcano
- Dust of industrial enterprise
- Transport dust
- Space dust

By the size of the particles

- **Dust as such:** size of particles is from 100 to 10μ
- **Clouds:** size of particles is from 10 to 0.1μ
- **Smokes:** size of particles is less than 0.1μ

By chemical composition

- **organic nature**
  - Vegetable dust:
    - cotton
    - wood
    - paper
    - flour
    - linen
    - tobacco
  - Animal dust:
    - woolen
    - horn
    - bone
    - dust of hair
  - Artificial organic dust:
    - different paints
    - explosive
- **inorganic nature**
  - Metal dust:
    - copper
    - iron
    - zinc
    - lead
    - manganese
  - Mineral dust:
    - asbestos
    - graphite
    - quartz
    - sand
  - Artificial inorganic dust:
    - soda
    - glass
    - cement
    - phosphorus
- **mixed nature**
  - Mixture of dust of different kinds and groups

By the character of effect

- Pantotoxic action
- Stimulating (irritative) action
- Allergic action
- Infecting action
- Carcinogenic action
- Fibrogenic action
Maximum permissible concentration of dust and chemical substances in air of working zone

<table>
<thead>
<tr>
<th>No</th>
<th>Substances</th>
<th>MPC (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nitrogen monoxide</td>
<td>5.0</td>
</tr>
<tr>
<td>2</td>
<td>Ammonia</td>
<td>20.0</td>
</tr>
<tr>
<td>3</td>
<td>Benzene</td>
<td>300.0</td>
</tr>
<tr>
<td>4</td>
<td>Manganese</td>
<td>0.3</td>
</tr>
<tr>
<td>5</td>
<td>Carbon monoxide (CO)</td>
<td>20.0</td>
</tr>
<tr>
<td>6</td>
<td>Lead</td>
<td>0.01</td>
</tr>
<tr>
<td>7</td>
<td>Mercury</td>
<td>0.01</td>
</tr>
<tr>
<td>8</td>
<td>Chlorine</td>
<td>1.0</td>
</tr>
<tr>
<td>9</td>
<td>Sulfurous gas (SO₂)</td>
<td>10.0</td>
</tr>
<tr>
<td>10</td>
<td>Dust, which includes SiO₂ from 10% till 70%</td>
<td>2.0</td>
</tr>
<tr>
<td>11</td>
<td>Dust, which includes SiO₂ more than 70%</td>
<td>1.0</td>
</tr>
<tr>
<td>12</td>
<td>Dust, which includes SiO₂ from 2% till 10%</td>
<td>4.0</td>
</tr>
<tr>
<td>13</td>
<td>Cement dust</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Permissible concentration of harmful substances in atmospheric air of cities

<table>
<thead>
<tr>
<th>Substances</th>
<th>Permissible concentration</th>
<th>Classes of danger</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>max</td>
<td>average/day</td>
</tr>
<tr>
<td>Nitrogen dioxide (NO₂)</td>
<td>0.085</td>
<td>0.04</td>
</tr>
<tr>
<td>Nitrogen monoxide (NO)</td>
<td>0.4</td>
<td>0.06</td>
</tr>
<tr>
<td>Sulphurous gas (SO₂)</td>
<td>0.5</td>
<td>0.05</td>
</tr>
<tr>
<td>Ammonia (NH₃)</td>
<td>0.2</td>
<td>0.04</td>
</tr>
<tr>
<td>Benzene</td>
<td>5</td>
<td>1.5</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>5.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Ozone (O₃)</td>
<td>0.16</td>
<td>0.03</td>
</tr>
<tr>
<td>Dust with SiO₂ more than 70%</td>
<td>0.15</td>
<td>0.05</td>
</tr>
<tr>
<td>Dust with SiO₂ 20-70%</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Dust with SiO₂ less than 20%</td>
<td>0.5</td>
<td>0.15</td>
</tr>
<tr>
<td>Mercury</td>
<td>-</td>
<td>0.0003</td>
</tr>
<tr>
<td>Lead</td>
<td>0.001</td>
<td>0.0003</td>
</tr>
<tr>
<td>Chlorine</td>
<td>0.1</td>
<td>0.03</td>
</tr>
</tbody>
</table>
## Hygienic standards of microclimate parameters at the work area of the industrial premises

<table>
<thead>
<tr>
<th>Season of year</th>
<th>Category of work</th>
<th>Temperature (°C)</th>
<th>Relative humidity</th>
<th>Velocity of air movement (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Optimal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max At the work places</td>
<td>Min At the work places</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Constant working places</td>
<td>Inconstant working places</td>
<td>Constant working places</td>
</tr>
<tr>
<td><strong>Cold period of year</strong></td>
<td>Easy I a</td>
<td>22-24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Easy I b</td>
<td>21-23</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Middle II a</td>
<td>18-20</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Middle II b</td>
<td>17-19</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Heavy III</td>
<td>16-18</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td><strong>Warm period of year</strong></td>
<td>Easy I a</td>
<td>23-25</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Easy I b</td>
<td>22-24</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Middle II a</td>
<td>21-23</td>
<td>27</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Middle II b</td>
<td>20-22</td>
<td>27</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Heavy III</td>
<td>18-20</td>
<td>26</td>
<td>28</td>
</tr>
</tbody>
</table>
Areas of school rooms

<table>
<thead>
<tr>
<th>Name of the room</th>
<th>Minimal area (m²)</th>
<th>Per pupil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class-rooms</td>
<td>50</td>
<td>1.25</td>
</tr>
<tr>
<td>Educational studies</td>
<td>50-66</td>
<td>1.25-1.65</td>
</tr>
<tr>
<td>Laboratory</td>
<td>66</td>
<td>1.65</td>
</tr>
<tr>
<td>Workshop for boys</td>
<td>66+16</td>
<td>3.3</td>
</tr>
<tr>
<td>Study of work for girls</td>
<td>50</td>
<td>2.5</td>
</tr>
<tr>
<td>Doctor's consulting room</td>
<td>12-15</td>
<td>-</td>
</tr>
<tr>
<td>Gymnasium</td>
<td>144-288</td>
<td>3.6-7.2</td>
</tr>
<tr>
<td>Premises for pupil rest</td>
<td>164-1176</td>
<td>0.42-0.46</td>
</tr>
<tr>
<td>Hall with cloak-room</td>
<td>98-490</td>
<td>0.25</td>
</tr>
<tr>
<td>Toilet with washing room for pupil</td>
<td>39-196</td>
<td>0.1</td>
</tr>
<tr>
<td>Toilet for teachers</td>
<td>4-6</td>
<td>-</td>
</tr>
<tr>
<td>Room for dinner (for 80-490 places)</td>
<td>52-319</td>
<td>0.65</td>
</tr>
<tr>
<td>Kitchen (all rooms)</td>
<td>94-171</td>
<td>-</td>
</tr>
<tr>
<td>Library</td>
<td>32-80</td>
<td>0.05-0.08</td>
</tr>
<tr>
<td>Assembly hall (80-400 places)</td>
<td>66-240</td>
<td>0.6</td>
</tr>
<tr>
<td>Cabinet of head</td>
<td>15</td>
<td>-</td>
</tr>
<tr>
<td>Cabinet of deputy head</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>Office</td>
<td>8-15</td>
<td>-</td>
</tr>
<tr>
<td>Cabinet for teachers</td>
<td>24-70</td>
<td>2-2.5 per for 1</td>
</tr>
</tbody>
</table>

Hygienic norms of natural and artificial lighting (illumination) in school premises

<table>
<thead>
<tr>
<th>Premises</th>
<th>Natural lighting, not less than</th>
<th>Artificial lighting (luxes) not less than</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daylight factor, %</td>
<td>Light coefficient</td>
</tr>
<tr>
<td>Class-rooms, studies, laboratories, work-shops, room for laboratory assistants, library</td>
<td>1,5</td>
<td>1:4 – 1:6</td>
</tr>
<tr>
<td>Study for drawing</td>
<td>2</td>
<td>1:3 – 1:5</td>
</tr>
<tr>
<td>Gymnasium, doctor’s consulting room, headmaster’s study, food department, assembly room</td>
<td>1</td>
<td>1:4 – 1:6</td>
</tr>
<tr>
<td>Economic rooms</td>
<td>0,5</td>
<td>1:7 – 1:8</td>
</tr>
<tr>
<td>Cloak-room</td>
<td>0,5</td>
<td>1:6 – 1:8</td>
</tr>
</tbody>
</table>

Amount of classes for different forms

<table>
<thead>
<tr>
<th>Forms</th>
<th>Numbers of classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>4-5</td>
</tr>
<tr>
<td>5-8</td>
<td>5-6</td>
</tr>
<tr>
<td>9-11</td>
<td>6</td>
</tr>
</tbody>
</table>
### Air temperature in the school rooms

<table>
<thead>
<tr>
<th>Name of the room</th>
<th>Temperature °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class-rooms, laboratories, history room, literature room</td>
<td>18-20</td>
</tr>
<tr>
<td>Workshop</td>
<td>15-17</td>
</tr>
<tr>
<td>Hall for music class and for dancing lesson</td>
<td>18-20</td>
</tr>
<tr>
<td>Display room</td>
<td>18-22</td>
</tr>
<tr>
<td>Gymnasium</td>
<td>15-17</td>
</tr>
<tr>
<td>Cloak-room for gymnasiums</td>
<td>19-23</td>
</tr>
<tr>
<td>Doctor’s consulting room</td>
<td>21-23</td>
</tr>
<tr>
<td>Places for pupils’ rest</td>
<td>16-18</td>
</tr>
<tr>
<td>Library</td>
<td>17-21</td>
</tr>
<tr>
<td>Hall and clock-room</td>
<td>16-19</td>
</tr>
</tbody>
</table>

### Limited duration of a working week at school (in hours)

<table>
<thead>
<tr>
<th>Forms</th>
<th>Six-day week</th>
<th>Five-day week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>2-4</td>
<td>25</td>
<td>22</td>
</tr>
<tr>
<td>5</td>
<td>31</td>
<td>28</td>
</tr>
<tr>
<td>6</td>
<td>32</td>
<td>29</td>
</tr>
<tr>
<td>7</td>
<td>34</td>
<td>31</td>
</tr>
<tr>
<td>8-9</td>
<td>35</td>
<td>32</td>
</tr>
<tr>
<td>10-11</td>
<td>36</td>
<td>33</td>
</tr>
</tbody>
</table>

### The home work preparation time

<table>
<thead>
<tr>
<th>Forms</th>
<th>The home work preparation time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>45-60 min</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>1.5 hour</td>
</tr>
<tr>
<td>3-4&lt;sup&gt;th&lt;/sup&gt;</td>
<td>not more than 2 hours</td>
</tr>
<tr>
<td>5-6&lt;sup&gt;th&lt;/sup&gt;</td>
<td>not more than 2.5 hours</td>
</tr>
<tr>
<td>7-8&lt;sup&gt;th&lt;/sup&gt;</td>
<td>not more than 3 hours</td>
</tr>
<tr>
<td>9-11&lt;sup&gt;th&lt;/sup&gt;</td>
<td>not more than 4 hours</td>
</tr>
</tbody>
</table>

### Duration of use of technical means in teaching process

<table>
<thead>
<tr>
<th>Forms</th>
<th>Duration of use of technical means (in min)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diafilm</td>
</tr>
<tr>
<td>1-2</td>
<td>7-15</td>
</tr>
<tr>
<td>3-4</td>
<td>15-20</td>
</tr>
<tr>
<td>5-7</td>
<td>20-25</td>
</tr>
<tr>
<td>8-11</td>
<td>-</td>
</tr>
<tr>
<td>Sign</td>
<td>Age</td>
</tr>
<tr>
<td>------</td>
<td>-----</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Stature, cm</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>17</td>
</tr>
<tr>
<td>Weight, kg</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>17</td>
</tr>
<tr>
<td>Circumference of the thorax, cm</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>
Regression scale by the stature

<table>
<thead>
<tr>
<th>Stature in cm</th>
<th>Weight in kg</th>
<th>Circumference of thorax in cm</th>
<th>Stature in cm</th>
<th>Weight in kg</th>
<th>Circumference of thorax in cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>107</td>
<td>16.6</td>
<td>56.4</td>
<td>107</td>
<td>15.5</td>
<td>53.2</td>
</tr>
<tr>
<td>108</td>
<td>17.2</td>
<td>56.8</td>
<td>108</td>
<td>16.0</td>
<td>53.6</td>
</tr>
<tr>
<td>109</td>
<td>17.7</td>
<td>57.1</td>
<td>109</td>
<td>16.5</td>
<td>54.0</td>
</tr>
<tr>
<td>110</td>
<td>18.2</td>
<td>57.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>111</td>
<td>17.7</td>
<td>57.7</td>
<td>110</td>
<td>17.0</td>
<td>54.3</td>
</tr>
<tr>
<td>112</td>
<td>19.2</td>
<td>58.0</td>
<td>111</td>
<td>17.6</td>
<td>54.7</td>
</tr>
<tr>
<td>113</td>
<td>19.8</td>
<td>58.3</td>
<td>112</td>
<td>18.1</td>
<td>55.1</td>
</tr>
<tr>
<td>114</td>
<td>20.3</td>
<td>58.6</td>
<td>113</td>
<td>18.6</td>
<td>55.5</td>
</tr>
<tr>
<td>115</td>
<td>20.8</td>
<td>58.9</td>
<td>114</td>
<td>19.2</td>
<td>55.9</td>
</tr>
<tr>
<td>116</td>
<td>21.3</td>
<td>59.2</td>
<td>115</td>
<td>19.7</td>
<td>56.2</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>117</td>
<td>21.8</td>
<td>59.5</td>
<td>116</td>
<td>20.2</td>
<td>56.6</td>
</tr>
<tr>
<td>118</td>
<td>22.4</td>
<td>59.8</td>
<td>117</td>
<td>20.8</td>
<td>57.0</td>
</tr>
<tr>
<td>119</td>
<td>22.9</td>
<td>60.2</td>
<td>118</td>
<td>21.3</td>
<td>57.4</td>
</tr>
<tr>
<td>120</td>
<td>23.4</td>
<td>60.5</td>
<td>119</td>
<td>21.8</td>
<td>57.8</td>
</tr>
<tr>
<td>121</td>
<td>23.9</td>
<td>60.8</td>
<td>120</td>
<td>22.4</td>
<td>58.1</td>
</tr>
<tr>
<td>122</td>
<td>24.4</td>
<td>61.1</td>
<td>121</td>
<td>22.9</td>
<td>58.5</td>
</tr>
<tr>
<td>123</td>
<td>25.0</td>
<td>61.4</td>
<td>122</td>
<td>23.4</td>
<td>58.9</td>
</tr>
<tr>
<td>124</td>
<td>25.5</td>
<td>61.7</td>
<td>123</td>
<td>23.9</td>
<td>59.3</td>
</tr>
<tr>
<td>125</td>
<td>26.0</td>
<td>62.0</td>
<td>124</td>
<td>24.5</td>
<td>59.7</td>
</tr>
<tr>
<td>126</td>
<td>26.5</td>
<td>62.3</td>
<td>125</td>
<td>25.0</td>
<td>60.0</td>
</tr>
<tr>
<td>127</td>
<td>27.0</td>
<td>62.6</td>
<td>126</td>
<td>25.5</td>
<td>60.4</td>
</tr>
<tr>
<td>Above</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>128</td>
<td>27.6</td>
<td>62.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>129</td>
<td>28.1</td>
<td>63.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>28.6</td>
<td>63.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>131</td>
<td>29.1</td>
<td>63.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>132</td>
<td>29.6</td>
<td>64.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High index</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>133</td>
<td>30.2</td>
<td>64.5</td>
<td>133</td>
<td>29.2</td>
<td>63.1</td>
</tr>
<tr>
<td>134</td>
<td>30.7</td>
<td>64.8</td>
<td>134</td>
<td>29.8</td>
<td>63.5</td>
</tr>
<tr>
<td>135</td>
<td>31.2</td>
<td>65.1</td>
<td>135</td>
<td>30.3</td>
<td>63.8</td>
</tr>
<tr>
<td>136</td>
<td>31.7</td>
<td>65.4</td>
<td>136</td>
<td>30.8</td>
<td>64.2</td>
</tr>
<tr>
<td>137</td>
<td>32.2</td>
<td>65.7</td>
<td>137</td>
<td>31.4</td>
<td>64.6</td>
</tr>
<tr>
<td>138</td>
<td>32.8</td>
<td>66.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>139</td>
<td>33.3</td>
<td>66.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M ± σ_R</td>
<td>121.6 ±5.28</td>
<td>24.3 ±2.28</td>
<td>121.5 ±5.54</td>
<td>23.3 ±2.19</td>
<td>58.7 ±2.81</td>
</tr>
</tbody>
</table>
Structure and content of this workbook for students corresponds to the educational program and basic program plan of practical lessons for students of the 3rd year of study. It includes the list of compulsory practical skills and practical lessons for general problems of hygiene. The workbook contains the main information and reference materials in accordance with the international and Ukrainian hygienic standards and other specific information.

Approved by scientific council of KNMU Protocol № 6 from 21.05.2009.

© Kharkov National Medical University, 2012.