

MINISTRY OF HEALTH OF UKRAINE
O.O. BOGOMOLET'S NATIONAL MEDICAL UNIVERSITY

“Approved”

at the methodological conference of hygiene
and ecology department

Head of the department

correspondent member of NAMS of Ukraine,
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GUIDELINES
FOR STUDENTS

<i>Subject</i>	Hygiene and ecology
<i>Module № 1</i>	Assessment of the environment and its impact on the population health
<i>Submodule № 4</i>	Labour hygiene
<i>Topic of the lesson</i>	Legislative background for carrying out the sanitary inspection in labour hygiene.
<i>Course</i>	6
<i>Faculty</i>	medical
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Kiev

1. Learning objective

1.1. Learn about general hazards caused by industrial environment and occupational injuries and diseases as their consequences.

1.2. Learn about methods and techniques for determination of the most common types of occupational hazards and their impact on worker's organism and health; about legislative, administrative, technical measures for health protection and prevention of occupational diseases.

1.3. 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.

1.4. Substantiate and take the indispensable therapeutic and prophylactic measures.

2. Basics

2.1. You should know:

2.1.1. Fundamentals of Ukrainian legislation in the field of hygiene and labour protection.

2.1.2. Classification and characteristics of occupational hazards.

2.1.3. Physiologic, biochemical and pathophysiological signs and characteristics of organism's response to occupational hazards.

2.1.4. Fundamentals of toxicology of chemical compounds – routes of penetration into organism, their transformation, mechanism of action, excretion.

2.1.5. Methods and techniques of intoxication prophylaxis, basic criteria of hygienic standardization of chemical compounds in the working zone air, in the other environments.

2.2. You should have the following skills:

2.2.1. To determine basic agents of industrial environment and work process that may have negative impact on the worker, to reveal and assess signs of such impact on organism.

2.2.2. To substantiate and carry out sanitary and hygienic measures regarding safe working conditions.

2.2.3. To recognize and investigate cases of poisonings and diseases having chemical character, use appropriate normative and directive documentation.

2.2.4. To recommend and take prophylactic measures regarding occupational diseases and poisonings, assess their effectiveness.

2.2.5. To draw up the documents concerning investigation of the cases of occupational poisonings and diseases properly.

3. Self-training questions

3.1. Work and labour as physical and philosophical concepts. Labour as social category. Division of labour in society.

3.2. Articles about labour protection in the Constitution of Ukraine.

3.3. Sanitary legislation in the field of labour protection. Labour Code (LC), its basic constituent regulations.

3.4. Occupational hazards' classification according to State Standard 12.0-003-74 "Dangerous and hazardous industrial agents".

3.5. Physical occupational hazards, their classification and significance in the professional pathology.

3.6. Chemical occupational hazards. Classification of dangerous and hazardous chemical agents of industrial environment, variety of their impact on organism. Occupational poisonings.

3.7. Biological agents as occupational hazards. Occupational infections, invasions and other kinds of pathology.

3.8. Psycho-physiological dangerous and hazardous industrial agents, kinds of pathology caused by these agents.

3.9. Labour physiology and main issues, which it studies. Concept of labour hardness and intensity.

3.10. Characteristics of methods and measuring devices of occupational hazards and their impact on organism and health.

3.11. Methods and measures of occupational pathology prevention and labour protection in industry.

3. Self-training assignments

4.1. When a regularly scheduled medical examination of the workers, who pour less-common non-ferrous metal (zinc) into small molds was carried out in the works, there were the following changes in peripheral blood detected: blurred reticulosis, basophilic stippling of erythrocytes, decrease of hemoglobin content. When carrying out the examination there was observed the peculiar hardly noticeable sallow pale colour of cutaneous coverings, inconspicuous limbus of chalky-scaly color along the margin of gums, qualitative test for presence of heavy metals in blood was positive; in urine – negative, though there was detected increased content of porphyrin in it.

When carrying out investigation of worker's conditions of job it was ascertained the following: pouring of metal into molds is done manually, this work is qualified as hard work, pouring area is equipped with aeration system using thermal head, places of pouring of metal are not provided for fume hoods. Temperature of air within workplace zone was 23°C during cold season, during warm season – up to 26°C. Concentration of aerosols of poured metal oxides in workplace zone was within 0.08-0.12 mg/m³ (MAC – 0.01 mg/m³). Workers did not use personal protective equipment.

Tasks:

1. Specify possible causes, which set conditions for origination of this occupational poisoning, substantiate the “occupational poisoning” diagnosis.
2. List main measures the physician must take in case of this occupational poisoning.
3. Describe the clinical picture and prophylaxis of zinc oxide poisonings in detail.

4.2. On September 21 of current year, 41-year old gasoline tank truck driver went to the polyclinic of petroleum refining plant to consult a physician because of headache, vertigo, nausea, asthenia, heartbeats, general tremor, sense of squeezing at heart area, sore throat, cutting pain in eyes.

Occupational assessment: he considers that he became ill since September 21 of current year, when in 3 hours after truck tank washing he felt hysteric reaction caused by trivial remark, tears, vertigo, nausea, asthenia, heartbeats, and then sleepiness, flaccidity, sharp cough, cutting pain in eyes, though he was in good health before.

Objective evidence: mucous membranes and cutaneous coverings are without changes. Blood pressure (BP) – 80/60 Hg mm, pulse is 54 heart beats per minute,

respiratory rate is 16 per minute, rough breath sounds in lungs, body temperature is 35.6°C. Heart sounds are muted. Stool is usual.

Tasks:

1. Set a provisional diagnosis.
2. Specify possible causes that set conditions for origination of this poisoning. Is there any substantiation to recognize this poisoning as occupational poisoning?
3. Specify main prophylaxis methods for gasoline vapour poisoning.
4. Draw up an emergency report on the acute occupational poisoning and other documents concerning its investigation.

5.

4.3 On March 5 of current year, seven workers from the sulfur-bearing oil processing (hydrogen sulfide extraction) workshop went to the medical and sanitary unit of the petroleum refining plant to consult a physician because of burning pain and cutting pain in eyes, cough, headache, nausea, emesis, problems with coordination of movements. Medical treatment was not provided.

On March 4 of current year the patients were working during the whole day in the workshop, where there was no exhaust ventilation due to routine maintenance of sanitary appliances.

Objective evidence: mucous membranes are irritated, cutaneous coverings are slightly hyperemic, and pulse is 60 heart beats per minute. Respiratory rate is 22 per minute, arterial pressure is 80/60 Hg mm. Body temperature is 37.5°C. Heart limits are within normal. Distant dry stertors are heard in lungs, rough breath sounds, liquid stool.

Tasks:

1. Specify possible cause of poisoning. Is there any substantiation to recognize it as occupational poisoning?
2. Which supplementary anamnestic data should one have to determine etiology of occupational disease?
3. List main measures the physician must take in case of this occupational poisoning.
4. Draw up an emergency report on the acute poisoning, the investigation certificate.

5. Structure and content of the lesson (duration of the lesson 160 min + 10 min break)

5.1. Preamble – 5-10 min.

5.2. Test control for assessment of students' knowledge datum level – 10-15 min

5.3. Theoretical training – 30-40 min.

5.4. Typical situational tasks "Krok-2" solution – 30-40 min.

5.5. State exams situational tasks solution – 30-40 min.

5.6. Test control for assessment of students' knowledge final level – 10-15 min.

Theoretical material

Dangerous industrial hazards (Abstract from State Standard 12.0.003 - 74)

According to this standard all dangerous industrial hazards are divided into 4 groups: physical, chemical, biological and psycho-physiological.

Industrial physical hazards are:

- movable machines, mechanisms, unprotected movable elements of production equipment, feedstock, materials, goods that move, other mechanical agents;
- hot or cold microclimate of the working zone, high levels of infrared radiation (hot shops in metallurgy industry, boiler shops etc.), hot water or steam;
- increased or decreased barometric pressure and its leaps;
- high noise level, vibration, infra- and ultra-mechanical fluctuations of air or hard surfaces;
- high levels of radio region electromagnetic oscillations, electric magnetic fields of commercial frequency, static electricity;
- high levels of ionizing radiation (X-radiation, gamma-radiation, corpuscular radiation);
- insufficient or excessive illumination of work places, low contrast, high luminosity, its dazzle, unevenness, pulsation of the light, stroboscopic effect;
- high dust content in the air, fuel and explosive gases (methane in the coal mines).

Group of chemical dangerous industrial hazards includes:

- according to their action on organism - irritant, general toxic, sensibilizing, carcinogenic, mutagenic and teratogenic;
- according to their penetration route into organism: through respiratory tract, digestive system, skin (chemical burns);
- according to their tropism: pneumo-, neuro-, hepato-, hemato-, nephro-, dermato- and polytropic;
- according to level of toxicity: extremely toxic (MAC in the air $< 0.1 \text{ mg/m}^3$), highly toxic (MAC $0.1 - 1.0 \text{ mg/m}^3$), medium toxic (MAC $1.0 - 10.0 \text{ mg/m}^3$), low toxic (MAC $> 10.0 \text{ mg/m}^3$).

Group of biological dangerous industrial hazards includes those biological objects, which impact on the workers causes diseases, poisonings and injuries:

- zoonotic bacterial, viral, fungal infections (anthrax, foot-and-mouth disease, Bovine Spongiform Encephalopathy (BSE), tularemia), invasions, allergies (from animal and plant dust) etc.;
- plant toxins and venoms (like snake hunters) etc.;
- biological production objects: antibiotics, protein-vitaminous concentrates, growth agents, bioactive preparations etc.

Group of psycho-physiological industrial hazards includes:

- excessive physical activities: static (hold of heavy loads); dynamic (lifting and displacement of heavy loads and their intensity); hypodynamia, forced body position, overstrain of some organs;
- neuropsychic overstrains: mental overstrains, overstrains of attention and analyzers, very rapid change of production processes, information, work monotony, psychological and emotional overloads (like “chief- subordinate” interrelations).

According to the character and extent of energy expenditure, physical labour is characterized by its weight and intensity, and mental activity, like operator's – by its intensity.

According to the State Standard 12.1.005 – 88 “General hygiene and sanitary requirements for air in the working zone” physical labour is divided into light one (energy expenditure – below 150 large calories per year), medium complexity (150 – 200 large calories per year), heavy one (200 – 250 large calories per year), and very heavy labour (> 250 large calories per year).

According to its tension, mental, operator’s work is divided into: non-tensioned, slightly tensioned, tensioned, super tensioned.

In accordance to the listed agents of industrial hazards “List of occupational diseases and instruction for its application” was approved by the Order № 23/36/9 from 2.02.1995 of the Ministry of Social Policy and Ministry of Labour.

Occupational diseases caused solely by industrial and occupational hazards, their consequences in the near and distant future as well as consequences of non-occupational diseases caused by occupational hazards (like arterial hypertension caused by vibration) were put on the list.

Acute and chronic occupational diseases and poisonings are recognized.

Acute occupational disease (intoxication) begins suddenly, after only one impact of a relatively high concentration of toxic chemical agents (during one shift) in the air of the working zone or levels or doses of other hazards.

Chronic occupational diseases occur as the result of long-term exposure to low (but exceeding MAC, MAL, MAD) concentrations, levels and doses of occupational and industrial hazards.

According to approved “List...” occupational diseases are divided into 7 groups:

1. diseases caused by chemical agents: acute and chronic intoxications of different tropism (neuro-, hemo-, hepato-, nephro-, poli-, dermatotropic, allergic etc.);

2. diseases caused by industrial particulate pollutants: black-lung diseases, dust bronchitis, rhino-pharyngolaryngitis, allergies;

3. diseases caused by physical agents: ionizing radiations (acute, chronic radiation sickness, local radiation injuries, long-term consequences – malignant tumors); non-ionizing radiations (laser, ultraviolet, infrared); decompression - caisson sickness; acute, chronic overheating; noise, vibratory diseases etc.;

4. diseases caused by overload and overstrain of certain organs and systems: coordination neurosis (at milkmaidens, violin players, linotypers), radiculitis, tendovaginitis, arthrosis, bursitis, thrombophlebitis; laryngitis at singers, teachers, progressive myopia etc.;

5. diseases caused by biological agents: infectious and parasitogenic diseases at stock-breeders, vets, infectiologists, bacterial laboratory assistants etc.;

6. allergic diseases: conjunctivitis, rhinitis, bronchial asthma, dermatitis, eczema, urticaria etc., that occur when one works with corresponding agents of plant or animal origin;

7. neoplasms – malignant tumors when working with carcinogenic substances of physical (ionizing radiations, ultraviolet radiation) and chemical (3, 4-benzpyrene, resins etc.) origin.

Considering listed industrial hazards and occupational diseases and poisonings that they can cause, a task of the physicians – specialists in occupational hygiene, occupational pathologists, and physicians of different specialties of medical departments of industrial plants and patient care and preventive institutions is:

- to study hazards of industrial environment, engineering processes and their compliance with hygienic regulations;
- to study impact of different hazards of industrial environment, (engineering process, air of the working zone, raw materials, half-products, end products, accompany products, wastes and industrial emissions);
- to study state of health of workers, their general occupational disease incidence;
- diagnostics and treatment of occupational diseases and poisonings, prevention and medical examination, sanatorium-and-spa treatment of the workers, participation in the work of Medical and Social Commission of Experts (MSCE), Medical Controlling Commissions (MCC), Medical and Labour Commission of Experts (MLCE) etc., examination commission of occupational pathology, ascertainment of disability etc.

Preventive medical measures must include:

- participation in development of technical and engineering sanitation of working conditions (airing, packaging, automation, mechanization, remote control etc.);
- scientific development of hygienic regulations, different sanitary legislation; Industrial Engineering (IE). (see appendices 3.1 - 3.7);
- preventive and running check by sanitary inspectors;
- health education and preventive work in the work collective (teaching sanitary regulations, use of overalls and personal protectors, clinical and preventive nutrition, water consumption schedule).

Methods and means of measurement of industrial hazards and working conditions (microclimate, noise, vibrations, natural and artificial illumination, electromagnetic radiation etc.) were learnt by students in the corresponding hygiene sections, therefore they are just mentioned in this lecture.

Methods and indications of environmental impact on organism and health were learnt by students in the previous sections of hygiene and physiology, pathologic physiology, biochemistry, lectures of clinical chairs, therefore in this lesson they are just listed.

Personal protective equipment of body, respiratory tract, eyes and ears are considered in "Personal hygiene" section.

ORGANIZATIONAL FORMS OF MEDICAL SERVICE OF INDUSTRIAL ENTERPRISES

Quantity of workers:	Up to 400 workers at harmless and up to 200 workers at harmful manufactures	400-1,000 workers at harmless and 200-400 workers at harmful manufactures	1,000-5,000 workers at harmless and 400-1,000 workers at harmful manufactures	5,000-10,000 workers at harmless and 1,000-5,000 workers at harmful manufactures	More than 10,000 workers at harmless and more than 5,000 workers at harmful manufactures
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Forms of medical structures	Territory medical institutions' service /regional polyclinic, hospital/	Medical attendant's /nursing/ medical posts formed from regional polyclinic personnel	Doctor's medical posts from regional polyclinic or from joint medico-sanitary centre	Medico-sanitary centre (MSC) with polyclinic, factory medical attendant's medical posts	MSC with polyclinics, hospitals, preventoriums, sanatorium-and-spa institution, doctor's and medical attendant's medical posts
Personnel of medical institutions	Personnel of district polyclinic, hospital, regional SES	Medical attendant /nurse/, aid women from regional polyclinic.	Doctor, nurses, aid women, from regional polyclinic or combined medico-sanitary centre	Working physicians, surgeons, neurologists, dermatologists, oculists, otolaryngologists, gynecologists, nurses, aid women.	Physicians, surgeons, neurologists, dermatologists, oculists, otolaryngologists, gynecologists, physical hydrotherapist, working physicians, nurses, aid women operating personnel.
Content and work methods of sanitary departments of enterprises	Extent of medical care according to category of regional hospital and polyclinic /general and qualified medical care/. SES control	First (before doctor) aid on-site and qualified medical assistance – in regional polyclinic, hospital. Sanitary inspection of SES.	First doctor's aid on-site and qualified medical assistance – in regional polyclinic, hospital or in combined medico-sanitary centre. Sanitary inspection of SES.	All kinds of qualified and specialized assistance by specialists of MSS, doctor's, medical attendant's aid in the factory. Sanitary inspection of SES.	Full treatment, health improving measures, prophylaxis, sanatorium-and-spa provision, regular medical check-up. Medical provision on-site (in the workshop). Sanitary inspection of SES.

With all forms of medical structures: - preliminary and regular examinations

- sanitary educational work
- preventive measures on workplaces

Main tasks and work forms of medical departments at industrial enterprises

Medical and sanitary centre (MSC) is a polyclinic or a hospital which is purposed exclusively or mainly for medical care of workers of industrial enterprises, construction organizations or other relatively big work collectives. According to “Regulation on MSS” its main tasks are following:

- providing urgent, first, qualified and specialized medical assistance to factory workers and other registered persons (family members of the workers);
- participation in activities of administration concerning sanitation of working conditions, prevention and reduction of systemic disease incidence and occupational morbidity, occupational traumatism, invalidism;
- regular medical examination of particular contingent of workers that are united by working conditions, pregnancy, age;
- organization and carrying out (together with SES) of preliminary (at the employment), regular and target medical examinations, development of sanitation measures according to results of medical examinations and their fulfillment control;
- examination of temporary disability of workers, issue and extension of medical certificates;
- participation (together with administration and trade union of the enterprise) in the work of medical and social commission of experts (MSCE), medical control commissions (MCC), medical and labour commission of experts (MLCE) at detection of occupational diseases and poisonings, disability, at medical selection of workers that require invalid food, referrals to sanatorium, preventorium, rehabilitation center, transfer to other allotted works with easier conditions of work; participation in work of social insurance commission;
- analysis of reasons of general and occupational morbidity, traumatism, disability and development of complex sanitation measures (together with administration, trade union, SES);
- analysis of efficiency of carried out medicinal sanitation measures, invalid food, sanatorium-and-spa treatment;
- sanitary educational work among workers, organization of the work of sanitary activists' teams;
- introduction into practice of advanced forms and methods of scientific labour management, raising the level of doctors', medical attendants', nurses' skills in the field of occupational pathology and prevention;
- record-keeping and reporting.

Sanitation medical posts are organized in small enterprises or separate workshops and are headed by factory's sectorial doctor – physician in charge of a workshop medical area (specialist-occupational pathologist) or by medical attendant, or by a nurse.

Medical posts are responsible for:

- early detection and urgent medical aid at traumas, acute and systemic diseases, poisonings, patient referrals for hospitalization;
- sending of emergency reports to SES about food, acute occupational poisonings, infectious diseases;
- pertaining to the prophylaxis in the workshop medical area;

- participation in the work of disability examination commission;
- participation in preliminary (at giving an employment), periodical or target medical examinations;
- employment control according to decisions of MSCE, MCC, MLCE.
- learning (together with sanitary inspector in occupational hygiene) about conditions of work in the workshop and development of corresponding sanitation measures;
- medical selection of patients that require special diet, regular medical check-up, referrals to preventorium, sanatorium and sending them to appropriate commissions;
- management and control of the work of sanitary activists, carrying out of sanitary instructive work;
- systematic analysis of general and occupational morbidity, traumatism;
- record-keeping and reporting at a medical post.

Legislative documentation that regulates work of medical and sanitary stations and medical posts:

1. Order of Ministry of Public Health of Ukraine № 263/121 from 1994 “List of works that require additional occupational take on”; which includes: underground works (in mines, construction of subway), works in hyperbaric chambers, diving jobs, altitude, alive works, works with explosives, in metallurgy, in transport etc.

2. Order of Ministry of Public Health of former USSR № 555 from 1989 “On improvement of medical care of workers of industry and carriers” and supplement to it – Order of Ministry of Public Health of Ukraine № 745 from 1994 “Regulation on medical examination of workers of certain categories”. These orders contain list of professions that anticipate preliminary (at the employment), periodical or target medical examinations; directions for such examinations, directions for drawing up hygiene and sanitary characteristics of working conditions of the worker who is suspected to have occupational disease, directions for medical examination of vehicle drivers before their trip start.

3. Order of Ministry of Public Health of former USSR № 12 from 1978. “On improvement of medical care of workers of industry, construction and transport”.

4. Regulations “On cooperation of enterprises (associations), organizations, institutions and sanitary-epidemiological stations on work conditions laboratory control” etc.

Medico-sanitary stations and medical posts of industrial enterprises keep registration and make reports about their activity in specially provided fill-out forms and send them in time scheduled by Central Department of Statistics and Ministry of Public Health.

Teachers of the department prepare such record and report forms for students’ familiarization.

TRAINING INSTRUCTION

on the noise measurement by sound level meter IIIYM-1-M (SHUM-1-M) (see fig. 33.3)

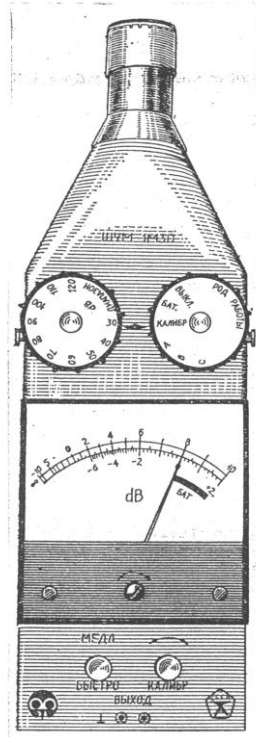


Fig. 33.3. Sound level meter „IIIYM-1M” (SHUM-1-M)

Setting-up procedures

1. An instrument is located close to the source of noise.
2. Capsule of microphone is screwed up on the electronic module.
3. Switch "Fast - Slow" is set in the position "Fast".
4. Required sound level is selected by switch "Band".
5. Switch «Operation mode» is moved to position «Battery» (needle must be located at the left side of the black sector, otherwise, battery should be replaced).
6. Switch «Operation mode» is set in the position of «Calibration» and with the help of button «Calibration» set a needle to the reference level of microphone capsule.

MEASUREMENTS

7. Switch "Operation mode" is set to characteristic A (if necessary – on characteristic B or C).
8. Switch «Band» is turned to the left, or to the right, to place the needle in the range of 0 - 10 dB.
9. Measurement result is read as follows: add (if the needle on the scale of the instrument is located from the right of zero) or deduct (if the needle on the scale of the instrument is located from the left of zero) dB indication of the needle of the instruments' scale to dB indication of the switch «Band». For example, 60 dB of switch «Band» + 3.5 dB of scale = 63.5 dB.
10. On completion of measurements «Operation mode» switch is set to "Turn off" position.

TRAINING INSTRUCTION

on noise and vibration level meter BIIIB-003 (NVD-003) (see fig. 33.4) operation

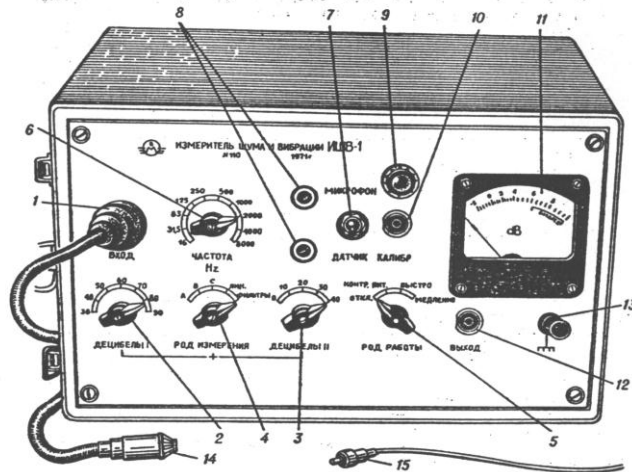


Fig. 33.4 Noise and vibration analyzer „BIIIB-003” (“NVD-003”)

Assignment of the instrument – This instrument is used for frequency analysis of noise and vibration parameters at scientific research works for permanent noise control according to SS 12.1.003-76 and for vibration control in the production areas.

Operational mode of the instrument. Analyzer BIIIB-003 (NVD-003) is designed on the principle of conversion of sound and mechanical vibrations of the objects under investigation into proportionate to them electric signals that later on are amplified and metered.

Preparation of the instrument for noise and frequency measurement. Instrument BIIIB-003 (NVD-003) can be operated from cells 373 or from 220 V electric mains. In this case the instrument is earthed through socket I. The needle of the instrument is set on zero scale indication with the help of mechanical equalizer (if required).

Switch «Operation mode» is set to the position -||- for voltage control of power supply elements. If voltage suffices the needle of the instrument must place between 7 and 10 scale divisions - + 10 (in lower scale divisions are marked by green strokes). Voltage presence is indicated by light of one of light-emitting diodes (LED) of the switch "Divider - dB 1, 2". Switch “Operation mode” is turned to positions F or S. The instrument is ready for operation.

Operation procedure. Before start of sound level measurement (and periodically in the process of measurement) electric calibration of the instrument BIIIB-003 (NVD-003) is carried out (according to special procedure).

Measurement of sound pressure levels at frequency characteristics of "Line", C. B. A:

- buttons "V", "1 kHz", "Octave filters", "H" must be switched off (unburied). Switch «Operation mode» is turned off.

- switches of the measuring instrument are set to position "Divider dB 1" - 80, "Divider dB II" - 50. Filters - to "Line", «Operation mode» - to F.

With this, a rightmost light-emitting diode lights up that corresponds to scale value 130 dB MI01 (the upper on the board). The instrument warms up during 2 minutes.

During measurements preamplifier ПМ-3 (PM-3) (microphone) should be held on a stretched hand in the direction to the source of the sound. If the needle of the instrument is located at the beginning of the scale (the lower), then it is moved to sector - 10 of dB scale, first by switch «Divider dB I», and then by switch «Divider dB II». If indicator "Overheat." lights up, «Divider dB I» should be switched over to a higher level.

When measuring sound low-frequency compounds oscillations of the needle of the instrument can occur. In this case switch «Operation mode» should be moved from F position to S position.

For getting measurement results, it is necessary to sum indications of light-emitting diode according to scale dB MI01 on the front board of the instrument and indications according to dB scale.

Sound pressure levels in octave bands of frequencies are measured only in frequency characteristic of "Line" (i.e., when switch "Filters" is positioned to "Line").

A button "Octave filters" is pressed. Required octave filters are switched on with the help of the switch "Octave filters", each time setting the needle of dB scale to the range of 0-10 dB with the help of switch «Divider dB II».

Switch «Divider dB I» must remain in the same position that it was when total amount of sound was measured (at characteristic of "Line").

At sound pressure in wind conditions, when wind speed exceeds 1 m/sec, screen П-II (for wind protection of capsule MI01) should be used. Sound pressure is measured as described above.

Based on the results a spectrogram is drawn (or ready-made form with standard curve is used), actual results are put in and frequencies that exceed standard ones are evaluated (fig. 33.2)

TRAINING INSTRUCTION

on pure tone audiometry by polyclinic audiometer (AP) (see fig. 33.5)

Hearing loss because of in-plant noise, depending on its degree, is diagnosed as auditory fatigue, auditory adaptation, cochlear neuritis (noise disease), occupational deafness.

Hearing loss among the workers because of in-plant noise is determined by audiometry method according to SS 12.0.067-78 "Noise. Determination methods of hearing loss of a person".

For assessment of the state of the auditory analyzer, method of determination of temporary and permanent shift of sensitivity threshold (TSST and PSST correspondingly) is used.

For assessment of the functional state of the auditory analyzer audiometers are used: clinical (AC) – for detailed clinical examination; polyclinic (AP) – for examination of auditory function of a person in polyclinic; mass (AM) – for mass rough assessment of auditory functions. Besides, audiometers of other manufacturers are used: "Elsa", "AU-5", "AM-31", audiometer - "PA-31" etc.

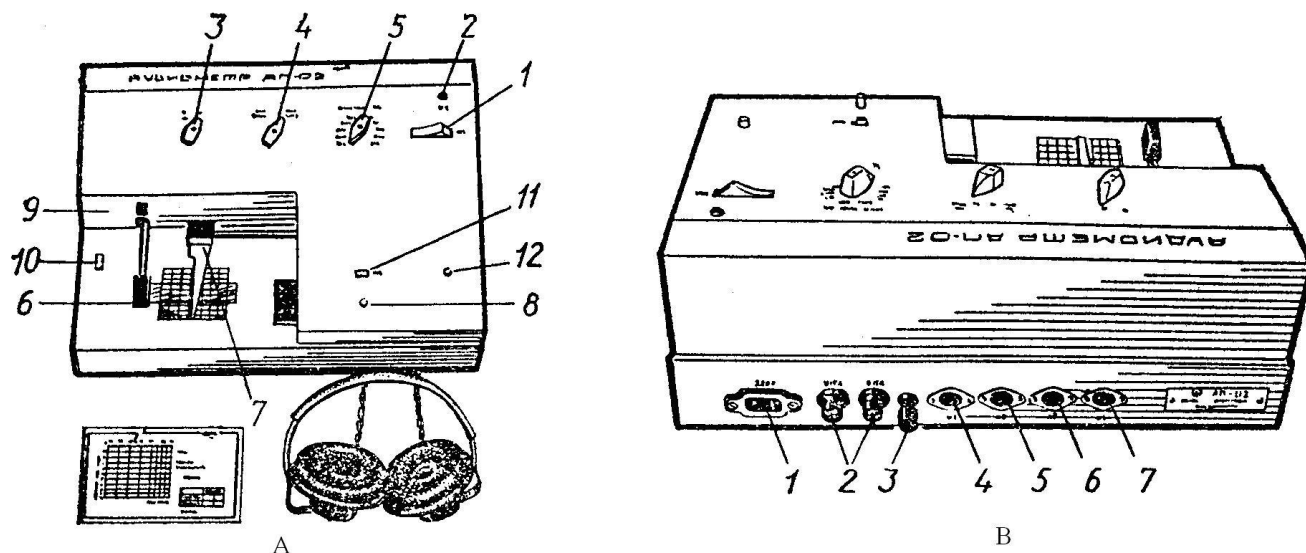


Fig. 33.5 Audiometer AP-02

a – physical configuration;

(1 – power connection key; 2 – indicating light; 3 – operation mode switch; 4 – switch telephones of air sound conduction; 5 – switch of masking noise intensity; 6 – tone intensity switch; 7 – frequency switch; 8 – button for audiogram freeze; 9 – indicating lamp of patient’s replies; 10 – switch „Conversation”; 11 – switch of tone feed break; 12 – button of tone feed break);

b – rear view;

(1 –plug for power connection; 2 – fuse box; 3 – bonding point; 4 – socket for connection of patient’s button; 5 – socket for telephones of bone sound conduction; 6 – socket for air conduction telephone; 7 – socket for microphone).

Pure tone audiometry procedure conducted with polyclinic audiometer (AP)

First of all it should be noted that audiometry must be conducted in the free-field room (a room, where a full silence is ensured). Procedure of pure tone audiometry measuring is as follows:

During the air conductivity examination, sounds of different levels are transmitted to the ear of the tested person through air telephone. Researches start from sound (tone) of frequency 1000 Hz transmission and sound energy flux density, which is much higher than hearing threshold is. Duration of tone sound transmission is about 1-2 seconds. Sound level is gradually being lowered until it becomes inaudible and then increased to the level of hardly heard. Thus audible sensitivity is determined at frequencies of 500, 200, 125, and later on - of 2000, 4000, 8000 Hz.

To determine bone sound conductivity bone telephone-vibrator is used, which must be pressed to mastoid process. At the same time in order to prevent auditing by another (untestable) ear, masking flat (white) noise is transmitted to that ear by a special device.

Measurement order for hearing threshold at bone sound conductivity is the same as at the air one.

To determine resistance of hearing organ in intensive in-plant noise conditions Paser’s test is used. At the same time after hearing threshold through air and bone sound conductivity of the tone of 1000 Hz determination, the same tone of 1000 Hz

and density of 100 dB is being transmitted through air conduction telephone to the ear during 3 minutes. After 15 seconds of sound loading, hearing threshold at the same frequency is determined once again. In an hour of rest the examination is repeated but sound loading of the same density and duration is transmitted through bone sound telephone. In 15 seconds after insonation, hearing threshold through bone sound conductivity of the tone of 1000 Hz is determined. Test results are assessed according to data of table 2.

Normative documents

Extract from State Standard 12.1.005-76 «Air of the working zone. General hygienic and sanitary requirements»

1.1. Optimal standards of temperature, relative humidity and air movement in the working zone of workshops

<i>Season</i>	<i>Work category</i>	<i>Temperature, °C</i>	<i>Relative humidity, %</i>	<i>Air movement, m/sec</i>
Cold and transitional seasons	Light – I	20-23	60-40	0.2
	Moderate– II a	18-20	60-40	0.2
	Moderate–II b	17-19	60-40	0.3
	Hard - III	16-18	60-40	0.3
Warm season	Light – I	22-25	60-40	0.2
	Moderate– II a	21-23	60-40	0.3
	Moderate–II b	20-22	60-40	0.4
	Hard - III	18-21	60-40	0.5

1.2. Allowable standards of temperature, relative humidity and air movement in the working zone of the workshops during cold and transitional seasons

<i>Work category</i>	<i>Air temperature, °C</i>	<i>Relative humidity, %</i>	<i>Air movement, m/sec</i>	<i>Air temperature outside workplace °C</i>
Light – I	19 – 25	75	0.2	15 – 26
Moderate– II a	17 – 23	75	0.3	13 – 24
Moderate–II b	15 – 21	75	0.4	13 – 24
Hard - III	13 - 19	75	0.5	12 - 19

3.3. Allowable standards of temperature, relative humidity and air movement in the working zone of the workshops at clear heat excess in warm season

Work category	Air temperature in premises, °C		Relative humidity, % in premises	Air movement, m/sec higher at higher temperature and lower at lower temperature	
	with little surplus of clear heat	with considerable surplus of clear heat		with little surplus of clear heat	with considerable surplus of clear heat
Light – I	At most 3° above average outdoor air temperature at 13.00 of the most hot month but below 28°	At most 3° above average outdoor air temperature at 13.00 of the most hot month but below 28°	At most, at the corresponding temperature	0.2 – 0.5	0.2 – 0.5
Moderate– II a	At most 3° above average outdoor air temperature at 13.00 of the most hot month but below 28°	At most 3° above average outdoor air temperature at 13.00 of the most hot month but below 28°	28° – 55% 27° – 60% 26° – 65% 25° – 70% 24° – 75%	0.2 – 0.5	0.3 – 0.7
Moderate–II b	At most 3° above average outdoor air temperature at 13.00 of the most hot month but below 26°	At most 3° above average outdoor air temperature at 13.00 of the most hot month but below 26°	At most, at the corresponding temperature	0.3 – 0.7	0.5 – 1.0
Heavy -III	At most 3° above average outdoor air temperature at 13.00 of the most hot month but below 26°	At most 3° above average outdoor air temperature at 13.00 of the most hot month but below 26°	26 – 65% 25 – 70% 24 – 75%	0.3 – 0.7	0.5 – 1.0

3.4. Air temperature outside permanent work places, °C, indoor

with little surplus of clear heat	with considerable surplus of clear heat
At most 3° above average outdoor air temperature at 13.00 of the hottest month	At most 5° above average outdoor air temperature at 13.00 of the hottest month

3.5. Maximum allowable concentration (MAC) of the aerosols with the fibrogenic activity

Substance	Value of MAC, mg/m ³	Class of hazard
Alumina – condensation aerosol	2	4
Alumina – disintegration aerosol (Argil, fused corundum)	6	4

<i>Substance</i>	<i>Value of MAC, mg/m³</i>	<i>Class of hazard</i>
Boron carbide	6	4
Dolomite	6	4
Crystal silicon dioxide:		
- content in dust - above 70%	1	3
- content in dust - within 10 – 70%	1	3
- content in dust - within 2 – 10%	4	4
Copper-nickel ore	4	4
Plant and animal origin dust with silicon oxide additive content of more than 10%	2	4
Industrial black soot with 3.4- benzpyrene additive content of less than 35 mg/kg	4	4
Content of natural and artificial asbestos in dust - more than 40%	2	4
Glass and mineral fiber	4	4
Cement, clay	6	4
Oil coke, shale coke, pitch coke	6	4
Coal with silicon oxide content of less than 25 %	10	4
Fused corundum with steel, chromium	6	4

3.6. Maximum allowable concentrations of hazardous substances in the air of working zone (selectively)

<i>Substance</i>	<i>Value of MAC, mg/m³</i>	<i>Class of hazard</i>	<i>Aggregative state *)</i>
Nitric oxides converted to NO ₂	5	2	f
Amino plastics (molding powders)	6	3	a
Ammonia	20	4	f
Arsenic anhydride	0.3	2	a
Selenium anhydride	0.1	1	a
Chrome anhydride	0.01	1	f
Anilin	0.1	2	f
Barium carbonate	0.5	1	a
Benzol	5	2	f
Beryllium and its compounds	0.001	1	a
3.4- benzpyrene	0.00015	1	a
Bromine	0.5	2	f
Gamma-hexachlorocyclohexane	0.05	1	a + f
Diethyl	0.005	1	f
Ethyl mercurous chloride (according to mercury)	0.005	1	a + f

*) a – aerosol; f – fumes and (or) gases; a + f – mixture of fumes and aerosol.

Maximum allowable levels of noise in the work places are given at the lesson “Methods of hygienic assessment of noise and vibration” (see Topic № 33).

6. Literature

6.1. Principal:

6.1.1. Загальна гігієна. Пропедевтика гігієни./ Є.Г. Гончарук, Ю.І. Кундієв, В.Г. Бардов та ін./ За ред. Є.Г. Гончарука. - К.: Вища школа, 1995 - С. 277-282.

6.1.2. Общая гигиена. Пропедевтика гигиены./ Е.И. Гончарук, Ю.И. Кундиев, В.Г. Бардов и др. - К.: Вища школа, 2000 - С. 333-344.

6.1.3. Даценко І.І., Габович Р.Д. Профілактична медицина. Загальна гігієна з основами екології. - К.: Здоров'я, 1999 - С. 284-289, 471-473.

6.1.4. Габович Р.Д., Познанский С.С. Шахбазян Р.Х. Гигиена. - К.: Вища школа, 1983 - С. 207-209, 217-220.

6.1.5. Lecture materials on the subject.

6.2. Additional:

6.2.1. Загальна гігієна. Посібник для практичних занять. / І.І.Даценко, О.Б.Денисюк, С.Л.Долошицький та ін. /За ред. І.І.Даценко - Львів, 1992 - С. 177-189.

6.2.2. Пивоваров Ю.П., Гоева О.Э., Величко А.А. Руководство к лабораторным занятиям по гигиене. - М: Медицина, 1983. - С. 147-161.

6.2.3. Гігієна праці. Підручник /За ред. А М Шевченка.- К.- Інфотекс, 2000.- 608 с.

6.2.4. Руководство к практическим занятиям по гигиене труда. / Под ред. А.М.Шевченко, Киев, “Вища школа”, 1986,- 336 с.

NEW REFERENCES

1. Hygiene and ecology: textbook for students of higher medical educational establishments / under the editorship of corresponding member of NAMS of Ukraine, prof. Bardov V.G. – Vinnytsia: Nova Knyha, 2009. – 688 p.

2. Hygiene and ecology / V.A. Korobchanskiy, M.P. Vorontsov, A.A. Musulbas. – Kharkov, 2006. – 207 p.

3. Medicine of emergency situations: textbook for students of higher medical institutions / V.V. Chaplyk, P.V. Oliynyk, S.T. Omelchuk, V.V. Humenyuk. – Vinnytsia: Nova Knyha, 2012. – 344 p.

4. General nutrition: Study guide for the 4th accreditation level Medical School Students / edited by S.T. Omelchuk, O.V. Kuzminska. – Kyiv, 2016. – 146 p.

5. Гигиена и экология: учебник для студентов высших медицинских учебных заведений. – Винница: НОВА КНИГА, 2008ю – 720 с.

7. Equipment required for the lesson

1. The Law of Ukraine «On provision of sanitary and epidemic safety of the population» from 24.02.1994.

2. Labour Protection Law of Ukraine No 64 from 1993.

3. Extracts from Labour Code (LC).

4. Extracts from legal acts, rules and instructions.

5. Dangerous industrial hazards (Extract from State Standard 12.0.003-74).

6. List of toils and works in dangerous and hazardous working conditions, where the involvement of women and adolescents is forbidden. (Order of the Ministry of Public Health of Ukraine No 51/260 from 1994).

7. Regulation on Medical and sanitary centers (MSC) and Medical stations of industrial enterprises.

8. Legislative documentation that regulates work of MSC, MSCE, MCC, MLCE.

(Order of Ministry of Public Health of Ukraine: “List of works that require additional occupational take on”; “Regulation on medical examination of workers of certain categories”; “On improvement of medical care of workers of industry, construction and transport”; “On cooperation of enterprises (association), organizations, institutions and sanitary epidemiological stations in laboratory (SES) monitoring of working conditions” etc.).

9. List of occupational diseases (MPH, MFA and ML. Order № 23 (36/9)).

10. Situational tasks Krok-2.

11. State examination situational tasks.