

LABORATORY NO. 2

2.1. VICIATED AIR

Definition. Viciated air represents the spoiling of the air's physical properties in a closed, unventilated and agglomerated room as an effect of the peoples' physiological activity in this room.

2.1.1. CAUSES OF THE VICIATED AIR:

- an increased temperature;
- an increased humidity;
- absence of air mobility.

OTHER CAUSES:

- a diminished oxygen concentration;
- an increased carbon dioxide concentration.

Initially they considered that the causes of a viciated air are a diminished oxygen concentration and an increased carbon dioxide concentration.

Hill and Haldanne demonstrated that the viciated air has the causes such as the modification of the air's physical properties, through two types of experiments:

HILL'S EXPERIMENT

Hill placed one group of people in a closed, agglomerated and unventilated room. When the symptoms began to appear, he used a ventilation apparatus. The symptoms had dissappeared.

HALDANNE'S EXPERIMENT

He placed two groups of persons in such a way that one group was in a closed, unventilated and agglomerated room and breathed air from exterior through tubs, and the other group was placed outside the room and breathed air from interior in the same way (through tubs).

The symptoms appeared in the group placed inside the room.

2.1.2. THE SYMPTOMATOLOGY

The accute symptomatology consists in:

- unbreathing heat perception;
- perspiration and swet;
- thirst;
- headache;
- vertigo;
- nausea;
- dizziness;
- tiredness;
- sleepness;
- lypotimia.

Chronical symptomatology consists in:

- organism's decreased resistance to the infections and chemical substances;
- anemia;
- delayed physical and neuropsychical development.

2.1.3. ESTABLISHING CARBON DIOXIDE

Carbon dioxide concentration (percent) is an index for viciated air.

Principle of determination

It is aspired a certain air volume through a measured quantity of barium hydroxid. Carbon dioxide from the inhaled sample will combine with a part of barium hidroxid solution and will form barium carbonate, unsolvable. Barium hidroxid remained uncombined is neutralized by oxalic acid in the presence of phenolphtaleine as colour indicator. It is titrated until pink colour dissapear.

2.1.4. NORMAL VALUES

Normal values are maximum 0,07%, exceptional 0,1% CO₂.

2.2. ILLUMINATION DETERMINATION

Definition. Illumination is the light effect which appears on a surface. The unit of measure for illumination is the lux.

2.2.1. EFFECTS OF THE LIGHT ON HUMAN HEALTH

The light has effects upon:

- the Central Nervous System - on Reticulate Ascendent Activator System;
- the skin:
 - photoallergenic effects
 - phototoxic effects
- the eyes - on the main functions of the eye:
 - visual accuity (perception);
 - contrast sensitivity;
 - clear visual stability;
 - visual perception speed;

A diminished illumination causes tiredness, decrease of the functional capacity, visual disorders such as myopia.

An excessive illumination causes photophobia, eye-pain, headache, sheded tears, temporary blindness.

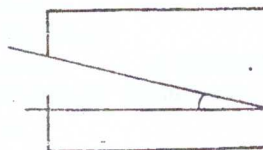
2.2.2. NATURAL ILLUMINATION

The illumination is natural and artificial.

Natural illumination can be realised directly by sun light, or can be realised directly by light sky, and reflected light by soil surface, building water surface.

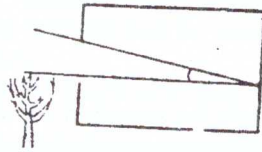
Building factors necessary for a good natural illumination are:

2.2.2.1. ANGLE OF INCIDENCE



The minimal value is 27° .

2.2.2.2. THE OPENNING ANGLE (THE FREE VIEW OF THE SKY ANGLE)



The minimal value is 5° .

2.2.2.3. LUMINOSITY COEFFICIENT

Luminosity coefficient results from ratio between window's surface and floor's surface of the room.

$$\text{Luminosity-coefficient} = \frac{\text{Window-surface}}{\text{Floor-surface}}$$

NORMAL VALUES FOR THE LUMINOSITY COEFFICIENT

- for dining room - $1/8 - 1/10$;
- for school halls - $1/4 - 1/6$;
- for industry that carries on high precision activity $1/2 - 1/4$.

2.2.2.4. DISTANCE BETWEEN BUILDINGS

Distance between buildings may be greater or the same as the building height.

$$D \geq H$$

where: D - distance between the buildings;
H - the building height.

2.2.2.5. ROOM DEPTH

Room depth may not be over $2,5$ x distance between floor and superior part of the window.

2.2.2.6. ILLUMINATION RATIO (COEFFICIENT)

Illumination ratio is the percentage ratio between interior and exterior illumination.

$$\text{Illumination-ratio} = \frac{\text{Interior-illumination}}{\text{Exterior-illumination}} \cdot 100$$

NORMAL VALUES FOR ILLUMINATION RATIO

- For the rooms of the house - **1%**;
- For school halls - **2%**;
- For industry with the highest precision activity - **10%**.

2.2.3. ARTIFICIAL ILLUMINATION

It is divided into two systems:

- incandescent system
- fluorescent system

The artificial illumination must fulfil the following conditions:

- a good light intensity for the activity is carried on in the room;
- missing shadow and bright light;
- presence of uniformity in space and time;
- no increase of atmosphere temperature;
- identical spectrum with natural illumination.

2.2.4. ILLUMINATION DETERMINATION

It is realised with luxmeter.

This apparatus measures illumination depending on the electricity formed in a circuit under the light radiations action. The reached values are expressed directly in lucsi.

The method is called luxmetry.

NORMAL VALUES FOR ILLUMINATION (NATURAL AND ARTIFICIAL) INTO A ROOM

- in the house:
 - in the kitchen - **50 lx**
 - in the dining room - **50 lx**
 - in the bedroom - **30 lx**
 - in the hall - **50 lx**
- in the hospital:
 - local illumination - **300 lx**
 - general illumination - **100 lx**
 - in the night - **2 lx** (blue light - for orientation)
 - in the surgery hall:
 - general illumination - **300 lx**
 - local illumination (in operational field) - **3000 lx**
- in school halls:
 - general illumination - **150 lx**
 - local illumination (on the writing or reading area) - **300 lx**.