

Physical factors in the indoor environment of buildings

The issue of the difficulties associated with living indoors came to the fore during the energy crisis in the **70s in the USA**, when it was necessary to **save energy** and houses were modified to prevent energy leakage. Natural ventilation through leaks was reduced, ventilation was reduced and air-conditioners with air recirculation became widely used. This has led to the **accumulation of pollutants** in the air in buildings, resulting in a non-specific health problem known as *Sick Building Syndrome*. Pollutants are both generated within buildings and enter the building from the external environment. These substances can be divided by factors into physical, chemical and biological. Physical factors in the indoor environment of buildings include **temperature, humidity and airflow** (thermal-humidity microclimate), **ionizing and non-ionizing radiation, noise, vibration and electroionic microclimate**.

Electroionic microclimate

Electroionic microclimate represents the amount of **free atmospheric ions** in the air.

Types of ions and their formation

Ions can be positive or negative and also light, medium, heavy or small, medium, large. They are formed both by **radioactive radiation** or **UV**, by **electrical discharge** and by **water spray** (e.g. waterfalls). Light ions are single ionized particles, heavy ions are formed by adsorption of light ions onto condensation nuclei (dust aerosol) or by aggregation of ionized molecules.

Occurrence of individual types of ions

High air ionization is in the upper atmosphere. Large amounts of **light ions** are above large **water levels**, in **mountains**, in **caves**. In industrial areas and in **cities, heavy ions** predominate due to high **dustiness**. These heavy positive ions are condensation nuclei that trap light ions on their surface (thus reducing the amount of negative ions in the air).

Effect on the organism

The organism is positively influenced by **light** or also **small negative ions**. They have a positive effect on the respiratory system, where they give up their charge, which is positively reflected in **increased ciliary epithelial activity** and mucus production, EEG, changes in blood pressure, basal metabolism and a subjective **feeling of freshness**. A positive effect of light negative ions has been observed in **asthmatics, allergics and rheumatics**.

Electroionic microclimate in buildings

In indoor environments, the amount of light negative ions is reduced by the presence of humans and their activities such as smoking. Smoking significantly reduces the light ion content in a room for several hours. In such an environment, people experience non-specific problems such as irritability, increased fatigue, difficulty in concentrating and a decrease in work performance. Sleep disorders and insomnia may occur.

Coefficient of unipolarity

The electroionic microclimate is given by the concentration of ions in cm^3 of air. The **unipolarity coefficient P** is the ratio of the concentrations of positive and negative ions. In a **pure natural environment** the unipolarity coefficient is equal to **1.13 to 1.25**. In **cities**, where positive ions predominate, the unipolarity coefficient can be as high as **4 or more**.

Ionizers

Light negative ion generators are sold in the general trade under the name **ionizers**. They work on the principle of **silent corona discharge**.

Non-ionising radiation

Electromagnetic fields are time-varying (radio waves, microwaves) and static (infrared, UV, visible). For artificial radio wave sources, it is electromagnetic radiation produced as a result of oscillating circuits and transmitting antennas (radio, television). Electromagnetic fields are produced around **any electrical appliance**, so we can say that the Earth is literally infested with electromagnetic radiation.

Ionising radiation

Buildings are monitored primarily for **radon**, a colourless, heavier-than-air, odourless gas. Radon is released from building materials, from the subsoil, from water and possibly from natural gas.

 For more information see *Radon health issues*.

Links

References

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