

Primary and Secondary Emissions

Terminology

The word emission comes from the Latin word *emittere*, which means "a giving off or emitting". Today it is used in many fields and can have many meanings. In the field of hygiene, environmental emissions refers to the release of pollutants into the air. It is distinguished in terms of primary and secondary emissions. Primary and secondary emission can be seen strictly as a wholly separate groups, since very few pollutants after the entry into the atmosphere retain their original structure. Usually we measure air pollution and human exposure, therefore we are mostly talking about air pollution. The word refers to the emission of air pollutants (pollutants) that have been in contact with the environment and are accumulated in water, soil and organisms. An example of the practice is accumulation of heavy metals in the soil along the roads.

Primary Emissions

Primary emissions are substances emitted directly from the source to the atmosphere. It refers specifically to the substances which have been released and **have not yet undergone any chemical or other reactions**, which would alter them.

Examples include ash from volcanic eruptions, CO gas from motor vehicle exhaust or SO₂ released from factories.

Secondary Emissions

The term refers to a group of secondary emission of substances **generated in atmospheric reactions between contaminants**. These reactions take place either by photo-activation (especially UV), or without it, that is reactions between the primary pollutants.

The harmfulness of these substances is not less than their initial products may be even more than the previous ones. The rate at which primary pollutants react together, is influenced by:

1. their concentrations in the atmosphere;
2. the degree of photo-activation;
3. particle size;
4. meteorological factors (variance and humidity).

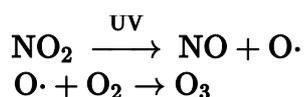
Solid Particles

An important basis of these reactions are solid particles. On their surface there is adsorption of gaseous particles, which increases the toxicity of these gases. They can get into contact with the respiratory mucosa in high concentrations locally, even if their total concentration in air is low. The best known of these reactions are those in which there is an oxidation (now known as summer) smog.

An example of a simple reaction with formation of secondary aerosol emission is combining sulfuric acid with metal oxides: from the chemical point of view it is a neutralization reaction forming salts giving rise to sulphates, which represent a dry phase of acidic air pollution.

Another typical reaction is the emission of secondary dissociation of nitrogen dioxide (NO₂):

- NO₂ is activated by UV light (photo-activation) and dissociates to NO and atomic oxygen (O·);
- these products are free radicals and start a chain reaction with many others, which result in very irritating substances (ozone, formyl alkyl radicals, peroxides);
- these substances are not only toxic but also act as promoters of carcinogenic substances. The reaction can be summarized by the following formula:



Examples of secondary emissions are:

1. fine dust and aerosol particles;
2. air pollution from gaseous compounds of sulfur, nitrogen, carbon, halides, organic and radioactive substances.

Links

Related articles

- Imissions
- Emergency situations in environmental pollution

Bibliography

- BENCKO CHARLES UNIVERSITY, PRAGUE 2006, 270 P, V, et al. *Hygiene and epidemiology. Selected Chapters*. 2nd edition. Prague. 2008. ISBN 9788024607931.