

WATER TOXICOLOGY

Major Types of Aquatic Contaminants

- **Metals and metalloids:** Includes essential metals such as copper, zinc, and iron; nonessential metals such as cadmium, lead, mercury, and silver; and metalloids such as arsenic. Major sources are household effluents, mining, and associated industry (e.g. smelteries), fertilizers, fuels, and well water

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- **Organometallic compounds:**
- Contaminants include organic tin compounds and methylmercury.
- Although methylmercury is partially of anthropogenic origin, natural methylation/ demethylation processes also cause its presence in waterways.
- Organic tin compounds used to be important components of antifouling paints of boats and ships but have now been banned

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- **Fertilizers:**
- Include especially nitrates, ammonium nitrogen, and phosphates. Their sources are household effluents, agriculture, and aquaculture.
- **Greenhouse gases:**
- Carbon dioxide production is involved in ocean acidification, and methane can be liberated in natural gas production

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- **Oxides of sulfur and nitrogen:**
- Their deposition in smoke from energy production and traffic causes acid rain
- **Radioactive compounds:**
- A natural source of radioactivity is radon gas.
- In addition, effluent from plants performing military processing (enriching) of uranium is a major source of radioactivity in water.
- Abnormal occurrences, such as earthquakes or accidents in the power plants, may result in high environmental radioactivity.

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- **Oil and its components;**
- Oil spills can take place during oil drilling, as a result of shipwrecks during oil transport, and from effluent discharges from oil refineries.
- **Pharmaceuticals and personal care products:**
- Antibiotics may kill bacteria in biological water purification. Soaps and other detergents dissolve lipid membranes, and sunscreens are often photochemically modified to more toxic compounds.

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- **Halogenated compounds:**
- Important halogenated compounds are polychlorinated biphenyls (PCBs), dioxins (e.g. TCDD), furans, and organochlorine insecticides.
- Chlorinated organic compounds are still a group of chemicals of concern, as they are highly persistent and bioconcentrate.

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- **Paper- and pulp-mill effluents:**
- Since chlorinated compounds have disappeared from effluents, the major toxic compounds are natural compounds of trees...
- **Endocrine-disrupting compounds:**
- These include several types of compounds with various modes of action which is most commonly used for compounds that disturb reproductive hormone cycles.
- **Pesticides:**
- Pesticides contain several different types of compounds, including herbicides, insecticides, and fungicides.....

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- **Nanomaterials:**
- The definition of a nanomaterial is any material with a maximal dimension of 100 nm.
- The use of nanomaterials has increased markedly during recent years, and nanotoxicology has consequently gained importance.