



Phosphates are a group of chemical compounds that contains phosphorus and oxygen. In the natural environment, phosphates occur in rocks and they dissolve in surface water runoff and find their way to lakes and rivers. Natural water has phosphorus levels in the order of 0.02 parts per million (ppm).

Phosphate compounds have various industrial uses in various consumer products such as dishwashing soaps, washing detergents, toothpastes, soft drinks, processed cheese and pharmaceuticals. Agricultural fertilizers also contain phosphate compounds and may ultimately end up in natural watercourses.

Small quantities of phosphates are not harmful to humans. In fact, phosphates are sometimes added to water supplies at treatment plants to prevent piping corrosion.

Just like vitamins for humans, phosphates are essential nutrients for the growth of plants, algae and aquatic organisms. When present in excess amounts, however, phosphates can cause algal blooms which have negative effects on the environment.

Excessive algal growth causes a thick layer of “scum” to form on the surface of affected lakes and ponds. When algae die, they sink to the bottom where they are decomposed by bacteria. The process of decomposition consumes dissolved oxygen from water. Due to the excessive level of decomposition, dissolved oxygen drops to levels too low to support aquatic life, causing many organisms to suffocate. This condition is known as *eutrophication*.

Eutrophication is particularly dangerous to freshwater fish like Trout and causes foul odours and unpleasant appearance. In the 1970s, the shores of Lake Erie in southwestern Ontario experienced severe eutrophication episodes due to the excessive levels of phosphates that were discharged to the lake. The effects were more pronounced in the summertime and many beaches had to close as a result.

Significant improvements in treatment technologies and enhances environmental management practices by Federal and Provincial authorities have restored the ecological health of many aquatic ecosystems including Lake Erie. Phosphates were banned from detergents and improved wastewater treatment technologies were implemented to control discharge levels of phosphates and other nutrients.

Wastewater phosphate concentrations are typically around 10 ppm while effluent limits are close to 1 ppm. One removal method of phosphates involves using microbial flocks incorporate phosphate into

their cellular structure. Another technique involves chemical precipitation, where metal salts are added to form insoluble forms of phosphates that can be easily removed from water prior to discharge.



The Adverse Effects of Eutrophication on Grand Beach in Lake Winnipeg, Manitoba