

Major Freshwater/Seawater Ions

$\text{Ca}^{2+}$	$\text{Cl}^-$
$\text{Mg}^{2+}$	$\text{HCO}_3^-$
$\text{Na}^+$	$\text{SO}_4^{2-}$
	$\text{K}^+$
	$\text{NH}_4^+$

Essential Plant Nutrients

<i>Macronutrients</i>	<i>Chemical Speciation</i>
Carbon	$\text{CO}_2$
Hydrogen	$\text{H}_2\text{O}$
Oxygen	$\text{H}_2\text{O}$
Nitrogen	$\text{NO}_3^-$
Phosphorous	$\text{PO}_4^{3-}$
Potassium	$\text{K}^+$
Sulfur	$\text{SO}_4^{2-}$
Magnesium	$\text{Mg}^{2+}$
Calcium	$\text{Ca}^{2+}$

*Micronutrients*

**B, Cl, Co, Cu, Fe, Mo, Mn, Na, Si, V, Zn**

Important Trace Elements in Natural Waters

	<i>Element</i>	<i>Sources</i>	<i>Effects/Significance</i>
<i>Metalloids</i>			
	Arsenic		
	Selenium		
<i>Transition Metals</i>			
	Chromium		
	Iron		
	Manganese		
	Molybdenum		
	Zinc		
“Heavy Metals”			
	Cadmium		
	Lead		
	Mercury		
<i>Halogens</i>			
	Fluorine		
	Iodine		
<i>Other</i>			
	Beryllium		
	Boron		

## General Types of Water Pollution

### Trace Elements

- Heavy metals
- Organically bound metals

### Radionuclides

### Inorganic Pollutants

- Asbestos
- Algal nutrients (N/P)
- Excess acidity, alkalinity, salinity

### Trace Organic Pollutants

- Polyhalogenated organics
- Pesticides
- Petroleum products

### Sewage (human and animal waste)

- Biochemical oxygen demand
- Pathogens
- Detergenents

### Chemical carcinogens

### Sediments

### Taste, Odour and Colour