International Standards for Drinking Water

Parameter (1)	Max. permissible USPH standard (2)	Level, WHO standard (3)	mg/l European standard (4)
pH	6–8.5	6.5–9.2	6.5–8.5
Sp. conductance (μ mho cm^{-1})	300	—	400
Arsenic	0.05	0.05	—
Ammonia	0.5	0.5	—
BOD	5.0	6.0	—
Boron	1.0	—	—
Calcium	100	100	100
Cadmium	0.01	0.01	—
Chromium (VI)	0.05	0.05	—
Copper	1.0	1.5	—
Chloride	250	500	25
Cyanide	0.05	0.05	—
COD	4.0	10	5.0
Iron	0.3	1.0	—
Lead	0.05	0.1	—
Magnesium	30	150	—
Manganese	0.05	0.5	—
Mercury	0.001	0.001	—
Nitrate + Nitrite	10	45	—
Phenol	0.001	0.002	0.5
Polynuclear aromatic hydrocarbons (PAH)	0.02	0.2	0.002
Pesticides (total)	0.005	—	0.005
E. coli	100/100ml	10/100 ml	
Total hardness (as $CaCO_3$)	—	500	—
Total dissolved solid	—	500	—

Chemical Composition of Groundwater, River Water and Sea Water: A Comparison

Parameter (ppm)	Groundwater* (well water)	Surface* (river water)	Sea water
Bicarbonate	339	119	140
Calcium	92	36	400
Chloride	9.6	13	19×10^3
Iron (III)	0.09	0.02	0.01
Magnesium	34	8.1	1.35×10^3
Nitrate	13	0.1	—
Potassium	1.4	1.2	380
Silica	10	1.2	6.0
Sodium	8.2	6.5	105×10^3
Sulphate	84	22	2.65×10^3
Total dissolved solid	434	1.65	—
Total hardness (as $CaCO_3$)	369	123	—

* and ' Sources for public water supply.

TRACE ELEMENTS IN WATER

Several trace elements (few ppm or less) are found in polluted water. The most dangerous among them are the heavy metals e.g., Pb, Cd, Hg and metalloids e.g., As, Se, Sb, etc. As mentioned earlier, the heavy metals have a great affinity for sulphur and attack sulphur bonds in enzymes, thus immobilising the latter. Other vulnerable sites are protein carboxylic acid (COOH) and amino (—NH₂) groups. Heavy metals bind to cell membrane, affecting transport processes through the cell wall. They also tend to precipitate phosphate biocompounds or catalyse their decomposition.

The trace elements in natural waters and waste waters have already been summarized in Table 9.1. The sources of heavy metals in surface waters are shown in Fig. 12.7. Street dust containing heavy metals, e.g., Pb, represent an important source of metal input to surface waters. Metals are contributed by industrial effluents and domestic sewage. All these sources may be routed by way of sewage treatment works which reduce significantly the amount of metal discharged. In developing countries, however, such sewage treatment works hardly exist or function.
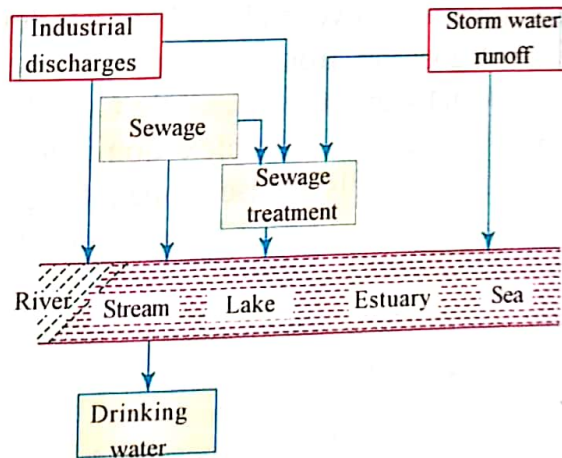

Fig. 12.7 Sources of heavy metals in surface waters

12.6 CHEMICAL