UNIT - IV: Water and Its Treatment

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Sources and Impurities of Water

Water sources include rivers, lakes, and groundwater. Impurities are classified as:
• Physical: Suspended particles, color, odor.
• Chemical: Dissolved salts, heavy metals.
• Biological: Bacteria, algae.

Water Quality Parameters

Key parameters used to assess water quality:
• Color, Odor, Turbidity: Aesthetic factors.
• pH: Measures acidity or alkalinity.
• Hardness: Caused by calcium and magnesium ions.
• Alkalinity: Presence of carbonate, bicarbonate ions.
• TDS (Total Dissolved Solids): Sum of all dissolved substances.
• COD (Chemical Oxygen Demand): Organic pollutant level.
• BOD (Biochemical Oxygen Demand): Oxygen required for microbial decomposition.

Desalination of Brackish Water

Reverse osmosis removes dissolved salts by applying pressure through a semi-permeable membrane.

Disadvantages of Using Hard Water in Boilers

• Scale formation: Reduces heat efficiency.
• Corrosion: Weakens boiler material.
• Sludge formation: Leads to blockages.

Treatment of Boiler Feed Water

• Internal treatment:
- Phosphate conditioning.
- Colloidal conditioning.
- Sodium aluminate treatment.
- Calgon conditioning.
• External treatment:
- Ion exchange demineralization.
- Zeolite process for softening water.