

WATER QUALITY - CRITERIA AND STANDARDS.

- exposure limits for bacteriological, viral, chemical & physical agents.

purpose:
to minimise all known health hazards.

- Guidelines recommended by WHO (2011) for drinking water quality relate to:

1. Acceptability aspects
2. Microbiological aspects
3. Chemical aspects
4. Radiological aspects.

Acceptability Aspects:

(A) Physical parameters.

1. turbidity. (> 4 NTU - noticeable)
2. colour. (> 15 TCU - noticeable)
3. taste and odour.
4. temperature.

(B) Inorganic constituents.

1. chloride (200 mg/L)
2. Hardness ($100 - 300 \text{ mg/L}$)
3. Ammonia. $< 0.2 \text{ mg/L}$.
4. pH. $6.5 - 8.5$.
5. H_2S . $0.05 - 0.1 \text{ mg/L}$.
6. Iron $< 0.3 \text{ mg/L}$.
7. Sodium 200 mg/L .
8. Sulphate. $< 250 \text{ mg/L}$.
9. Total dissolved solids $< 600 \text{ mg/L}$.
10. Zinc. $< 4 \text{ mg/L}$.

11. Manganese. 0.1 mg/L .
12. Dissolved oxygen.
13. Copper. $< 1 \text{ mg/L}$.
14. Aluminium. 0.2 mg/L .

Microbiological Aspects

Bacteriological indicators.

- coliform organisms
- faecal streptococci
- *Clostridium perfringens*.

coliform organisms.

- present in great abundance in human intestine.
- easily detected by culture methods
- survive longer
- have greater resistance to forces of natural purification.

Viral aspects.

- Disinfection with 0.5 mg/L of free chlorine residual after contact period of 30 min.

turbidity $< 1 \text{ NTU}$.

Biological aspects.

- protozoa.
- Helminths (guinea worm, ^{shistosomes}).
- Free living organisms (fungi, algae).

Chemical Aspects.

• Inorganic: As, cadmium, Chromium, cyanide, fluoride, lead, mercury, nickel, nitrate, selenium etc.

- Organic constituents.
 - polynucleated aromatic hydrocarbons, pesticides,

$$ADI = \frac{NOAEL}{UF}$$

Drinking water

Avg daily per capita consumption is 2L (for 60kg)

Health risk assessment:

- Tolerable daily intake (TDI) amount that can be ingested daily without appreciable health risk.
- Acceptable daily intake (ADI) for food additives. permissibility not acceptability
- No-observed adverse effect level (NOAEL) highest dose / conc. of a chemical that causes no detectable adverse health effect.
- Lowest observed adverse effect level (LOAEC) lowest observed dose / conc. at which there is a detectable adverse effect.
- Uncertainty factors (UF)

$$TDI = \frac{NOAEL \text{ or } LOAEC}{UF}$$

$$\text{Guideline value} = \frac{TDI \times bw \times P}{C}$$

bw → body wt.
P → fraction of TDI allowed
C → daily water consumption

Radiological aspects

gross alpha activity < 0.5 Bq/L

gross beta activity < 1.0 Bq/L