Drinking Water Treatment

Pre-seminar Material

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Importance of Drinking Water Treatment

- Raw water collected from Dongjiang (東江) and rain water requires treatments before public use.

- Some substances to be treated:
  - Colloids (膠體)
  - Pathogens (病原體)

Colloids

- A colloid is a heterogeneous mixture in which insoluble particles are uniformly suspended in the dispersion medium (e.g. water).
- Examples of colloids in raw water
  - Organic matter
  - Clay minerals
- Usually colloidal particles are negatively charged.

Coagulation (凝聚)

- Coagulation refers to the removal of colloids by adding positively charged particles to neutralize the negatively charged colloidal particles.
- Alum ($KAl(SO_4)_2 \cdot 12H_2O$) is commonly used in coagulation.
  - Mechanism
    1. Dissolving alum in raw water (some Al^{3+} ions are in water).
    2. Al^{3+} ions bind to the negatively charged colloidal particles.
    3. The resulting particles are then sink to the bottom as colloids.
    4. Colloids are then removed from raw water.

Flocculation (絮凝)

- Flocculation is another way to remove colloids in which polymers are used to bind to the colloidal particles, followed by sedimentation.
- Unlike coagulation, neutralisation of electrical charges on colloidal particles is not involved in flocculation.

Disinfection (消毒)

- Disinfection aims to remove pathogenic microorganisms (pathogens) in water.
- There are 2 major disinfectants used in water treatment.
  1. Chlorine gas (Cl_2)
     - Cl_2 (g) + H_2O (l) → HOCl (aq) + HCl (aq)
     - HOCl is very effective in killing pathogens.
  2. Ozone (O_3)
     - Ozone kills microorganisms by destroying their cell walls.

Content of the Seminar

- In this seminar, you will learn about:
  - Collection of raw water in Hong Kong
  - Water treatment processes
  - Water quality monitoring