

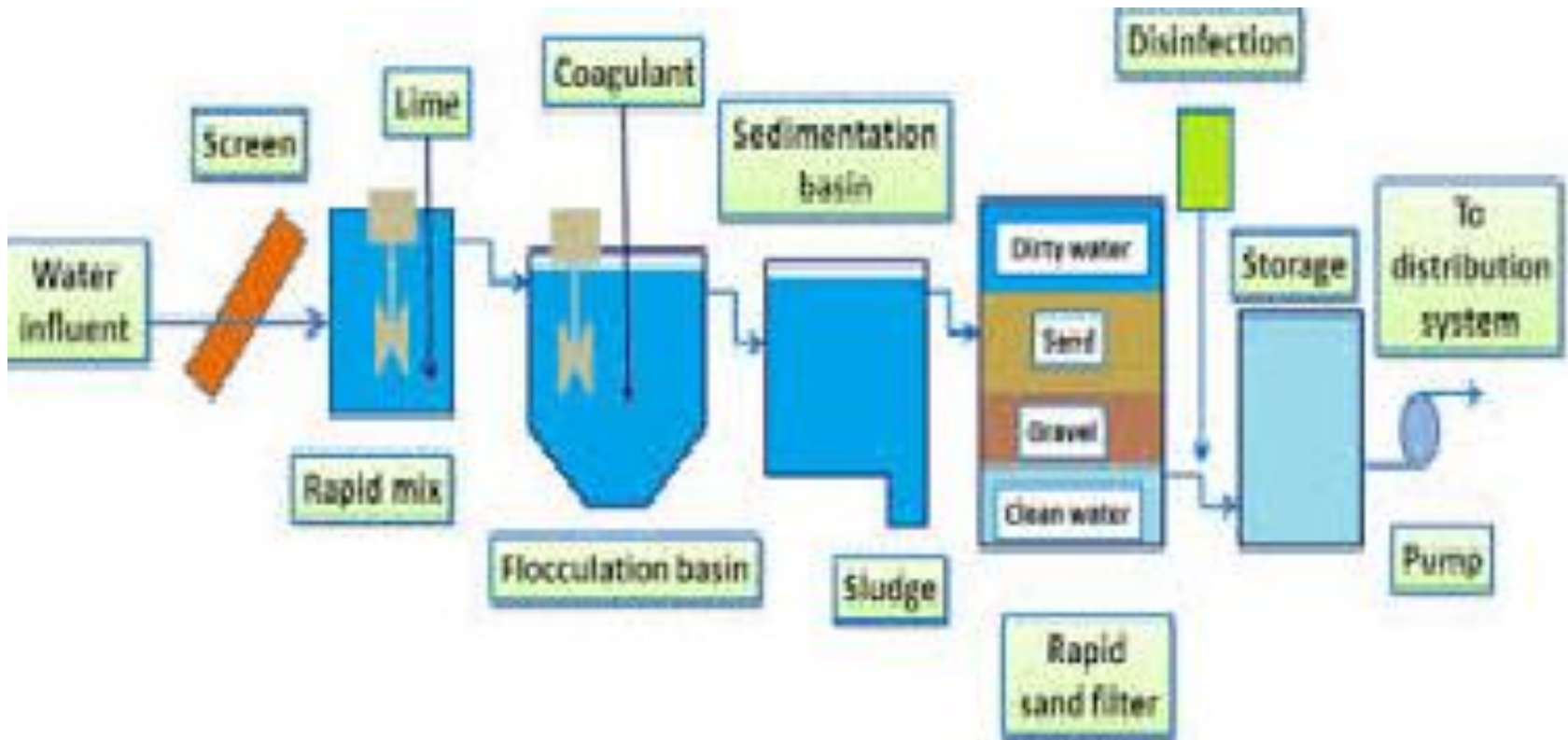
WATER TREATMENT - FITRATION

Prof M CHANDRA SEKHAR
HEAD, DEPARTMENT OF CIVIL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY
WARNAGAL

INTRODUCTION

- Water is treated to make it safe for drinking
- Filters are provided after the Primary Sedimentation and /or Coagulation Flocculation units
- Filtration is final stage of water treatment
- Filters are generally referred as polishing units
- Filtered water is disinfected remove pathogens and hence make water safe for drinking.

Schematic view of Water Treatment



Purpose of Filtration

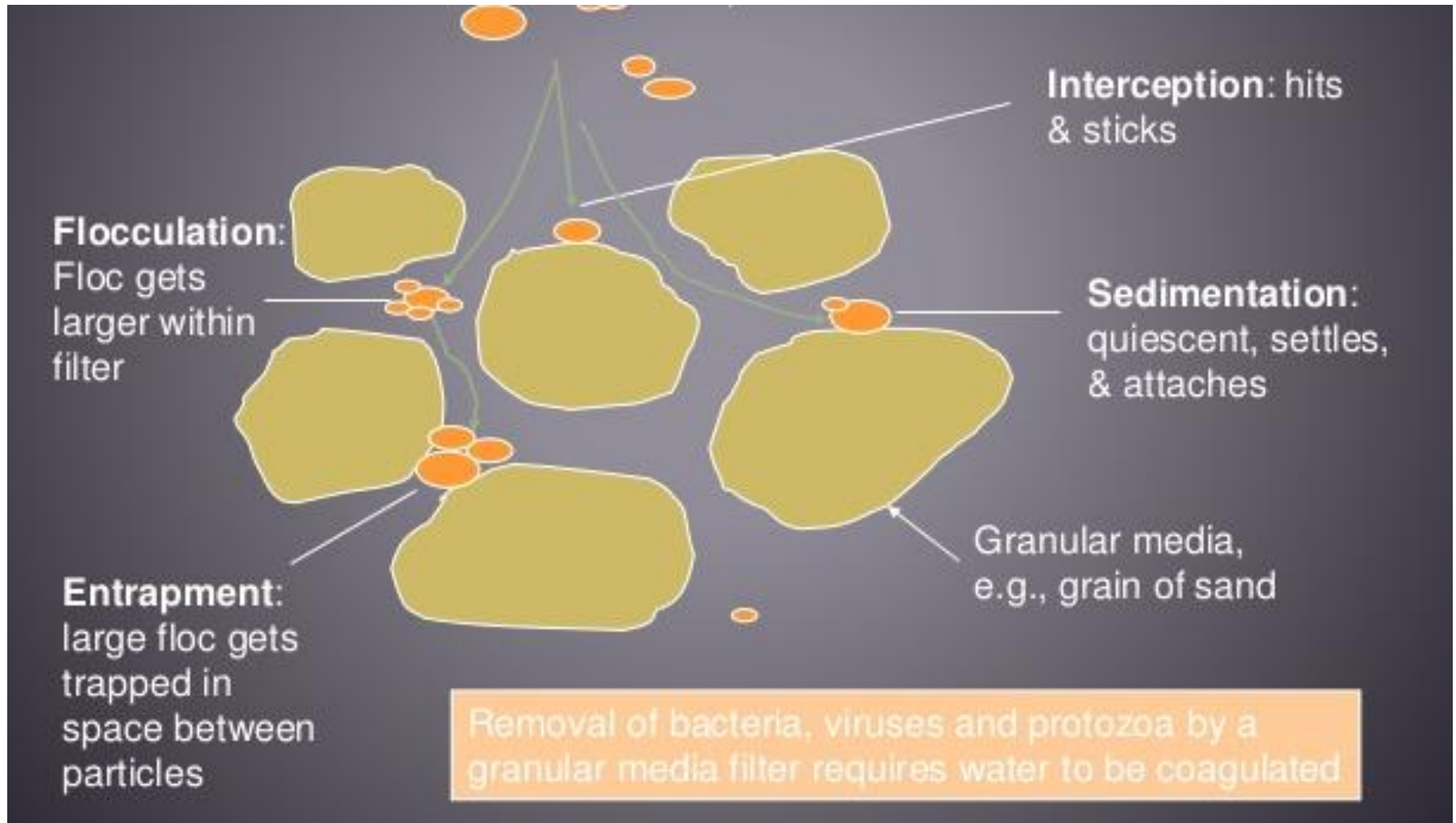
Filters remove

- Fine suspended solids which escape PST
- Colloidal solids which escape C-F
- Dissolved solids
- Taste and odour
- Colour
- Pathogens

Mechanisms of Filtration

- Staining / Entrappment
- Sedimentation
- Flocculation
- Interception
- Bacterial Metabolism
- Electrostatic forces
- Adsorption
- Diffusion

Mechanisms of filtration



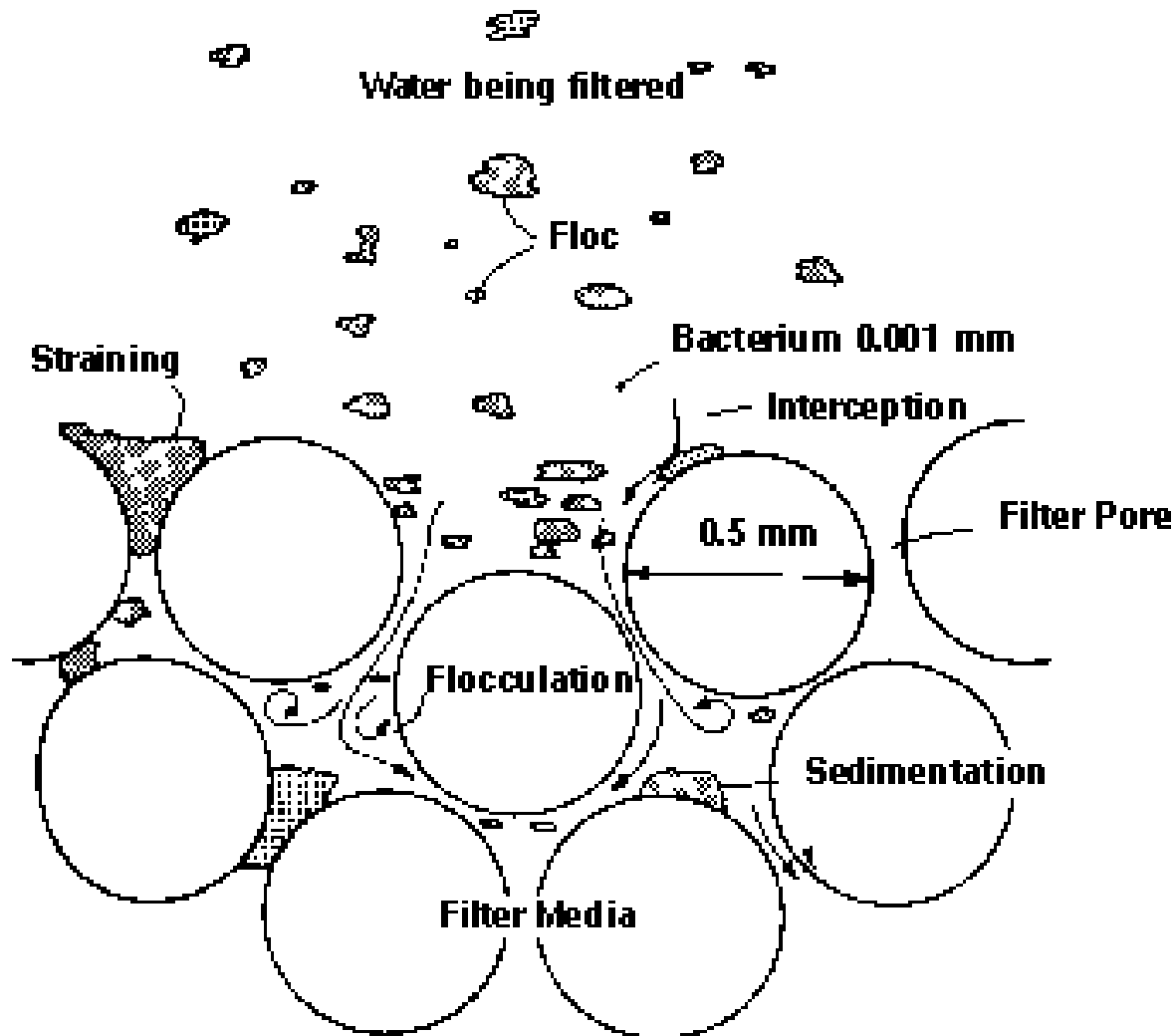
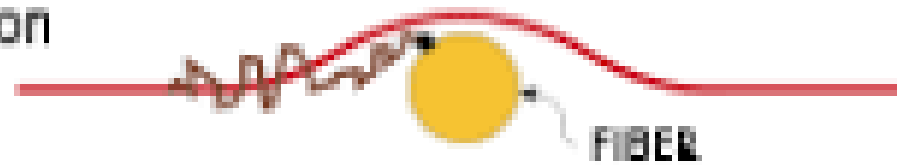


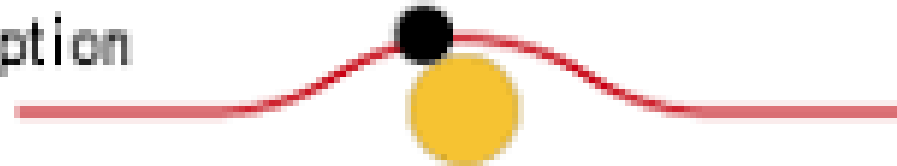
Figure 1. Schematic diagram illustrating straining, flocculation, and sedimentation actions in a granular-media filter.

Filtration Mechanisms

Diffusion



Interception



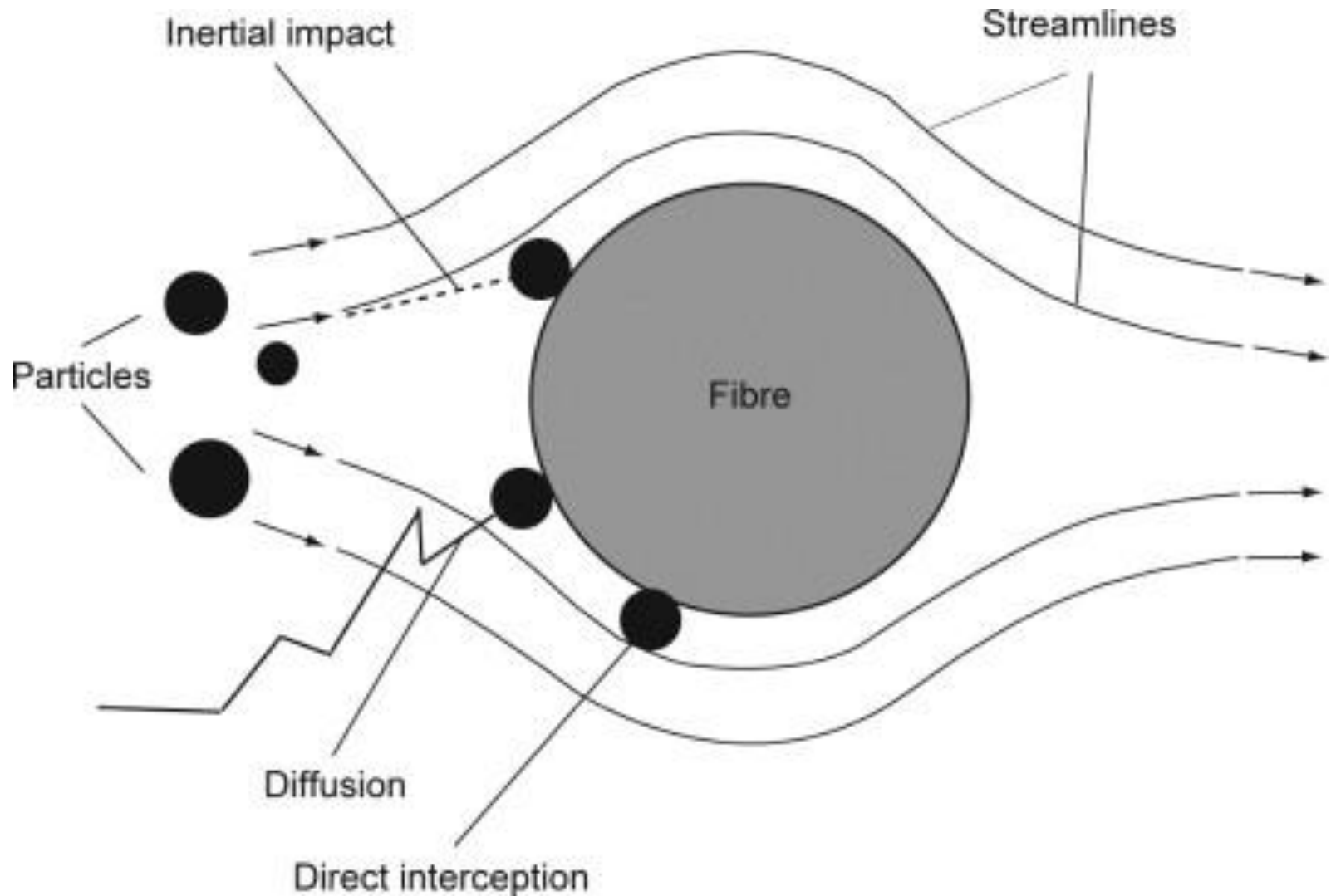
Inertial Impaction



Electrostatic attraction



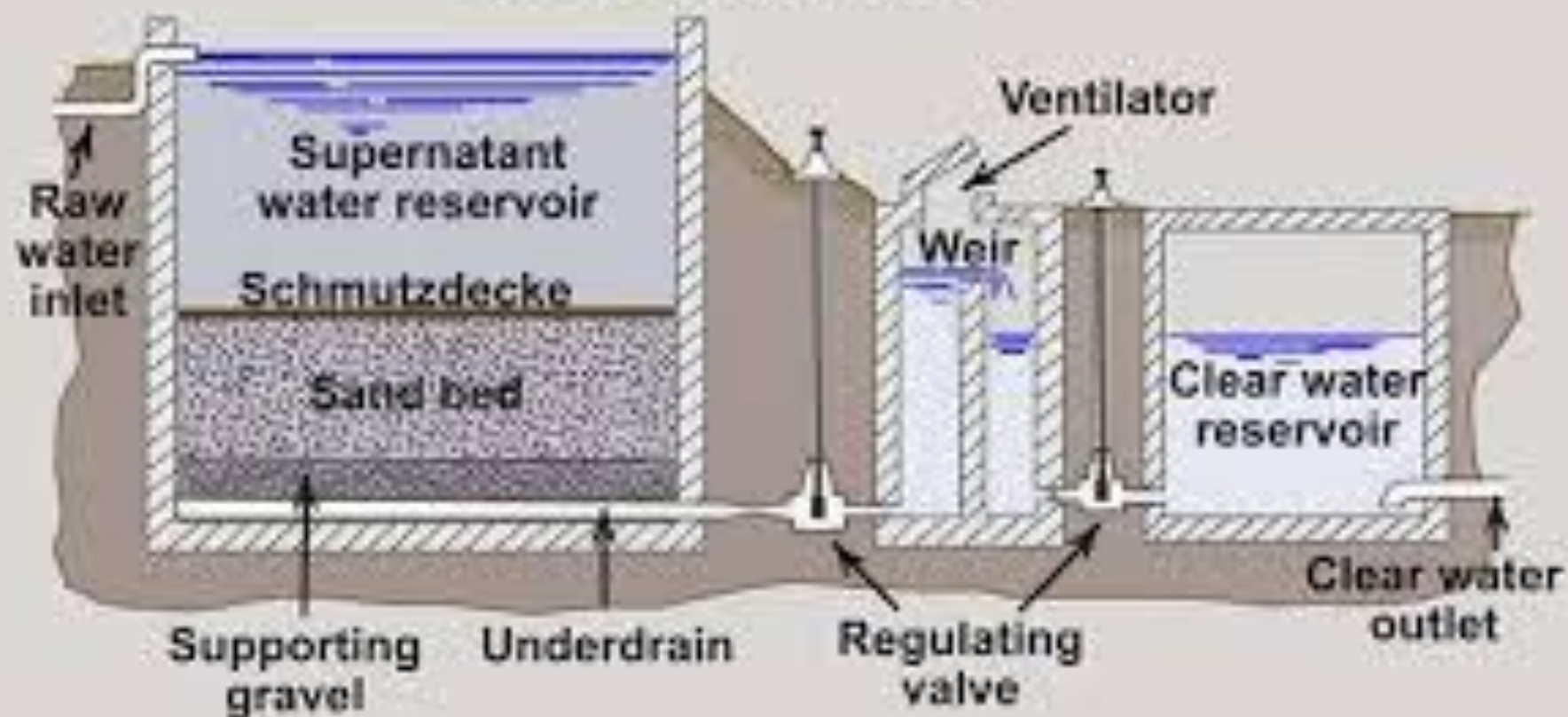
Mechanisms of Filtration



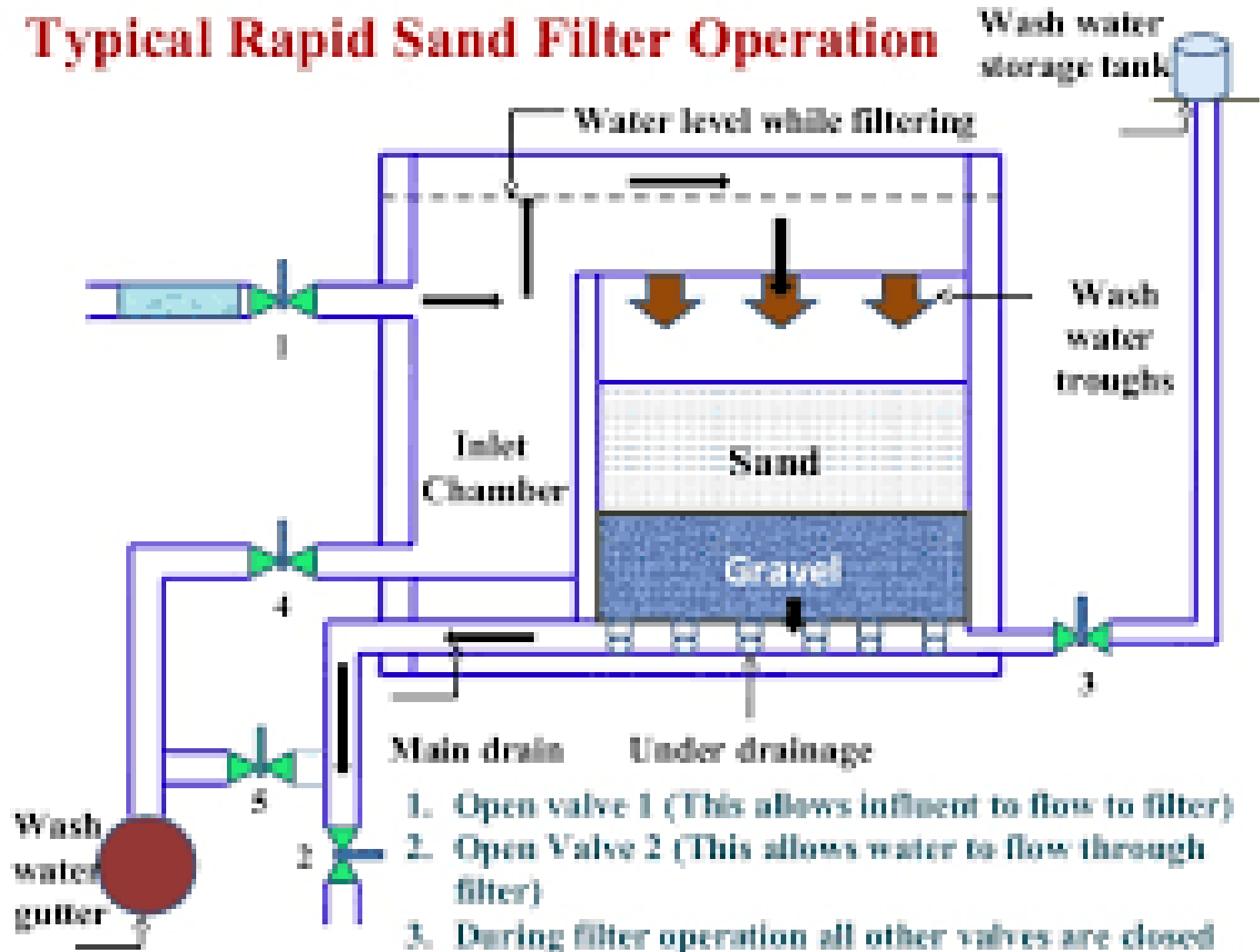
Types of Filters

- Slow Sand Filters
- Rapid Sand Filters
- Pressure filters

Slow Sand Filter



Typical Rapid Sand Filter Operation



Filtration

- Slow sand filters treat water @ 200 -400 l/sqm/hr
- Rapid sand filters treat water @ 4000 -6000 l/sq m/hr
- Pressure filters are used in Industrial applications to treat water @ 6000 -15000 l/sqm/hr
- Filtered water requires disinfection to ensure 100% safety against pathogens