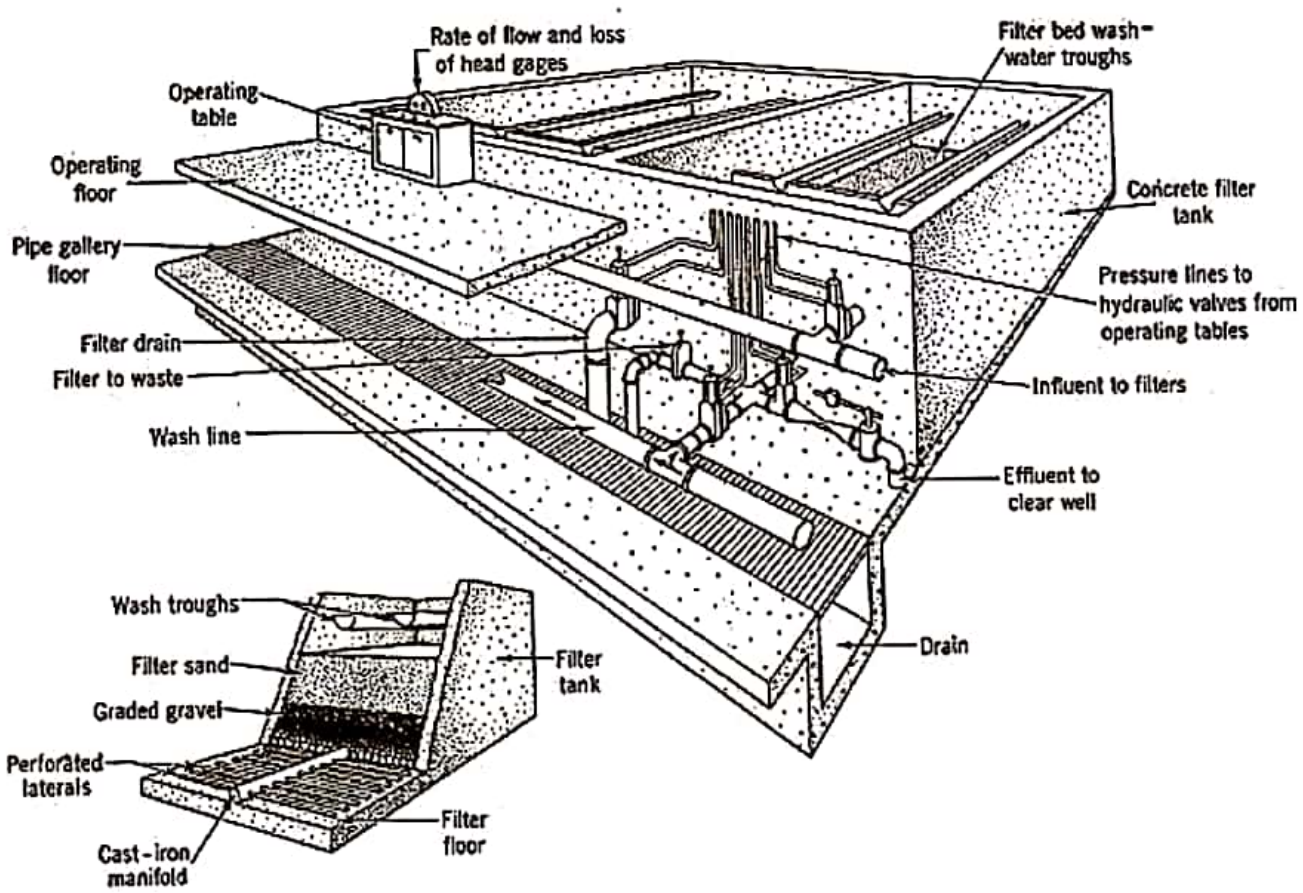
Rapid sand filtration, in contrast to **slow sand filtration**, is a purely physical treatment process. As the water flows through several layers of coarse-grained sand and gravel, relatively large particles are held back safely (D[illegible]).

Advantages

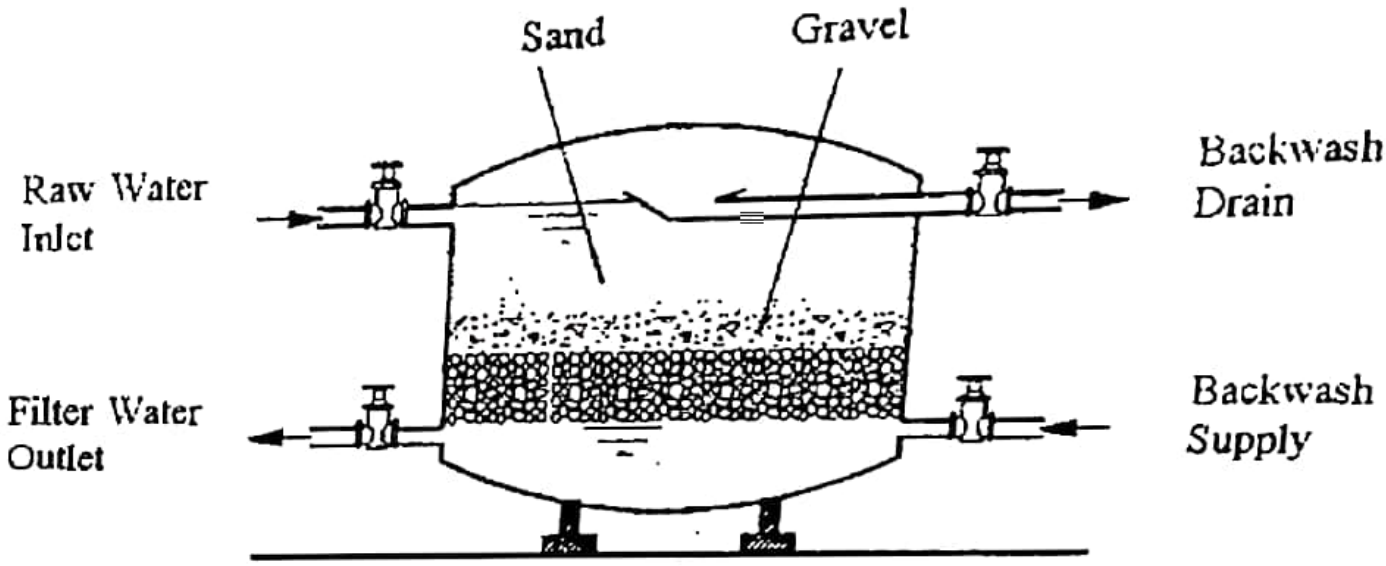
- Highly effective for removal of turbidity (usually < 0.1-1 NTU)
- High filter rate (4'000 – 12'000 litres per hour per square metre of surface), small land requirements
- No limitations regarding initial turbidity levels (if coagulant or flocculant is available and correctly applied)
- Cleaning time (backwashing) only takes several minutes and filters can be put back into operation instantly

Disadvantages

- Not effective in removing bacteria, viruses, fluoride, arsenic, salts, odour and organic matter (requires pre- and post-treatment)
- High capital and operational costs
- Frequent cleaning (backwashing) required (every 24-72h)
- Skilled supervision essential (e.g. for flow control and dosage of disinfectant)
- High energy input required
- Backwashing water and sludge needs treatment; sewage system or stabilisation ponds required



Components of an open (gravity) rapid



Closed rapid sand filter (pressure filter).

Item	Slow Sand Filter	Rapid Sand Filter
Pre treatment	Not required except plain sedimentation	Coagulation, Flocculation and Sedimentation
Base materials	Gravel base of 30 to 75 cm depth with 3 to 65mm size graded gravel.	Gravel base of 45 to 50 cm depth with gravel size varies from 3 to 50 mm in 4 or 5 layers
Filter sand ▪ Effective size ▪ Uniformity coefficient ▪ Thickness of sand bed	 ▪ 0.25 to 0.35 mm ▪ 3 to 5.0 ▪ 80 to 100 cm	 ▪ 0.45 to 0.70 mm ▪ 1.2 to 1.7 ▪ 60 to 75 cm
Under drainage system	Open jointed pipes or drains covered with perforated blocks	Perforated pipe laterals discharging into main header
Size of each unit	50 to 200 sq.m	10 to 100 sq.m
Rate of filtration	100 to 200 Lph/sq.m	4800 to 7200 Lph/sq.m
Cost ▪ Installation ▪ O&M	 ▪ High ▪ Low	 ▪ Low ▪ High
Efficiency ▪ Turbidity of feed water ▪ Removal of bacteria	 Low; < 30 NTU 98 to 99%	 Any level of turbidity of feed water; (with pre-treatment) 80 to 90%
Suitability	For water supply to rural areas and small town	For public water supply to towns and cities
Post treatment	Slight disinfection	Complete disinfection is a must
Ease of construction	Simple	Complicated;
Skilled supervision	Not essential	Essential
Loss of head ▪ Initial ▪ Final	 ▪ 10c m ▪ 80 to 120 cm	 ▪ 30 cm ▪ 250 to 350 cm
Method of cleaning	▪ Scrapping and removing *Schmutzedecke* and 1.5 to 3 cm thick sand layer ▪ Laborious	▪ Back washing with or without compressed air agitation ▪ Simple and easy
Quantity of wash water required	0.2 to 0.5% of total water filtered	1 to 5% of the total water filtered
Cleaning Interval	Three to four months	One to two days

Comparison of Slow Sand water Filter and Rapid Sand water Filter