Topic →

* FILTRATION :- The process of purifying water by passing it through a bed of sand or other fine granular material, is called filtration.

→ The filters are used for this purpose. The sand required for filtration should have the following properties.

(a) It should be free from clay, loam, lime and organic matter.
(b) It should be of uniform size and nature.
(c) It should not be very fine nor too coarse.
(d) It should be resistant and hard.
(e) It should not loose weight more than 5%. When placed in hydrochloric acid for 24 hours.

→ It may be noted that the rate of filtration reduces when the water is filtered through a bed of very fine sand.

→ The effective size of sand particles varies from 0.30 to 0.50 mm and uniformity coefficient from 1.30 to 1.75.

* Theory of filtration

→ The filters, in fact, purify the water under four different processes.

(1) Mechanical straining → The suspended particles present in water and which are of bigger size than the size of the voids in the sand layer of the filter, cannot pass through these voids and get arrested in them. The resultant water will, therefore be free from them.

→ Most of the particles are removed in the upp layer and the arrested particles including the c flocs forms a ~~mattress~~ mat on the top of which further helps in straining

(ii) Flocculation and sedimentation → It has been found that the filters are able to remove even particles of size smaller than the size of the voids present in the filter. this fact may be explained by assuming that the void spaces act like tiny coagulation-sedimentation tank. The colloidal matter arrested in these voids is a gelatinous mass and therefore, attract other finer particles. These finer particles thus settle down in the voids and get removed.

(iii) Biological Metabolism → certain micro-organism and bacteria are generally present in the voids of the filters. They may either reside initially as coatings over sand grains or they may be caught during the initial process of filtration. Nevertheless, these organisms require organic impurities (such as algae, plankton etc) as their food their survival. These organisms, therefore, utilise such organism impurities and convert them into harmless compounds by the process of biological Metabolism.

(iv) Electrolytic changes → the purifying action of filter can also be explained by the theory of ionisat Acc. to this theory a filter helps in purifyi the water by changing the chemical charact of water.

→ the sand grains of the filter media a impurities in water carry electrical charges of opposite nature. When these oppositely charged particles and the impur come in contact with each other, they neutralise each other, therefore changing the character of the water and making it purer.

* Types of filters and their classifications:

There are mainly three types of filters

(i) slow sand filters
(ii) Rapid gravity filters
(iii) pressure filters.

→ However, when classified on the basis of the rate of their filteration, the filters can be divided as follows.