An iron removal plant for drinking water

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Water contains many impurities in dissolved and solid form. These impurities should be in their permissible level to satisfy the drinking water standards. In a large number of areas in Sri Lanka, the ground water, shallow as well as deep, contain a considerable amount of dissolved iron in the form of Fe^{2+}. It is important to have an iron removal system in areas where the iron content is in excess, in order to reduce the iron content in water to an acceptable level. There is a large number of methods and processes to remove iron compounds from water at commercial and large scale water treatment which are usually expensive to have at domestic level. In this study, the design of an ion removal plant using simple articles available at domestic level is described. In this case, the iron removing mechanism includes the basic principle of converting the existing form of iron (Fe^{2+}) to precipitating form of iron (Fe^{3+}).

The investigated raw water samples were obtained from Kiribathkumbura area in Kandy District. Kaolin mineral and naturally occurring red earth are used as a natural filter and polystyrene is used as an artificial filter medium. Cascade type aerator was designed in order to get maximum oxygen contact to the raw water before different treatments.

According to WHO standards, the permissible level for iron in drinking water is 0.3 mg/l and the maximum measured value of iron content of the raw water from the above area was 1.1 mg/l. By adding Kaolin with the concentration with 5 g/l to the raw water 60% of reduction of iron content was observed. Adding red earth with same concentration, as a natural filter media, only 26% of reduction of iron content in raw water samples was observed.

The possibility of further reduction of iron content by using a static magnetic field was also tested. For Kaolin added water samples, with the presence of the static magnetic field, the maximum total reduction of the iron content was 71.8%. Also it has shown that iron removal using artificial filter medium is very effective for water quality improvement. For example, when polystyrene was used as an artificial filter medium, for the treated water, the maximum total reduction of the iron content was 76%.

Using the apparatus setup, we have proposed that an iron removal plant can be constructed at domestic level. Iron removal using artificial filter media is very effective for water quality improvement. Our study and the data presented provide the essential framework to modify the filtering systems that are currently being used.

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