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Removal of iron from ground water using a low cost household water purification system

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Every person needs at least 50 liters of water per day; however it depends on the availability of water in the particular location. Even though the earth's 75 % area is covered by water, not all that water can be consumed directly by humans. Hence finding good consumable water is not always easy on every place on earth. Even though there is plenty of water in coastal areas, the consumtion ability of that water is very low as it gives a metallic taste.

Due to unwanted substances in the water of the Ja-Ela area, there are some health related problems such as discolouration of teeth. Further, this water also keeps dark coloured patches in sanitary wares. Hence the water requires cleaning even for general use. The general public cannot afford costly water filtering systems, which require frequent maintenance. Therefore, some mechanism is needed at some point to acquire a good quality consumable water supply. This research was aimed to design a heavy duty household water filtering system that will filter the water into acceptable standards to cater for the needs in areas of high concentrations of iron in ground water.

The standard water quality states that the iron concentration in a drinking water sample should be not more than 0.3 mg/l, while current situation holds 6.5 mg/l. The people still do not have pipe borne water at present. From normal filtering systems iron cannot be removed. It is essential to establish a proper low cost treatment system to remove iron from drinking water. It was found that aerating the raw water helps to reduce a considerable amount of iron in water. A multiple tray type aerator was constructed and raw water was passed through the trays changing its height between two trays. This process changes the soluble ferrous concentration into an in-soluble ferric concentration and thus sediment deposits are removed using a sand media filter. This height, and the selected parameters such as sieve size and the water flow rate were found to be optimized according to a series of tests that was conducted changing various parameters in the aerator. The optimum distance between two trays was 70 cm. When consider the sieve size, it had been shown that the aerator performs at its best when the sieve diameter is 4mm which had an iron removal efficiency of 66.67%. The cost of the aerator is approximately Rs. 4760.

Treated samples were tested for water quality parameters and it proved that considerable iron amount is reduced. The treated water should pass through a filter unit for drinking purposes. The filter unit is designed using a series of sand media that will ensure the removal of unwanted particles, and therefore cleans the water from muddiness and also the in-soluble ferric concentration.

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