

A Novel Approach for Separating Iron and Manganese from Ground Water

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Abstract

The water plays very important role in life of all living organisms. Any changes in the quality of water will affect. The ground water has more contamination in nature; the contaminations are some of the minerals and other toxic chemical components. The iron and magnesium content of the water are not good for health. The magnesium and iron must be removed from the water than only the water can be drink. There are many methods of filtration and oxidation are used to normalize remove the magnesium content of water. Generally small water plants are use either sequestrates or remove iron and manganese.

Keywords— Physico-chemical analysis, Nickel titanate, oxidation

I. INTRODUCTION

Generally water is a most essential part of the human life without water there is no human beings and living things. Many of our organs constitute more than 80% of water. All the cells and organs of our body is depends on water for their effective function. And also water reduce the diseases that affects us such as blood cancer, colon cancer etc. Iron is a commonly contaminate in all source of water. The deposition of iron on the water will allow growing the micro larger number of organisms. If the iron is contaminated with water the water the characteristics of the water becomes metallic taste, change of color. Iron present in water as two form soluble ferrous iron or insoluble ferric iron. The globally available methods for removing iron from water are coagulation, oxidation and filtration. Oxidations are done by using oxidizing agents such as chlorine, chlorine dioxide, potassium permanganate and pre-chlorate. There are some other methods for removing iron from ground water are oxidizing with oxidation agents such as chlorine, chloride, super critical fluid extraction, magnetic separation, treatment with lime stone, electro-coagulation, membrane filtration and magnetic separation etc. The remaining portion of this paper will describes the function of water in human body, filtration and oxidation methods.

II. FUNCTION OF WATER IN HUMAN BODY

The water play an important role in the life of human beings, without water there is no human beings. The functions of water in our body are as follows

- Transportation of nutrients
- Regulating our body temperature
- Chemical and metabolic reaction
- Elimination of body waste
- Cell life maintenance
- Hydrate brain cells
- Generate energy
- Prevent loss of calcium
- Lubricate skin and tissues
- Oxygenates blood and lungs
- Helps to dissolve nutrients

Fig.1 Function of Water in Human body



Water act as a medium to transport the nutrients glucose, potassium, minerals etc to the body cell. Water removes the wastes such as toxic chemicals that are rejected by the cells which are existed through urine and sweats. Water separates the bio chemical elements from the food we eat and bring it to the cells.

III. METHOS FOR WATER TREATMENT

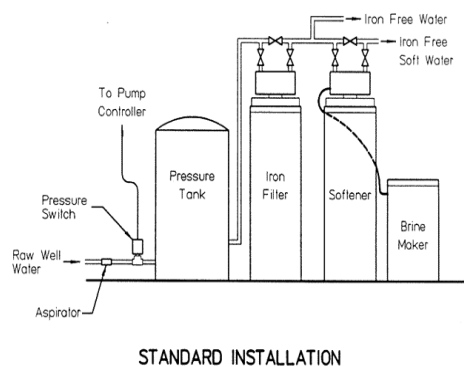
There are some important considerations when choosing the water treatment water quality characteristics such as PH level of water which is more important the PH level is less than 7 indicate the water has acidity and concentration of iron present in water, treatment cost, ease of management and implementation. The presence of iron and arsenic are in natural water in form of both organic and inorganic forms. The level of iron contamination in the ground water is a primary consideration to select the treatment method. The treatment techniques are as follows

- Oxidation
- Adsorption
- Iron exchange
- Coagulation
- Point of entry
- Point of use

A. Oxidation

Oxidation is the process which is designed to remove the naturally occurred iron contamination of the ground water. Oxidation is used for special case of granular-media filtration which catalyze precipitation and oxidation of manganese and iron. In this type of filtration process the ground water passed through the MnOx media which adsorbs and catalyzes the oxidation of the iron and manganese. The manganese, iron and arsenic are backwashed. After the separation and backwashed process the media must refresh with permanganate and chlorine.

Fig.2 Oxidation process

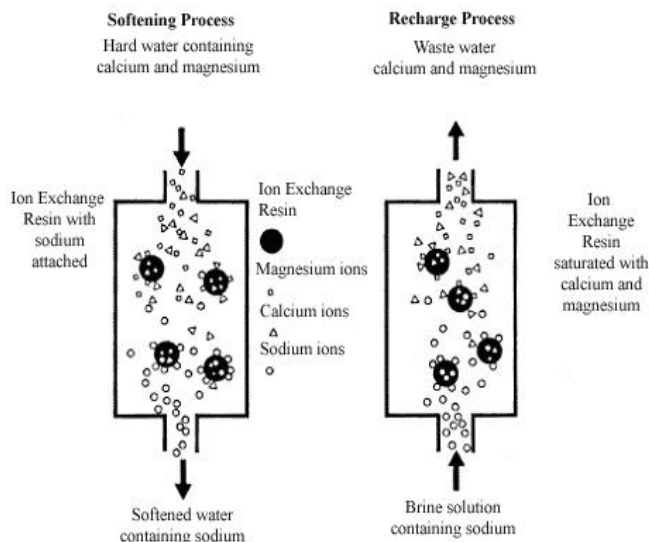


B. Iron Exchange Filtration

Iron exchange method is commonly used filtration process for purifying the ground water. It is the combination of physical and chemical process; the ions are swapped out by the form of solution and solid state. The solid ion waste has highly elastic in nature they contain larger number of ionic compounds. It is the process of continuously passing the contaminated

ground water with pressure, by exchanging the water through the various pressure cylinder the arsenic and iron content can be removed moreover. The separation of toxic materials are based on the following sequence $SO_4-2 > HAsO_4-2 > NO-3$, $CO_3-2 > NO-2 > Cl-$

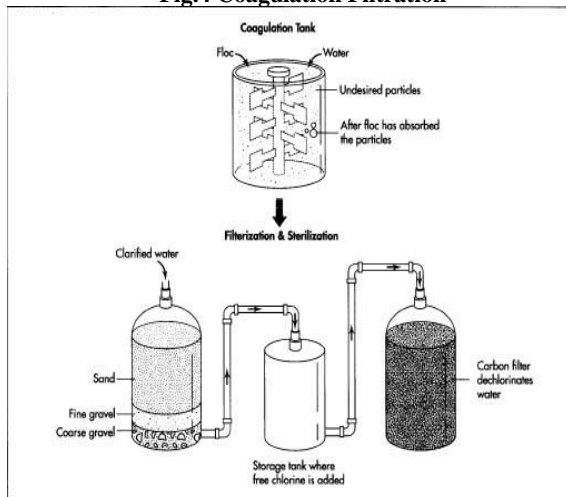
Fig.3 Iron Exchange Filtration



C. Coagulation Filtration

Coagulation filtration is the most precipitate filtering process. The most widely used coagulants are aluminum and ferric salts. The coagulants are ferric sulfate and ferric phosphates are more efficiently filter than aluminum. The level of PH in coagulants with ferric salts and aluminum are 5-8 and 5-7. The filtration process can be accomplished by either using media filter or micro filter.

Fig.4 Coagulation Filtration



IV. PHYSICO-CHEMICAL ANALYSIS

Physico- chemical analysis is the process of determining the interaction between naturally presented components. Physico chemical analysis which is used to measure thermal properties, electrical properties and optical properties. The temperature of water is measured by placing the mercury in a glass as a thermometer arrangement during water bores. There are more number of samples are taken from the different places in different climate condition. These samples are kept in the laboratory and determining some physical biological and chemical parameters. There are various water quality parameters are determined such as PH level, total alkalinity, oxygen demand, nitrate, chloride, sodium, sulphate, phosphate, total suspended solid(TSS), etc. The analysis based on those parameters will helps to improve the quality of water.

V. CONCLUSION

There are 30 groundwater samples are taken and analyses the psycho-chemical characteristics. The psycho –chemical analysis will help to identifies some of the toxic parameter of the water and useful to choose the various types of filtration methods and techniques depend on the characteristics of water. This paper concludes that the coagulation filtration method is more better than any other method because of its cost, maintenance, and ease of installation.

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