ISSN NO. 2320-5407

Journal homepage: http://www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

REMOVAL OF ARSENIC FROM SAND FILTRATION

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Manuscript Info

Manuscript History:

Received: 11 June 2013
Final Accepted: 24 June 2013
Published Online: July 2013

Key words:
Arsenic, sand, groundwater, ferric oxide

Abstract

The efficiency of removal of arsenic from ground water using iron oxide and sand filtration is been found and the outcome says they are one of the best natural technique. The arsenic is removed with Single, Double and Triple filters with efficiency of 70-58%, 83-90% and 88-96% respectively. The higher is the percentage of arsenic in ground water the lower will be the efficiency. This study also concludes that the life of ferric oxide disk is about 16-17 months which indicates it as a low cost process.

Introduction

Arsenic is a common pollution problem in groundwater. It originates from arsenic containing rocks and soils and is transported via dilution, air emission and erosion. Some man-made sources are also responsible as mining, pesticides and industrial byproducts. Arsenic occurs both in organic and inorganic form. However the inorganic form is more prevalent in water and is more toxic. Arsenic is also used in insecticides, pesticides, wood preservatives, herbicides, dyes, glass industries, electronics and growth promoting agents.

Material

A sand filter is been made using a specific percentage of all sands. We use 60% coarse sand, 25% medium sand and 15% fine sand partials. The iron oxide is used for oxidation of arsenic in the form of arsenate complex. Pierce and Moore (1980) developed a system known as ARFS (Arsenic Removal Filter System). This system is a modified version of conventional bio- arsenic sand filter. The bio-sand filter is based on principal of slow sand filtration developed in 18^{th} century. The bio-sand filter is been used to remove iron and bacteriological components from drinking water.

Methods

We also use the ARFS and the arsenic contaminated water is allowed to fall through a medium on to iron plate and then throw sand filter. The filter removes arsenic and suspended particles contained in ground water. This is also brought down by iron oxide to a standard level. The arsenic reacts with iron oxide disc and forms complex this absorption process is known as chemiabsorption. This complex gets filtered from sand and the output we get is arsenic free water.

Results and Discussion

The main objective of this study is to remove arsenic from water. We observed that the arsenic content reduces after filtration. We have used 3 disks in 3 different installations. Single, double and triple and we found that the efficiency of removal is 70-58%, 83-90% and 88-96% respectively. Thus the summarization of conclusion says that after the third disk the removal efficiency of arsenic is 95.84%.

Table 1 – Effect of Iron Oxide in sand medium

S.No.	Arsenic before in mg/L	Single mg/L	Double mg/L	Triple mg/L
1	0.85	0.18	0.14	0.11
2	0.80	0.16	0.12	0.08
3	0.78	0.14	0.11	0.07
4	0.82	0.17	0.13	0.10
5	0.87	0.22	0.17	0.12

$Fe_2O_3 + AsH_3O_3 \longleftrightarrow 4H^+ + 2Fe^{2+} + H_2O + AsH_3O_4$

Conclusion

The above result shows us that arsenic is been removed most from disk III. It's also clear that higher the arsenic content lower will be the cleaning efficiency. The life of the disk is also calculated which comes about 16 months. So this system is a cheap system and should be encouraged in its industrial use.

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