



Global Health and Education Foundation

Uniting The World To Help Those In Need

Advanced

Technologies for Arsenic Removal

Innovated by Chinese Academy of Sciences

BACKGROUND

Global Health and Education Foundation (GHEF) and **Chinese Academy of Sciences (CAS)** initiated Safe Drinking Water Program in rural areas of China in year 2006, to address the fluoride and arsenic contamination problem in drinking water sources. The pilot project was completed in Shanxi province in September of 2007.

Recently CAS has developed two new technologies for arsenic removal, and the two parties agree to extend the cooperation, to prevent waterborne disease, and improve the health and well-being of individuals globally with the new technologies available.



New technologies for arsenic removal:

1. Metal Oxide Complex Adsorption

2. Electro – Coagulation



Why new technologies?

Lower cost, better health. Compared to current various technologies such as Reverse Osmosis and Ultra-Filtration, both of the two technologies are:

- ♦ much lower electricity consumption and maintenance cost;
- ♦ able to remove arsenic while retain ions that are good for human-being.

Most beneficial to

- ♦ Rural areas;
- ♦ Mountainous areas.



To remove arsenic by

Metal Oxide Complex Adsorption

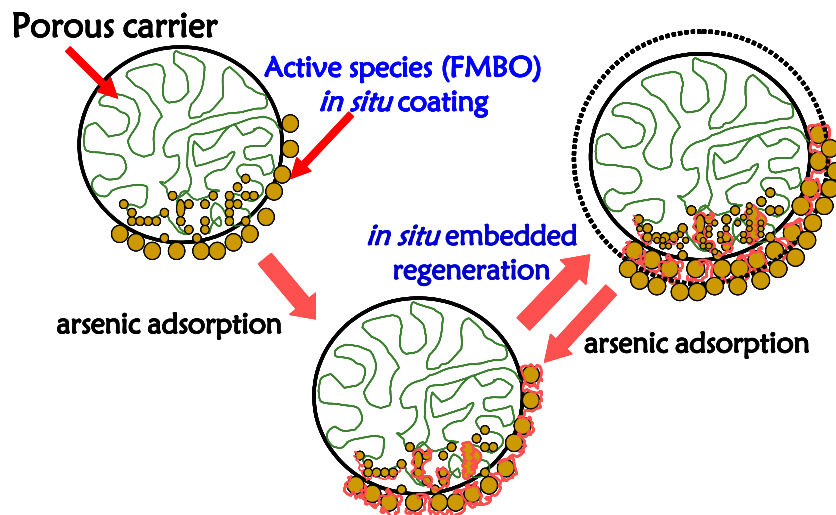
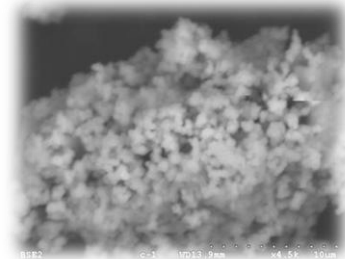
- ◆ **General Introduction**
- ◆ **Application Guidance**
 - ◆ **System Process**
 - ◆ **Pilot Projects**



General Introduction

Theory

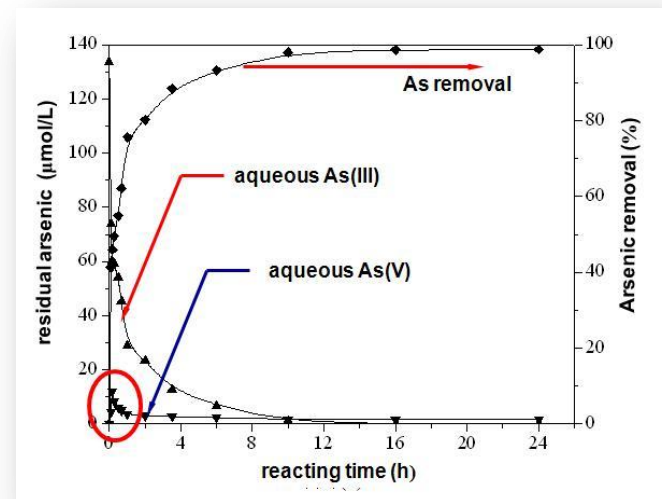
By using Ferric and Manganese Binary Oxide (FMBO) as adsorbent, this technology is able to remove Arsenic (III) and Arsenic (V) from underground water simultaneously. The treated water quality meets WHO, US EPA, and China National Drinking Water Standard (As <math><10 \mu\text{g/L}</math>).



General Introduction

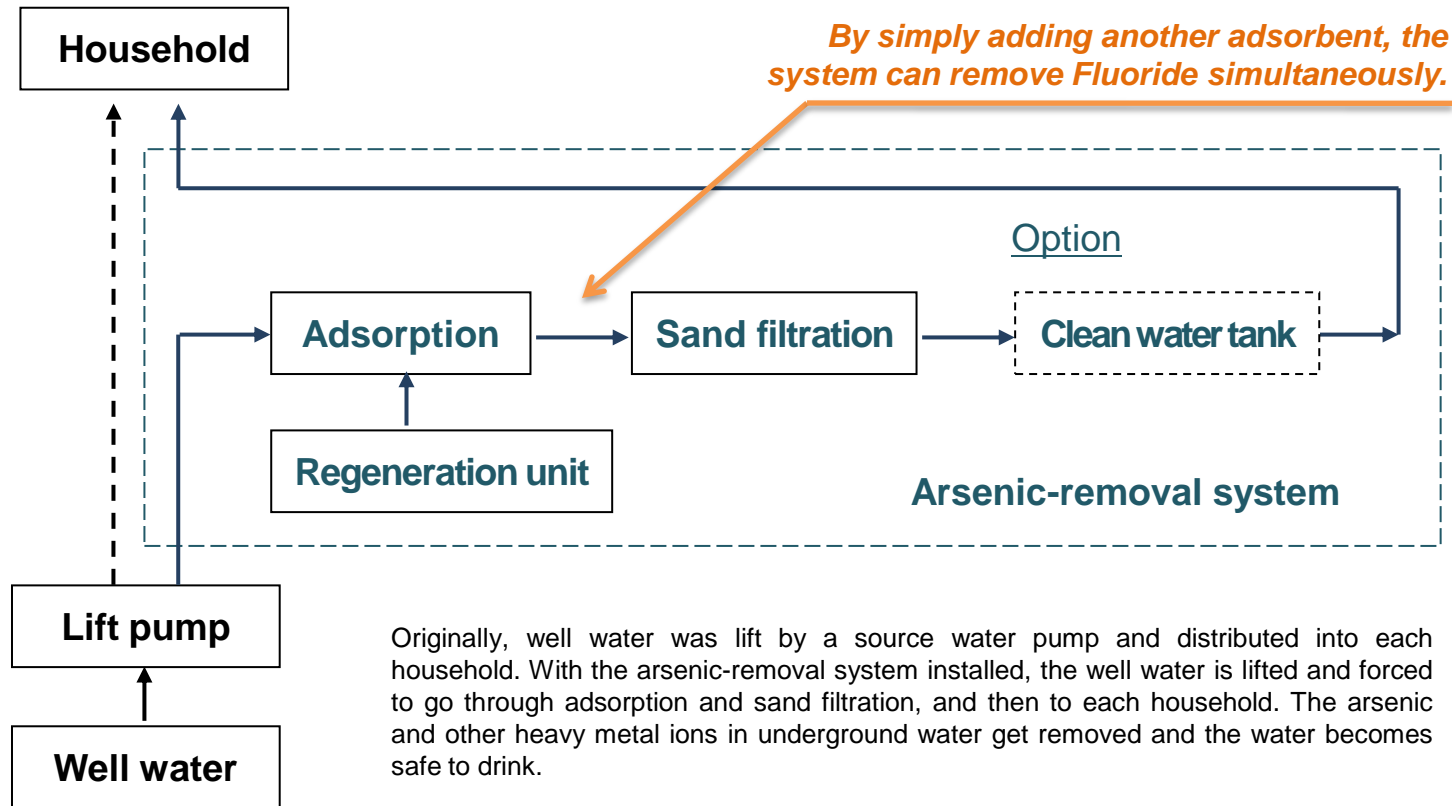
Advantages

- ◆ Effective in removing heavy metals while retain ions good for human-being such as Calcium, Magnesium, Carbonates, and Sulphates;
- ◆ High adsorption capacity;
- ◆ High stability in operation;
- ◆ Cost-effective. Operational cost is 0.73~2.82 cents per cubic meter;
- ◆ Safe for health.



Application Guidance

Recommended System Process



Note: For municipal water supply, disinfection process should be added into current process when necessary.

Application Guidance

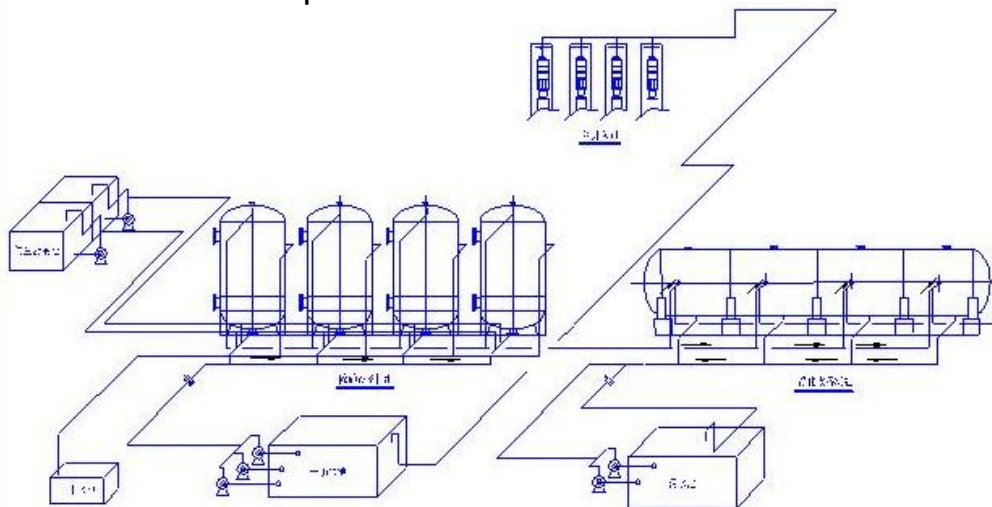
Pilot Projects

1. Small system in rural area (finished)

- >> Location: suburb of Beijing, China
- >> Benefit population: 2,000 people
- >> System capacity: 55,000 gallons per day
- >> System investment: USD \$26,470
(exclude lift pump and distribution piping)
- >> Operation cost (reagent):
0.15~1.5 cents per cubic meter

2. Large scale plant (under construction)

- >> Location: XX city, China
- >> System capacity: 1,230,000 gallons per day
- >> System investment: USD \$ 270,590
(exclude lift pump and distribution piping)
- >> Operation cost (reagent):
0.18 cent per cubic meter



To remove arsenic and fluoride by

Electro-Coagulation

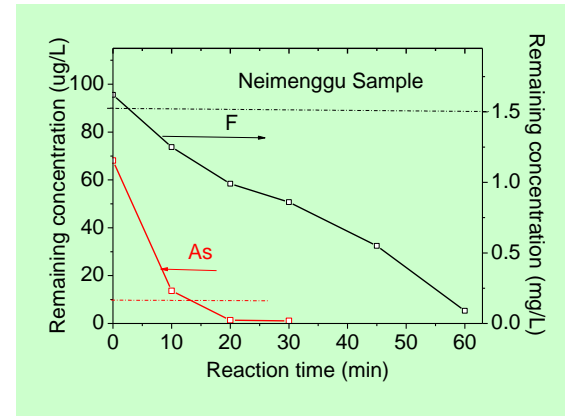
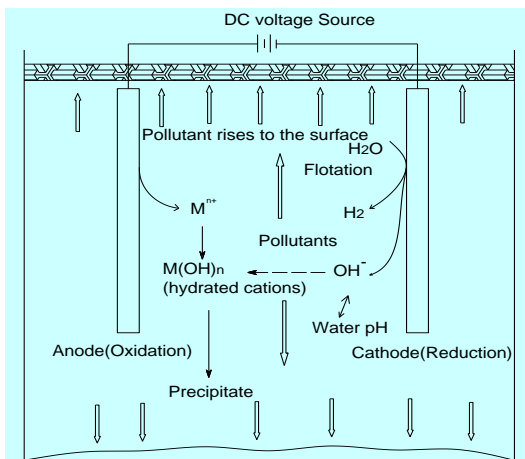
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General Introduction

Theory

Electro-Coagulation (EC) technology has been applied to remove fluoride and arsenic since 1983.



Iron and Aluminium ions are generated via electrochemical process, and Arsenic and Fluoride can be efficiently removed simultaneously.

General Introduction

Advantages:

- ◆ Easy to manufacture
- ◆ Less space required
- ◆ Simple in operation
- ◆ No chemical addition
- ◆ Low maintenance cost

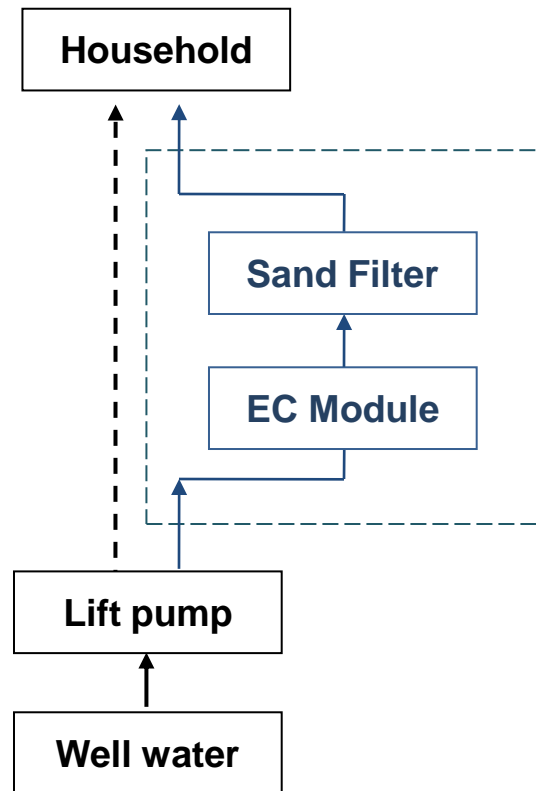
Limitations:

- ◆ Not recommended for large scale plants
- ◆ System investment is twice as much as Adsorption Method



Application Guidance

Recommended System Process



Originally, well water was lifted by a source water pump and distributed into each household. With the Electro-coagulation unit installed, the well water is lifted and forced to go through EC module and Sand filtration, and then to each household. The arsenic and fluoride in underground water get removed and the water becomes safe to drink.



Thank you!



Global Health and Education Foundation



Chinese Academy of Sciences

