

Arsenic removal for ceramic water filters

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ABSTRACT: *Arsenic is a heavy metal that when found in drinking water is a hazard to health. Resource Development International Cambodia (RDIC) has created a simple Ceramic Water Filter (CWF) that has proved to be very good in removing viruses, bacteria and fungi from water. This paper explains methods of removing arsenic from water. The study suggests that the use of uncommon methods to remove arsenic from water may yield better results, yet notes that more research into new technology is still required.*

KEYWORDS: CERAMIC, FILTER, ARSENIC, REMOVAL, HOUSEHOLD.

INTRODUCTION: Over 137 million people suffer from arsenic related problems each year, stated the World Health Organisation (WHO 2001). Arsenic is bad if consumed in small doses over a long period of time. WHO believes that using household water treatment methods can be the best solution to reducing the spread of diseases, especially in developing countries. Ceramic water filters (CWFs) remove 99.99% of diseases from water however is unable to remove arsenic.

There is no single solution which is always utilized to remove arsenic from water in all cases, as there are many issues to consider. This paper aims to assess the appropriateness of various arsenic removal technologies; and then to suggest a method which would be most applicable to CWFs.

ARSENIC REMOVAL TECHNOLOGIES: COMMON METHODS

Thin layer technology is a method of removing arsenic from water using small holes that let certain materials through, while blocking the passage of other materials; however it requires a force to push the arsenic through these holes. This method was considered unsuitable as it is too costly for developing countries and requires a reliable water source.

Absorption/ion exchange technology is also a method of treating arsenic water however the process requires a constant manual attention. It also requires the water to sustain a constant electrical charge; therefore it has been deemed a costly and unsuitable option.

Coagulation and filtration technology is another method which is very effective at removing arsenic from water. It requires adding chemicals and manually stirring the water. Further studies need to be conducted to find which chemicals are best suited for CWFs. However as this technology requires constant manual attention, it has been rejected in countries such as India.

ARSENIC REMOVAL TECHNOLOGIES: UNCOMMON METHODS

The following methods of removing arsenic from water are considered good for the following reasons: they provide a low cost option; are sustainable; require little energy; and use local materials.

PLASTIC BOTTLE SOLUTION: This technology requires applying a type of chemical to plastic bottles so that when you drink water from the bottle, the chemicals interact with the water automatically to remove the arsenic. This method is successful as it uses chemicals that are easily bought from local markets. It can also be used with CWFs by applying the chemicals to the inside of its surface.

NANO-COMPOSITE ARSENIC SORBENT: In America scientists have designed a chemical that can be applied to the water surface that works eight times faster than other chemical options. This method reaches a larger area of the container and requires much less effort than other known absorption methods.

INDUSTRIAL AND AGRICULTURAL PROCESSES: This method uses rice husks, slag, fly ash and red mud to remove arsenic. It is a low cost option however this technology is still being tested by scientists and requires further research and development.

WASHING CWFs BEFORE USE: A test showed that if CWFs were repeatedly washed over a period of two days after they are made it would successfully reduce the arsenic levels by a significant amount. It is recommended that Resource Development International (RDIC) follow a similar procedure before they distribute the CWFs.

CONCLUSIONS: This paper aimed to determine technologies that would reduce arsenic from CWFs. The following was found:

- If you drink water with high levels of arsenic it will lead to health problems.
- The most harmful metals in CWF appear in the first 2-3 weeks after they are made, whereby the arsenic levels reach levels higher than the WHO guidelines allow.
- If the CWFs were washed repeatedly after they are made it will prevent the arsenic levels increasing to harmful levels.
- It is not good to apply the same methods of treating arsenic water in developed countries as it is in undeveloped countries, as they deal with different available water sources, financial issues and social issues.
- The methods that were deemed as uncommon, have a better chance of removing arsenic from water than others.
- Further research and development is required for certain technologies to work with CWFs.

In order to implement these methods quickly it is recommend to:

- Provide data to scientists, researchers and engineers to help the development of their technology.
- Tests need to be done at homes and in laboratories with new technologies.

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