

Water quality and contamination research paper

[Health & Medicine](#), [Alcoholism](#)



Abstract

The present paper examined water quality and contamination. The three experiments were conducted to find the effects of different pollutants on groundwater, processes of water treatment, and quality of bottled water. The contamination of groundwater was observed to evaluate the result of vitiating environment that has to be protected to ensure a safe future for the progeny. Water treatment processes have to be effective as well as economical, so that people in general worldwide can be benefitted. Treatment method like filtration has researched out for the benefit of people at large. Bottled water was analyzed considering safe for drinking. The level of PH and the presence of chloride, iron and hardness play an important role in making water potable. The outcome of the experiments was in accordance with hypothesis and justified. The precious water has to be protected and preserved at all costs through sustained well directed efforts.

Introduction

Water quality is a measure of its biological, physical and chemical characteristics. It takes into account the state of water in relation to the standard required for different uses, especially for human consumption purposes. The quality of water is assessed against a set of standards relating to the state of ecosystems, safety for drinking and other uses. Water is indeed for the survival of organisms on this earth. Hence, in setting of standards for different uses of water political, scientific as well as technical aspects are looked into as per uses of water. The differing conditions of the environment determine the quality of natural water bodies. The functioning

of the natural ecosystems helps environmental scientists to understand and locate sources of contaminants, and methods of their containment.

Leaving aside sea water, a great portion of surface water is neither drinkable nor poisonous. The quality of water also signifies whether it is polluted or not polluted. As a matter of fact, water being intrinsically related to the earth's ecology, water quality is equally a complex term which can be studied only in relative terms. All types of commercial and industrial pursuits whether it is mining, construction, manufacturing, transport or the likes are major factors of water pollution besides agricultural and urban runoffs, and discharges of untreated as well as treated sewage. (Water quality, 2014) Contamination of water refers to pollution of bodies of water like rivers, aquifers, lakes, oceans, and groundwater. It takes place when pollutants get discharged into water without removal of compounds that are harmful to living organisms. It affects adversely the plants and living organisms. Water contamination is a problem affecting the whole world and needs consistent evaluation of policies relating to water resources (Water pollution, 2014).

The present paper strived to review three experiments relating to water quality and contamination conducted in the laboratory. While, the first experiment explored effects of the contamination of groundwater, the second focused on the ways of water treatment. The third examined the issue of quality of water with respect to its origin as well as procedures to be adopted to make it fit for human consumption. The three experiments examined the issue of water quality and related matters as per hypothesis and provided answers to many questions on water pollution, contamination and its purification for human as well as animal consumption. For experiment

1, this was hypothesized that water would show signs of contamination with all of the pollutants and, on the other hand, in experiment 2, it was assumed that the water would become cleaner after treatment.

Literature Review

Water consumption increasing due to rapid growth of population worldwide and water preservation have assumed added significance on a global level (Gupta et al., 2012). Its utility for humanity has necessitated appropriate use of this invaluable resource. Water management requires the development of techniques and technologies for treatment of wastewater. Contaminating water resources by large volumes of industrial effluents will have to be taken care of by the deployment of proper technologies to restore ecological imbalance and to garner economic benefits. The wastes generated by oil exploration and production lead to produced water that is a complex mix of water, dissolves solids, oil, and suspended solids (Ottaviano et al., 2014). Wang et al., (2014) studied the effects of combined chlorine disinfection and ultraviolet (UV) on water quality . They reported that the UV irradiation enhanced the inactivation of heterotrophic bacteria, and reduced the required initial dose of chlorine. In addition UV pretreatment persuaded fewer changes in the composition of corrosion products and decreased iron release and turbidity of the water in the treatment process. The corrosion bacteria present within the biofilm on the corrosion scales could grow in many disinfection processes (Wang et al., 2014).

Mair & El-Kadi, (2013) conducted a study, to devise an alternative approach to assessing sources of drinking water by combining the use of capture zones with 11 contaminants represented by four groups of compounds

namely solvents, nutrients, pesticides, and fumigants that were found in that region. The main concern was to develop a model of vulnerability as a forecaster of groundwater pollution with respect to sources of drinking water. They utilized Pearl Harbor-Honolulu aquifer region to test those models. This case study differed from other studies as it used multiple pollutants in place of one or two.. The improvements in predictive capabilities by the use of statistical model approach corroborate the contention that changes in existing risk model can make contaminant detection easy and reliable.

Material and Methodology

Experiment-1

Groundwater refers, as the name suggests, water accumulated beneath the ground in fractures, pores, and other spaces available in the soil as well as rock. Rainfall and melting of snow percolating into to the soil under the ground and accumulating there form the underground water. Under the experiment, one can evaluate effects of pollutants on groundwater. One finds in the day to day activities that oil, detergent, vinegar or the likes alter the color, taste, and smell of water. These chemicals get dispersed in the environment and enter groundwater resources, too. The bacteria in the soil try to prevent pollutants from reaching underground water. Under this experiment, 1, it was examined the capability of the soil to absorb or remove vinegar, oil, and laundry detergent available in the environment prior to their reaching underground water.

This experiment strives to observe effects of different pollutants on groundwater. Altogether eight beakers were used by proper labeling and one to four beakers were filled with water 100 mL while rest of beakers 5 to 8

was kept aside. After examination of beaker one, the observations were properly recorded. In the beaker two, 10 mL of vegetable oil was poured and stirred with a wooden stick. Similarly, 10 mL of vinegar was added to the water in the third. In fourth beaker, similar amount of liquid detergent was added and stirred. The cheesecloth was then cut into four pieces, and four thick layer of it was placed in the funnel, and 10 mL of soil was poured into the cheesecloth-lined funnel. The content of beaker one was poured into beaker five through the funnel. The observations were recorded and analyzed. This process of filtration was repeated for contents in second and fourth beaker by utilizing new pieces of cheesecloth, new samples of soil of the same quantity, and beakers six to eight. The observation was tabulated in table 1.

Experiment-2

Water treatment refers to processes through which purification of water is performed. Water contains pollutants that are harmful to humans, as well as animals and plants. Hence, it is imperative that water be treated suitably to make, it fit for human, as well as animal consumption. The processes adopted for the treatment of water may involve solid separation by the use of such physical methods as filtration and settling, and through chemical processes as coagulation and disinfection. The wastewater treatment is done by biological processes and may include activated sludge, slow sand filters, or aerated lagoons. (Water treatment, 2014)

This experiment strives to bring home effects of different methods used in water treatment. Under the experiment, 10 mL of soil was kept inside a beaker of 250 ml to which water was added up to the 200 mL mark. 10 mL of

Alum was placed into the 250 mL beaker containing contaminated water and solution was kept aside for about fifteen minutes to settle. 20 mL of activated charcoal, 40 mL of gravel, and 40 mL of sand were then placed on a piece of cheese cloth that was solidified by pouring of clean water. The contaminated water was then passed through the gravel, activated charcoal, and sand layer to which some drops of bleach solution is added. This filtered solution was evaluated against the contaminated solution, and observations and smell were recorded. The outcomes were recorded and analyzed against standard charts in colors.

Experiment 1: Effects of Groundwater Contamination

Experiment 3

Bottled water is usually considered safe for human consumption, but it may not be true with all kinds of brands. In the U. S., health related issues arising out of bottled water are uncommon. Preferences of customer in terms of convenience, cost, and taste develop a motivation to prefer a particular water, and bottled water is one of them. Many manufactures use natural water body to produce bottled water, but several others use tap water for the same. It is mainly through disinfection and fluoridation that the bottled water is produced. The disinfection treatment meted out, and the fluoride ions added are responsible for the quality of bottled water (Bottled Water, 2013).

This experiment deals with the issue of the quality of bottled water. It compared bottled water of two different brands with the water of a running tap. The three types of water samples were placed into three beakers. Each of these water samples was tested separately with a chloride test strip,

ammonia test strip, iron test strip, and phosphate test strip. During tests, each strip was dipped into the water for one minute, and outcomes were recorded against standard charts in color.

Discussion

The contamination of water of lakes, rivers, groundwater, and other bodies of water takes place due to the impurities present in the water. The three interlinked experiments were conducted to examine effects of contamination of groundwater, water treatment methods, and quality of water with respect to its originating sources. The measurement and analysis of impurities present in the water such as Chloride, PH, Phosphorus, Hardness, Chlorine, Ammonia, and Iron had been done. The effects of oil, vinegar, and detergent were examined with respect to groundwater. In the second experiment, the quality of water collected from the treatment plant was examined by the use of Alum. This experiment brought forth the efficacy of water treatment plants. Third experiment had been designed to evaluate the quality of bottled water. Under the experiment, water samples of bottled water from Fiji and Dasani had been compared and evaluated against, tap water. The outcomes recorded high level of intoxication in the filtered solution kept in beaker 7, and 8, for experiment 1 but contamination level in the water of beaker six, was lower than that of seven and eight. Also, beaker seven emanated foul smell. Dasani bottled water sample showed PH value of two that might be due to the possibility of error in mixing of acid in samples. However, other samples exhibited PH value within prescribed limit with minor variations possibly due to temperature variations. The presence of chloride in Dasani bottled water sample was observed 500 mg/L that were

double the guideline value of 250 mg/L, and it pointed the presence of solids dissolved in the water. Also, hardness could not be zero in case of drinking water. To sum up, the sample might have been wrongly provided or labeled for Dasani Bottled Water.

Rest of samples used in the experiment showed results on expected lines, and justified hypotheses coined. The experiment one adequately confirmed that the oil being trapped into the soil could not affect adversely the groundwater. The viscosity value being high; the infiltration of oil was slow. However, if it might reach groundwater, it leads to hazardous effects. Also, due to the presence of hydrocarbons, water contaminated with oil is hard to treat. Vinegar mixed with groundwater after passing through the soil contaminated water. Similarly, liquid detergent altered the viscosity of water by mixing with water that contained organic pollutants in abundance, and made the water contaminated. This is in line with the hypothesis.

In the present era of industrialization under which effluents and discharges have been continually disseminated into the water treatment is an important issue. Numerous organizations have cropped up to treat water to make it suitable for the teeming millions. It has put economic pressure on the populace, but it is worth the cost because a large number of unsuspecting people fall sick by consuming contaminated products of the environment like water. A controversy is doing the rounds regarding costs of protecting the environment and treating the water (National Resources Defense Council, 2014). However, the protection of the environment can obviate the necessity of treating water, and hence, researching out better ways of protecting the environment is the need of the hour. Meanwhile, home based means to treat

water should be researched out to save people from spending too much in purchasing potable water. Hence, filtration appeared to be the best method which is cost effective and home based to treat water. The experiment three justified the hypothesis as obtained results were in accordance with standards of treated water.

Conclusion

Water is the most precious and all animals and plants need water to survive and sustain life. Apart from drinking, water has myriad of uses in the day to day life. Water is indispensable for growing crops, animals, and manufacture of various products. However, what concerns the most is the availability of drinking water that is safe, and one call it potable water.

Water being invaluable needs to be preserved and protected. All concerned should make concerted efforts in this direction to ensure a safe future for the progeny. The three experiments conducted revealed ominous fact that groundwater is getting contaminated by mindless activities of humans.

Water treatment is an important process through which safe drinking water could be produced. However, home based water treatment method which is conducive and cost effective has to be found out to provide potable water to the people worldwide. The resultant health issues due to unclean water are gigantic, and hence, Himalayan efforts are required to ameliorate the situation.

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