

**PURIFYING OF GROUND WATER AT SUB GROUND LEVEL BY NATURAL METHODS**<sup>1</sup>M Kavitha yadav, <sup>2</sup>R Bheemlal, <sup>3</sup>M Sai kumar sagar<sup>1</sup> Environmental Science, University College of Science, Osmania University, Hyderabad  
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**Abstract:** Groundwater typically becomes polluted when rainfall soaks into the ground, comes in contact with buried waste or other sources of contamination, picks up chemicals, and carries them into groundwater. Sometimes the volume of a spill or leak is large enough that the chemical itself can reach groundwater without the help of infiltrating water. Heavy metals occur in the earth geological structures, and therefore entire water resources through natural process. For example, heavy rains or flowing water can leach heavy metals out of geological formations. Arsenic occurs in many minerals usually in combination with sulphur and metals, and zinc is chemically similar to magnesium, zinc deficiency such as retardation of growth in children, mail reproduction, according to this two chemicals lead, cadmium plays a major role in groundwater due this pollution. Humans affected with several health disorders like reduce in blood cell production, break up red blood cells in circulation and brain damage. in this circumstances by using natural methods we can clean the ground water and sub ground level by using natural methods with natural products, like corn, coal powder neem bark, wood activated carbon, alum rice husk, and gravel by this method we can purify ground water and control the entering of chemicals into the food chain then we can control the food born diseases.

**Key words:** *Groundwater*, contamination, Arsenic, zinc, corn, coal powder and gravel.

**I. Introduction**

Groundwater typically becomes polluted when rainfall soaks into the ground, comes in contact with buried waste or other sources of contamination, picks up chemicals, and carries them into groundwater. Sometimes the volume of a spill or leak is large enough that the chemical itself can reach groundwater without the help of infiltrating water.

Groundwater tends to move very slowly and with little turbulence, dilution, or mixing. Therefore, once contaminants reach groundwater, they tend to form a concentrated plume that flows along with groundwater. Despite the slow movement of contamination through an aquifer, groundwater pollution often goes undetected for years, and as a result can spread over a large area. One chlorinated solvent plume in Arizona, for instance, is 0.8 kilometers (0.5 miles) wide and several kilometers long

The growing population and an increase of industrialization and agricultural production in numerous countries require more and more water of adequate quality. In many regions there is a lack of surface water and severe water contamination is to be found. Shallow groundwater resources are often of insufficient quality and over-exploited. Therefore, it is of high priority to take into consideration all the proved water techniques that could help to reduce the existing disaster.

Artificial groundwater recharge is an approved method that has been improved during the last decades. It has been found that also the new kinds of polluting agents, especially organic compounds, can be minimized or even removed by natural purification processes in the subsurface. Until recently, this view may have been mostly true. But now groundwater investigators have found

contaminants in groundwater supplies, such as industrial and municipal wastes; leaking sewer or septic tank effluent; animal feedlot runoff; Ground water get polluted in many ways in that due to the globalization industries well developed the industries are factories are discharged directly are in directly in to the near water body's that particular contaminants affects the plants and animals living in these in most all cases the effect is damaging not only to individual and populations but also the nature

**II. Objectives**

1. To clean the ground water by natural methods.
2. Presently the ground water get polluted by heavy metals from industries and agriculture sector because of pesticides and chemicals.
3. Another hand because of landfill sites the ground water is heavily polluted. Due to lizchade.it is nothing but combination of chemicals and plastic.
4. The lizchade contains heavy metals like arsine, zinc, cadmium.

**III. Identification of Polluted Ground Water**

We can identify easily by with naked eye most probably, in that first one is

1. By Oder of the water.
2. By color.
3. By taste

**A. Source of pollution:**

Source of pollution mainly two types

1. Point source of pollution.

2. Non point source of pollution.

#### **B. Point source of pollution:**

In point source of pollution the pollutants discharge into a particular water body from a single source.

#### **C. Non point source of pollution:**

In non point source of pollution the pollutants discharge into particular water through many ways that means not from the single way.

And ground water pollution due to heavy metals from municipal and E- electronic waste.

The municipal and E-electronic waste release the some heavy metals into the ground this are mainly

#### **D. Important Heavy Metals Contaminated**

1. Arsenic
2. Zinc
3. Lead
4. Cadmium

#### **E. Measurements of ground water pollution:**

1. Low BOD
2. High DOB
3. High alkanity.
4. Low pH

#### **IV. Heavy Metals enter in the Ground Water:**

Heavy metals occur in the earth's geological structures, and can therefore enter water resources through natural processes. For example, heavy rains or flowing water can leach heavy metals out of geological formations. Such processes are exacerbated when this geology is disturbed by economic activities such as mining.

These processes expose the mined-out area to water and air, and can lead to consequences such as acid mine drainage (AMD). The low pH conditions associated with AMD mobilize heavy metals; including radionuclide's where these are present. Mineral Processing, operations can also generate significant heavy metal pollution, both from direct extraction processes (which typically entail size reduction - greatly increasing the surface area for mass transfer - and generate effluents) as well as through leaching from ore and tailings stockpiles.

#### **A. Health Effects caused by Heavy Metals:**

Soluble inorganic arsenic can have immediate toxic effects. Ingestion of large amounts can lead to gastrointestinal symptoms such as severe vomiting, disturbances of the blood and circulation, damage to the nervous system, and eventually death. When not deadly, such large doses may reduce blood cell production, break up red blood cells in the circulation, enlarge the liver,

Color the skin, produce tingling and loss of sensation in the limbs, and cause brain damage. Deficiency in zinc interferes with the cell division in sperm. Young boys going through puberty need higher levels of zinc to develop health reproductive organs.

#### **V. Plan of the Work**

Plan of my work is identify the good irrigated land and check that land is suitable for the ground water cleaning by some methods. If that particular land is may be a block soil land it is not completely good for the ground water cleaning process, and if that particular land is may be sand soil. Also not good for the ground water cleaning process because this particular two types of land not having the good capacity to hold the water. Another types of soils are good for ground water purification in this project main objective is purify the ground water in ground by natural methods. Plan for this project is we want suitable irrigated land and 10 cement ring And sand and small gravels, cast iron turnings and wood activated carbon alum oxidation zone,. Neem bark, rice husk ash. In this first step is select the particular land and dig the well with 10 fits depth and in the second step arrange the cement rings one by one without gapes. In the first layer we can spread the sand and gravel, along with the alum. In the next layer we can spread the sand, charcoal, and wood activated carbon. In the 3<sup>rd</sup> layer add the neem bark and rice husk along with the sand ,in the next level we can treat the water with in oxidation zone. In the fourth step give connections to another empty well. In the fifth step collect ground water from ground by bore well and give the connection to newly form well which one is filled with sand and gravel. Natural purification effects within filter layers and in the subsurface are caused mainly by filtration, sedimentation, precipitation, oxidation-reduction, sorption-desorption, ion-exchange and biodegradation. The oxygen content of the water is decisive for oxidation processes and activities of microorganisms.

The presence of reducing substances such as humic matter, causing a lack of oxygen, is responsible for chemical reductions. pH-value and redox-potential influence these reactions, too. Dissolved compounds, among them also contaminants, can be adsorbed especially by clay minerals, iron-hydroxides, amorphous silicic acid, and organic substances. If the chemical composition of the water changes, desorption may happen.

Ion exchange processes take place mainly in the presence of organic matter and clay minerals. One kind of ion is exchanged against another in stoichiometric relation.

In this way, contaminating ions can also be fixed at underground.

The forming of ionic and molecular complexes changes the solubility, precipitation and sorption of substances such as heavy metals and organic compounds.

## PURIFYING OF GROUND WATER AT SUB GROUND LEVEL BY NATURAL METHODS

Within the layer of filter sand and the aquifer, a great variety of natural microorganisms exist, which are highly involved in rehabilitation processes (Balke and Griebler, Biodegradation, the decay of organic compounds by microorganisms, reduces the amount of organics, no matter they are of natural origin or stemming from contaminations.

### VI. Methodology

In this process we totally follow the natural methods the polluted water enter into the newly formed well by pipe lines in this weal the polluted ground water filtered through four layers. The first layer is combination of sand

and gravel along with the alum. when the polluted water flow through sand layer the major contaminants are blocked in the sand layer and below the sand layer maize layer is their the maize's are mainly formed with cellulose compounds light in weight. In the second layer we add the sand, charcoal and wood activated carbon along with maize, and this layer is called as the maize layer. when the water flow through the maize layer some micro organisms and contaminants which are having related compounds of cellulose are blocked here. From bottom to second layer spread the sand and neem bark along with the rice husk after the complication of this three layer filtering the can enter in to the oxidation zone. In the fourth layer of gravel qualify the water from micro organism

### Results :

**Table1 sample unpurified water**

RESSample (un purified water)	P <sup>H</sup>	Turbidity NTU	Arsenic (µg/l)	Zinc (µg/l)	Lead (µg/l)	Cadmium (µg/l)
Tap water	9	10	12	15	11	9
Ground water	10	13	13	12	19	12
Surface water	9	11	11	16	16	2

**Table2 sample purified water**

Sample(purified water)	P <sup>H</sup>	Turbidity NTU	Arsenic (µg/l)	Zinc (µg/l)	Lead (µg/l)	Cadmium (µg/l)
Tap water	6	4	7	5	9	5
Ground water	7	4	5	1	13	8
Surface water	6	3	5	1	16	4

### Conclusion

As above test results

- i) For tap water: pH value for un purified water is 9 by using layers method the change in P<sup>H</sup> value is 6 and the heavy metals in the water can be decrease for un purified water the arsenic is 12 and after the purification the value of arsenic is 7 and finally the remaining heavy metal concentration is reduces in results zinc for unpurified water is 15 after purification is 5 along with this the cadmium and lead are decreases.

### Reference

- [1] Gokcen, N.A (1989). "The As (arsenic) system". Bull. Alloy Phase Diagrams.
- [2] Ellis, Bobby D.; MacDonald, Charles L. B. (2004). "Stabilized Arsenic Iodide: A Ready Source of Arsenic Iodide Fragments and a Useful

Reagent for the Generation of Clusters". Inorganic Chemistry.

- [3] Cverna, Fran (2002). ASM Ready Reference: Thermal properties of metals. ASM International.
- [4] Lide, David R., ed. (2000). "Magnetic susceptibility of the elements and inorganic compounds". Handbook of Chemistry and Physics (PDF) (81 ed.). CRC press .
- [5] Standard Atomic. Thornton, Papers and Lectures Online. Archetype Publications.
- [6] Wolf, L., Nick, A., Cronin, A. (2015). How to keep your groundwater drinkable: Safer siting of sanitation systems – Working Group 11 Publication. Sustainable Sanitation Alliance
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