A STUDY OF WATER POLLUTANT PRESENT IN GROUNDWATER OF BHIWANI CITY, HARYANA AND DIFFERENT METHODS TO REMOVAL THESE WATER POLLUTANTS

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ABSTRACT

More than 70% of our country's fresh water in liquid form has been rendered unsafe for human use. Water pollution is now a worldwide challenge for environmental sustainability, necessitating the use of high-performance materials in successful pollution remedies. The main goal of this article is to investigate and analyse the water contaminants found in ground water in several colonies in Bhiwani, Haryana, India. Water samples were gathered from five locations in Bhiwani, Haryana, India. Many colonies have high TDS, magnesium, calcium, and nitrate contents, making the water unfit to drink. Various technologies have been implemented to address this issue. Different pollutants, such as hazardous trace metals, E.Coliforms, and other inorganic contaminants, are found in both surface water and groundwater sources. We also cover recent research on the removal of inorganic, organic, and heavy metal contaminants from water.

KEYWORDS:- Groundwater, organic pollutant, inorganic pollutant, Bhiwani city, contaminants, TDS, Hardness, E.Coliform bacteria, removal methods, water pollution.

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INTRODUCTION

India occupies a unique position in the globe for historic, geographic, religious, politic, and sociological cause. During the previous several decades, aquatic habitates got a significant change that cause pollution. In recent years, serious concerns have been raised about river water for drinking purpose and other reasons. The groundwater is being contaminated by a variety of toxins **[1]**. Water becomes dangerous for washing, cooking, swimming, drinking, and other activities when toxins damage water sources. Chemicals, waste, parasites, and infections are examples of contaminants. Pollution from the earth can enter an underground stream, then a river, and eventually the sea. When we talk about ground water pollution, we're talking about solutes dissolved in water that can make it inappropriate for human consumption or an ecosystem **[2]**. The district of Bhiwani is located in the south-western section of Haryana and has an area of 5140 square kilometres. The district does not have a perennial river running through it. The territory is characterized by a flat and level plain that is disturbed from time to time by clusters of sand dunes, solitary hillocks, and rocky ridges. In the district's south central area, a few solitary rocky hills rise high from the plain. The single ephemeral stream in the area, the Dohan River, runs in direct reaction to precipitation. According to the 2011 Census, Bhiwani district is the third most populous in Haryana, with a population of 16,34,445 people. The male population is 866,672 people, while the female population is 767,773. The population density is 342 people per square kilometre. The district's literacy rate

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is about 75.21 percent. The rural population accounts for 80% of the population, while the urban population accounts for 20%. There are 437 inhabited villages and 7 uninhabited villages out of 444 total. The district's average annual rainfall is 420 mm, which is evenly divided over 22 days. Rest During the non-monsoon season, western disturbances and thunder storms bring 15 percent rainfall. Rainfall in the district tends to rise from the southwest to the northeast **[3].** The goal of this research is to investigate the water pollutant in Bhiwani city. And how potable water of Bhiwani city. Is this water is to drink or not ?

POLLUTANT FOR WATER:

Today, the entire globe is dealing with a slew of environmental issues, including polluted ground water and hazardous waste discharge from industrial sectors, all of which are the result of improved industrialization in many domains. As a result, numerous water filtration systems have been created **[4].** Nonpoint sources, contribute to water pollution, as do urban and municipal wastewater discharge**[5].** The majority of non-point sources were first recognise as such by ground specialist, who realised that the soil (urban or rural) was an essential method of transferring pollution to the surface water by complicated interactions **[5, 6].** A contaminant in water can be characterized as one of the following:

(1). Organic pollutant (2). Inorganic pollutant (3). Pathogens

(4). Suspended solid (5). Agriculture and Nutrient pollutant

(6). Radioactive, Thermal and other pollutants.

As, Sb, B, Be, Ba, Cl, Ca, Cu, Cd, Cr, Co, Pb, Fe, F, Mn, Mb, Mg, Hg, NO_3^{2-} , PO_4^{2-} K, P, , Se, SiO_2, Na, Ag, S^{2-}, Sn, Tl, Ti, U .These may be categorised as inorganic toxins whether they present in the type of elements or compounds if their concentrations exceed the allowable limit, are harmful to environmental. Heavy metals and other inorganic pollutants pollutes water sources, involve minerals acids, trace elements, inorganic salt, metals, sulphate, metal complexes by organic molecules, and larger amount of cyanides. The primary contaminants in wastewater are inorganic and organic pollutants. Heavy metals are a significant source of inorganic pollution **[5, 6].**

STUDYING TABLE: Chemical analysis report of water sample in various colony of Bhiwani city-

TABLE NO. (1)

S.NO	TEST	RESULT 1 & 2 DATE- 28 JUNE 2021 FRIENDS COLONY	RESULT 3 DATE- 13 october 2020 D.C. Colony	RESULT 4 DATE- 13 october 2020 CITY STATION	RESULT 5 DATE – 28 MAY 2021 BANK COLONY	RESULT 6 DATE- 28 JUNE 2021 LAJPAT NAGAR	ACCEPTABLE VALUE (in mg/L)	MAXIMUM ACCEPTABLE (in mg/L)

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		SITE 1 SITE 2						
1	Total Dissolved Salts(TDS)	918 150	516	1477	79.8	1008	500	2000
2	Total Hardness As CaCO3	295 50	250	450	100	310	300	600
3	Calcium As Ca	195 20	100	180	40	115	75	200
4	Magnesium As Mg	96 12	60	108	24	79	30	100
5	Alkalinity	180 100	84	154	26	100	200	600
6	Iron As Fe	0.9 0.2	0.5	1.4	0.3	0.2	0.3	1.5
7	Chloride As Cl	215 210	260	600	170	510	250	1000
8	Sulphate As SO4	185 180	47	376	42	40	200	400
9	Fluoride As F	0.3 0.2	1.2	1.8	0.08	0.9	1.0	1.5
10	Nitrate As NO3	32 30	28	54	27	40	------	45
11	pH (at 25°C)	7.5 7.3	7.0	7.8	7.2	7.6	6.5 to 8.5	Less than 6.5 or Greater than 8.5

Source:- : Public Health Engg. Laboratory, Bhiwani

TABLE NO. 2:- Bacteriological Report of various colony of Bhiwani city, Haryana, India

S.NO.	COLONY NAME Sample taken on dated-	No. of Coliform (Present in 100 ml)	Conclusion:- Whether Bacteriologically

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	(26/08/2021)		Fit Or Not
1	Ninan	0	FIT
2	Dhana Road	23	UNFIT
3	Vikas Nagar	0	FIT
4	Bank colony	0	FIT
5	MC colony	0	FIT
6	Defence colony	0	FIT
7	Patram Gate	0	FIT
8	New Housing Board	0	FIT
9	Hanumaan Gate	23	UNFIT

SOURCE:- : Public Health Engg. Laboratory, Bhiwani

TABLE NO. 3 :- Bacteriological Report of various colony of Bhiwani city, Haryana, India.

S.NO.	COLONY NAME Sample taken on dated- (20/08/2021)	No. of Coliform (Present in 100 ml)	Conclusion:- Whether Bacteriologically Fit Or Not
1	Rajiv colony	0	FIT
2	Neharu Colony	0	FIT
3	Indira colony	0	FIT
4	Vidhya Nagar	0	FIT
5	Kirti Nagar	0	FIT
6	Vijay Nagar	0	FIT
7	Old Housing Board	0	FIT
8	DC colony	0	FIT
9	City Station	23	UNFIT
10	Chiranjiv Colony	23	UNFIT
11	Jagat colony	0	FIT

SOURCE: Public Health Engg. Laboratory, Bhiwani

REMOVAL METHOD:

METHOD TO DECREASING INORGANIC WATER POLLUTANTS:- Anionic, cationic or neutral forms of ions, atoms, or molecules of every element in the periodic table can be dissolved in water **[7].**

(1). In recent decades, there has been a growing interest in using biological methods to remediate wastewater prior to it's dumped into the natural water reservoir. Water hyacinth phytoremediation has been indicative as an excellent biological wastewater management technology. The most promising plant for

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eliminating contaminants from wastewater is water hyacinth (Eichhornia crassipes), a common weed. Banana , neem leaves, rice husk, orange peel, mango seed kernel, modified saw dust, peanut hulls and pineapple stems are now suggested for the use treatment it is Because all of these adsorbents are inexpensive. However, such an adsorbent's adsorption efficiency is rather low. As a result, more study is needed to create a cost-effective wastewater treatment system., long-lasting, and highly successful. Dyes, radionuclides, other inorganic, heavy metals and organic pollutants have been effectively accumulated from water at large scale. Finally, heavy metal ions like Cd, Cu, Fe, Mn, Cr, As and Zn as well as different colours are efficiently removed by water hyacinth **[8].**

(2). Phytoremediation is widely considered as a practical method for eliminating pollutants from wastewater and as an excellent green remedial technique. Regardless of the fact that there have been several articles on wastewater treatment utilising water hyacinth, the removal of heavy metals, inorganic, and organic pollutants has not been adequately investigated in recent years. **[9].**

(3). To remove different contaminants from aqueous solutions, graphene become popular as a better adsorbent due to its exceptional capacity, unique structure and great no. of adsorption site to adsorb contaminants. The using of graphene-based Nanomaterials, this paper give a summarized table about the how to remove inorganic pollutants of the anionic and cationic types . A low pH value favours adsorption of anionic contaminants, whereas a high pH value favours adsorption of cationic pollutants for the reason of electrostatic interaction **[10].**

(4). Biologically modified silica and Mesoporous silica-based materials are utilised to remove organic and inorganic contaminants from aqueous solutions **[11].**

(5). Biochar (BC) has shown tremendous promise in removing water pollutants due to its inexpansive cost, large surface area and large availability of raw materials. However, the use of BC for water cleanup has a number of drawbacks. Adsorption is chosen over other separation methods for pollutants in wastewater treatment because of its high efficiency, cheap cost, and ease of operation. BC has recently gained popularity as a new sorbent due to its superior properties **[12].**

(6). To eliminate contaminants from tannery wastewater, an electrocoagulation method was used. It was found that electrode's set up gives best result in parallel connection because the same value of current in the system might be moved with a lower applied voltage The optimal conditions for treating tannery wastewater were determined to be a current density of 22.4 Am2, a circulation flow rate of 3.67 lmin1, an initial pH of 7-9, and an electrolysis period of 20 minutes. About 95 percent of COD, 100 percent of Chromium, 62 percent of TKN, 96 percent of TSS, 96 percent of BOD, 50 percent of Total Dissolved Salts, and 99 percent of oil and grease were eliminated in this situation **[13].**

(7). Several typical treatment strategies for removing inorganic impurities from natural water sources now in use pose major exploitation issues. Membrane processes like Nanofiltration, Reverse Osmosis, Microfiltration, and Ultrafiltration in hybrid systems , membrane bioreactors and Donnan dialysis and Electrodialysis can all produce high-quality water for drinking without inorganic anions if properly selected **[14].**

(8). HYDROGEL:- Zeolites, coagulant, activated Carbon, mineral clays, chitosans, hydrogels, and microorganism adsorbent materials are only a few of the materials that have been described

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for anion removal. Hydrogels becomes popular to remove undesirable water anions because of their unique features, such as being water-friendly, producing little to no secondary pollution, being easily recycled, and not requiring expensive equipment to function. NCAHs, CCHs, and HHs are three types of hydrogels that have been studied recently for the aim of eliminating undesirable anions from water **[15].**

(9). The change of bentonite yielded HO-CaBen, a new adsorbent which is effective and cheap adsorbent to remove inorganic pollutants from aqueous solutions. Theoretical calculations supports anion/OH exchange reaction. These results revealed that HO-CaBen might be good adsorbent for removing bentonite-based anion from wastewater **[16].**

(10). Using a microwave-assisted technique, ternary Ag_2O/NanoGraphenePlatelet/TiO_2 composites comprising varying quantities of NGP were produced and applied as catalysts to degrade the organic dyes from the aqueous solution. This composites might be applied as effective wide-spectrum catalysts for removing a variety of dye pollutants from aqueous solutions **[17].**

(11). Coir pith, a typical lignocellulosic agricultural waste, is used to manufacture ZnCl2 activated carbon, which is used to filter water for heavy metals, toxic anions, colours, and organic compounds. The sorption of inorganic anions like SCN-, NO_3^-, Cr(VI), selenite, SO_4^{2-}, molybdate, V(V) and PO_4^{3-}, as well as heavy metals like Hg(II) and Ni(II) has been investigated. Catechol, 4-nitrophenol bisphenol A, O-cresol, 2-aminophenol, phenol, quinol, 2-chlorophenol, and resorcinol have all been examined for elimination **[18].**

(12). Acids and bases, which are typically found in sources of drinking water, are found in a wide range of environmentally hazardous compounds, including medications and illicit drugs. Activated carbon (AC), UV/H_2O_2, and Membranes are currently utilized water treatment technologies that may difficult for removing these charged micropollutants.. Numerous ionic organic compounds were studied for their sorption propensity to both other charged polymeric and AC material. Ion-exchange polymers may be useful as extra extraction phases in water purification since sorption of all charged compounds to oppositely charged polymers was stronger than sorption to AC. This is especially true for metformin, a double-charged cation **[19].**

(13). This study uses in situ optical absorbance measurements and electrical resistance in appropriately designed cells to investigate the processes of open-circuit adsorption and electrosorption at electrochemically polarised, high-area C-felt electrode modules. In two cases, C-felt electrodes are used to study S-containing anions and the kinetics of their adsorption **[20].**

CONCLUSION/RESULT:

Our result showed a wide variation in TDS due to changes in places, depth of water sources and other geological and thermodynamic factors. These results are very useful for human beings by paying more attention to the chemical composition variation correlated to National and International acceptable level. In some cases it is indicated that TDS, Calcium, nitrate levels were not comparable with National and International Standard and consumers are highly risk of body's homeostasis mechanism. This natural process keeps the concentrations of minerals (ions) and water in body fluids within restricted bounds within and outside all cells in all organs and tissues of the body. The kidneys play a critical role in maintaining ion concentrations at a steady level. Diabetes, esophageal, stomach cancer,

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and Methaemoglobinaemia and thyroid enlargement are the most serious health risks associated with nitrate. Nitrate level in water should not present in drinking water. However, all six water samples contains some amount of nitrate. The danger of Blue Baby Syndrome/methemoglobinemia in humans has been linked to a high intake of NO3- in drinking water. The measurement of TDS does not sole criteria for health risk but it is a working sign of a health problem. TDS levels above 255 are considered unacceptable because they may have major health consequences. Three of the six samples have higher TDS above the acceptable level given by BIS (2011) and WHO (2011).

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