Original Research Paper

Volume-9 | Issue-4 | April-2019 | PRINT ISSN No 2249-555X

Chemical Science

BESIDES AIR POLLUTION, WATER POLLUTION IS ONE OF THE MAJOR CAUSE OF HUMAN DEATH

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ABSTRACT With about 70% of the earth's cover being water, it undeniably becomes one of our greatest resources. Water is used in almost every important human chores and processes. It is important in both domestic as well as industrial purposes. However a closer inspection of our water resources today, give us a rude shock. Infested with waste ranging from floating plastic bags to chemical waste, our water bodies have turned into a pool of poison. The contamination of water bodies in simplest words means water pollution. Thereby the abuse of lakes, ponds, oceans, rivers, reservoirs etc is water pollution. Pollution of water occurs when substances that will modify the water in negative fashion are discharged in it. This discharge of pollutants can be direct as well as indirect. Water pollution is an appalling problem, powerful enough to lead the world on a path of destruction. Water is an easy solvent, enabling most pollutants to dissolve in it easily and contaminate1 it. The most basic effect of water pollution is directly suffered by the organisms and vegetation that survive in water. On a human level, several people die each day due to consumption of polluted and infected water.

KEYWORDS : Infested, Modify, Appalling, Contaminate, Consumption.

Introduction

Water is vital to the existence of all living organisms, but this valued resource is increasingly being threatened as human populations grow and demand more water of high quality for domestic purposes and economic activities. Water abstraction for domestic use, agricultural production industrial production, power generation, and forestery practices can lead to deterioration in water quality and quantity that impact not only the aquatic ecosystem (i.e., the assemblage of organisms living and interacting together within an aquatic environment), but also the availability of safe water for human consumption. As human populations expand and place ever greater pressure on natural environments. The ability to properly track natural environments and improving access of humans to safe water depends on the availability of data. As such, ongoing monitoring of both water quality and quantity in surface and ground water resources is a necessary activity at all level.

Material & Methods

Sample collection locations are listed in Table 1 Shown below. Chemical analyses were carried out for the major ions, minor ions and trace ions concentrations using the standard procedures recommended by American Public Health Association[3]. The analytical data can be used for the classification of water for utilitarian purposes and for ascertaining various factors on which the chemical characteristics of water depend[4]. Water quality is usually determined by analysing samples of water collected from different sites at regular intervals. Here different villages are selected of same Tehsil / Block Huzur in Bhopal district for monitoring water quality.

Result & Discussion

In the present investigation TDS, concentration of calcium, magnesium, Lead, cadmium, flueride and nitrate has been observed. Table 1 shows the Physico chemical parameter of the study centre water sample. The total dissolved solids observed from this area is between 484-1124mg/l. Generally the higher TDS cause gastro intestinal irritation to the human beings, but the prolonged intake of water with the higher TDS can cause kidney stones and heart disease. High TDS of this area may be influence of anthropogenic sources such as domestic sewage, agricultural activities and influence of rock – water interaction.

Calcium content is very common in groundwater because they are available in most of the rocks, abundantly and also due to its higher solubility. The calcium concentration in water samples collected from the study area is of high ranged. All the samples exceed the permissible limit. The rapid urbanization in the area contribute to the high concentration of calcium in the groundwater of the region.

Magnesium (Mg^{+2}) usually occurs in lesser concentration than calcium due to the fact that the dissolution of magnesium rich minerals is slow process and that of calcium is more abundant in the earth's crust. Magnesium is an essential ion for functioning of cells in enzyme activation, but at higher concentration, it is considered as laxative agent.

Lead (Pb) is an undesirable trace metal less abundantly found in earth crust. Lead is used principally in the production of lead-acid batteries, solders and alloys. Lead is also found in soil, vegetation, animals and food. It is a serious cumulative body poison. Lead inhibits several key enzymes involved in the overall process of haemosynthesis, whereby metabolic intermediate accumulates. The concentration of lead is below permissible limit in most of the water samples of study area except few it exceeds the safe limit of 0.05 mg/l.

Nitrate (NO_3^-) generally occur in trace quantities in surface water but may attain high levels in some groundwater. It is well known that the nitrogenous fertilizers are one of the important sources for groundwater nitrate for the past two decades[5]. Further, nitrogenous materials are rare in geological system. The permissible limit of nitrate is 45 mg/l prescribed by BIS standards. The nitrate concentration in groundwater collected from the study area ranged between 36 to 84 mg/l. Hence, as far as the nitrate is concern few water samples exceed the permissible limit. The origin of nitrate is derived may be from agricultural areas due to leaching[6] process from plant nutrient and nitrate fertilizers.

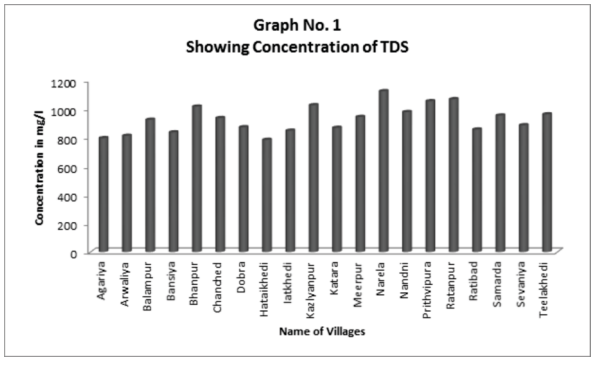
Bedrock containing fluoride minerals is generally responsible for high concentration of this ion in groundwater. Fluoride normally accumulates in the bones, teeth and other calcified tissues of the human body[7,8]. Excess of fluoride in water causes serious damage to the teeth and bones of the human body, which shows the symptoms of disintegration and decay, diseases called dental fluorosis and skeletal fluorosis[9]. Water containing more than 1.5 mg/l of fluoride cause mottled tooth enamel in children and are not suitable for drinking purpose. Excess fluoride may also lead to fluorosis that can result in skeletal damage.

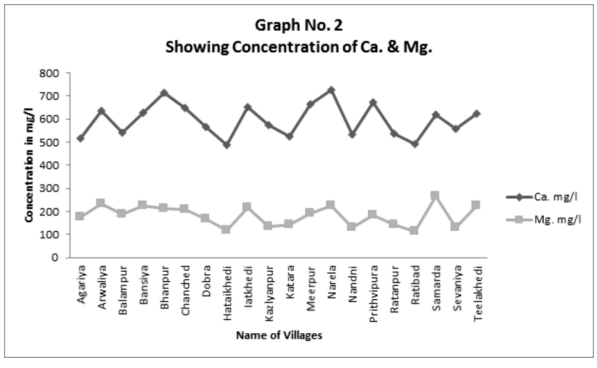
Cadmium concentration is found to be very[10] low in the study area but its low concentration is also toxic. The Cadmium concentration is groundwater is mainly due to anthropogenic activities (Heavy Metal Poisioning, 2016). Its concentration is not in alarming situation but one should be very alert in using nickel cadmium batteries. Cadmium compounds are currently mainly used in rechargeable nickel-cadmium batteries. Cadmium emissions have increased dramatically during the 20th century, one reason being that cadmium-containing products are rarely re-cycled, but often dumped together with household waste. Cigarette smoking is a major source of cadmium exposure. Natural as well as anthropogenic sources of cadmium, including industrial

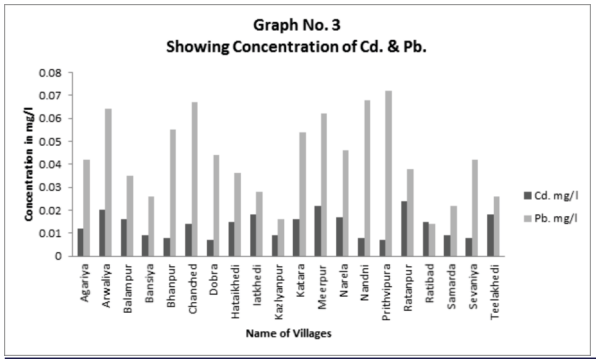
emission and the application of fertilizer and sewage sludge to farm land, may lead to contamination of soils, and to increased cadmium uptake by crops and vegetables, grown for human consumption.

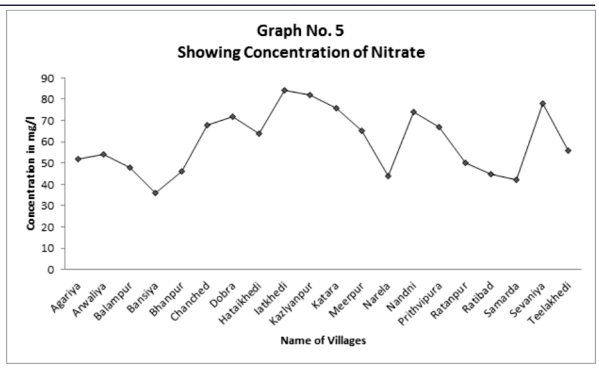
Analytical Parameters Showing The Concentration Of Various Ions In Ground Water Of Some Villages Surrounding Bhopal

S. No.	Name of Villages	TDS mg/l	Ca mg/l	Mg. mg/l	Cd mg/l	Pb. mg/l	F mg/l	NO_3 mg/l
1.	Agariya	796	516	176	0.012	0.042	1.67	52
2.	Arwaliya	812	634	234	0.020	0.064	2.05	54
3.	Balampur	924	542	188	0.016	0.035	1.84	48
4.	Bansiya	836	626	226	0.009	0.026	1.95	36
5.	Bhanpur	1016	714	212	0.008	0.055	2.24	46
6.	Chanched	936	646	208	0.014	0.067	2.62	68
7.	Dobra	872	565	166	0.007	0.044	2.35	72
8.	Hataikhedi	784	486	118	0.015	0.036	1.56	64
9.	Iatkhedi	848	652	216	0.018	0.028	1.68	84
10.	Kazlyanpur	1026	574	136	0.009	0.016	2.76	82
11.	Katara	868	526	142	0.016	0.054	3.02	76
12.	Meerpur	944	664	192	0.022	0.062	2.82	65
13.	Narela	1124	726	224	0.017	0.046	2.54	44
14.	Nandni	978	534	128	0.008	0.068	1.78	74
15.	Prithvipura	1054	672	184	0.007	0.072	1.48	67
16.	Ratanpur	1068	535	142	0.024	0.038	2.66	50
17.	Ratibad	856	492	114	0.015	0.014	3.14	45
18.	Samarda	954	618	264	0.009	0.022	1.88	42
19.	Sevaniya	886	556	132	0.008	0.042	2.25	78
20.	Teelakhedi	962	624	224	0.018	0.026	3.22	56









Conclusion

Hydrogeochemical studies of Block Huzur, Bhopal District reveal that the concentration of TDS, Ca2+, Mg, Lead, Cadmium, nitrate and fluoride in few villages are exceeding the permissible limit for drinking purpose. Groundwater quality is strongly influenced by bedrock geology and climate, but may also be attributed to the impacts of agricultural pollution. The present water availability situation in the study area is under threat. The chief sources of fluoride in groundwater are the fluoride-bearing minerals in the rocks and the sediments. The high fluoride content in the groundwater of few villages has affected villagers in the form of primary level of fluorosis resulted in stained and darkened tooth enamel. The source of fluoride in the natural water can be traced to the occurrence of fluorine-rich granitic rocks and soils derived from those rocks in the drinking water should also be given attention and defluoridated water should be provided for drinking purposes in the rural areas. The prime sources of nitrate enrichment are leaching from the sewage effluents being utilized extensively for irrigation, leakage from sewerage systems, septic tanks and natural drains carrying municipal wastes, and application of fertililizers. Due to the detrimental biological effects, treatment and prevention methods must be considered to protect groundwater aquifers. Treatment through ion-exchange and other processes can rehabilitate already contaminated water. During recent years, new data have emerged suggesting that also relatively low cadmium exposure may give rise to skeletal damage, evidenced by low bone mineral density (osteoporosis) and fractures. Recent data indicate that adverse health effects of cadmium exposure, primarily in the form of renal tubular damage but possibly also effects on bone and fractures, may occur at lower exposure levels that previously anticipated. Therefore, measures should be taken to reduce cadmium exposure in the general population in order to minimize the risk of adverse health effects.

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