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A Study On Physico-Chemical Characteristics Of Water In Opencast Coal Mine Area At Parasia City In M.P.

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Abstract

Physico-chemical Analysis of a coal mines area of Parasia city (M.P.), India in month of April, 2022. Water samples were collected from Four different sites namely (S1)- discharge water Sethiya mine, (S2)- Setting tank Sethiya mine, (S3) Old quarry Sethiya mine, (S4)- Pench river Sethiya village. The range of observations are as under; Temperature 24-32^0 C, pH of water ranges between 7.1 to 7.2, Cl from 35-75.5 ppm, Nitrate from 1.3-2.5 ppm, Fluoride from 0.43-0.87 ppm, Calcium hardness from 125-152 ppm and Magnesium hardness from 60-76 ppm and TDS from 255-499 ppm. Regular monitoring of water quality is necessary to have a check on surface water quality for the sake of human life & to maintain a balanced aesthetical value of religious.

Keywords: Physico-chemical Analysis ,Water quality and Water resources etc.

INTRODUCTION

Water is an essential component of the environment that can determine the pattern of population distribution. Water resources in particular, groundwater sources are being used for drinking ,industrial agricultural and recreational desires**.(Behailu et al, 2017).**Coal mining adversely affects the ecosystem as a whole. On the unstable earth, the un-resting mankind constantly uses a variety of resources for daily lives. Coal is recognized to have been the main source of energy in India for many decades and contributes to nearly 27% of the world's commercial energy requirement. This causes invasive species to occupy the area, thus posing a threat to biodiversity. Huge quantities of waste material are produced by several mining activities in the coal mining region. If proper care is not taken for waste disposal, mining will degrade the surrounding environment. The methods of waste disposal affect land, water, and air and in turn the quality of life of the people in the adjacent areas. Water is an integral part of the survival of living beings both in way of direct consumption and maintaining the environment. The extent to which it is abundant or scarce, clean or polluted, beneficial or destructive, determines the quality of life to a large extent.

It is generally accepted that the total supply of water is constant on our planet, which has been estimated at 64.3 M km2. Though the estimated groundwater is extremely large, a major share of it is deep sheeted and is not exposed to the hydrological cycle which has a self-cleansing quality. Whereas the shallow sheeted groundwater is mostly tapped through wells and gets the chance of recycling, the deep-seated water is reached, disturbed, and contaminated by mining operations in the earth's womb. Mining of minerals, on one hand, is associated with the problem of seepage causing disaster if left untamed, and on the other hand, threatening the natural balance ecologically. Whereas one seems to be more concerned with the former, the latter is generally

left uncared for so long 3 Water is the most important element of eco-system and it is thus imperative to determine and mitigate the effects of mining operation on the same. Also, contaminated water has adverse physiological effects on human being and other animals. For this, it is important to identify the critical parameters in the water sample which is the scope of the study.

In its natural state every area maintains a physical and chemical balance. In physical balance the landscape and the natural drainage system assumes the most priority position. Due to mining, the land damage takes place directly in case of open-pit mining and by subsidence in case of an underground method of mineral extraction. In either case the landscape is damaged and contours reshaped due to which the drainage system suffers. This leads to serious problems in respect to further land degradation. A number of mines occur in forest areas, which mean damage to forests along with. This indirectly initiates an unending chain of physical imbalances. The chemical constituents of soil and dissolved minerals in the regional water maintains a chemical balance, which is disturbed due to mining. This is due to breaking and degradation of land. Such imbalance in its turn affects local flora and fauna.

MATERIALS AND METHODS

Water samples were collected from four sites of coal mines area during (April,2022) namely (S1)- discharge water Sethiya mine, (S2)- Setting tank Sethiya mine, (S3) Old quarry Sethiya mine, (S4)- Pench river Sethiya village. In the present study the sampling was done during morning hours and all water sample were collected the above sites from at 10-15 cm depth in pre-conditioned and acid rinsed clean polypropylene bottles. The physico-chemical parameters were determined following the standard methods for the examination of water and wastewater (APHA).

RESULTS AND DISCUSSION

The result of physico-chemical analysis of water samples of A coal mines area of Parasia city (M.P.), India in month of April, 2022 were mentioned in Table 1 and depicted in Figures 1,2 and 3. The temperature in water samples was found to be 24 to 32^0C. The average pH content in water samples was found to vary between7.1 to 7.4. The values obtained were found to be under the permissible limit (6.5 to 8.5, WHO, 2006). The average total dissolved solids content in water samples was found to vary between 255 to 499 ppm, which was also above the permissible limit (500 ppm, WHO, 2006).The concentration of total dissolved solids in water can be approximated in the field by measuring the specific conductance of a sample (**Fermer, 2001**). In the present study, the average concentration of calcium hardness in water samples was found to be 150 to 190 ppm, which was also higher than its permissible limit (75 ppm, WHO, 2006). The average magnesium hardness content in water samples was found to vary between 125 to 152 ppm of the river. The observed values were higher than its permissible limit (30 ppm, WHO, 2006). The average fluoride content in water samples was found to vary between 0.43 to 0.87 ppm of the river. The observed values were above the permissible limit of (1.5 ppm, WHO, 2006). The average chloride content in water samples was found to vary between 35-75.5 ppm of the river. The observed values were above the permissible limit of (250ppm, WHO, 2006). The Higher values of chloride are hazardous to human consumption and create health problems (**Kataria and Iqbal, 1995**). The average nitrate content in water samples was found to vary between 1.3 to 2.4 ppm of the river. The observed values were above the permissible limit of (45 ppm, WHO, 2006).

Table 1: Concentration of physico-chemical parameters of April, 2022:

Parameter	S1	S2	S3	S4
Temperature	32	32	30	24
P^H	7.1	7.1	7.2	7.4
Calcium Hardness	150	160	190	150
Magnesium Hardness	132	130	152	125
Chloride	75.5	70	45.8	35
Nitrate	1.3	1.8	1.5	2.4
Fluoride	0.73	0.87	0.60	0.43
T.D.S.	499	380	255	465

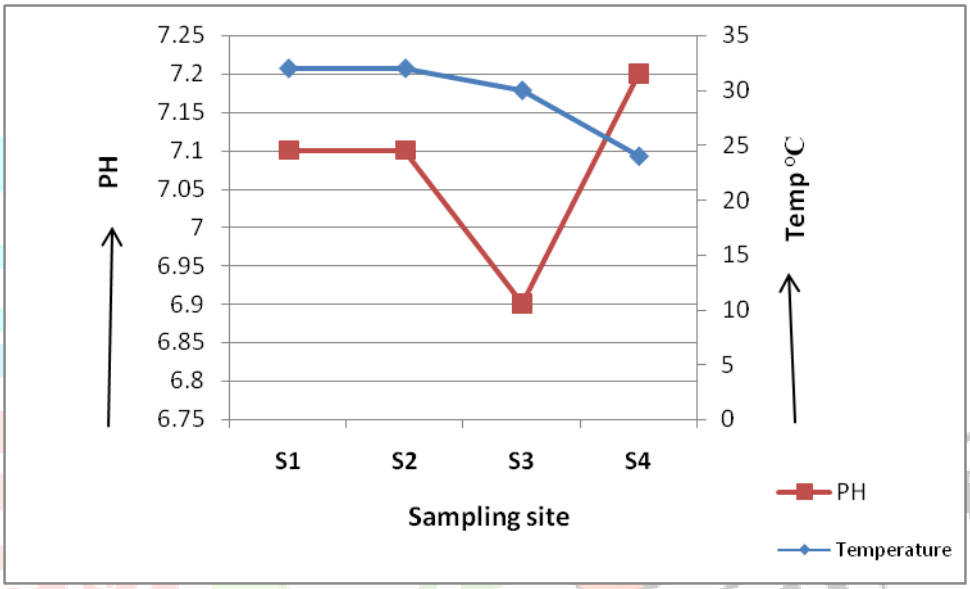

Figure 1 Concentration of physico-chemical parameters p^H /Temp. of April, 2022

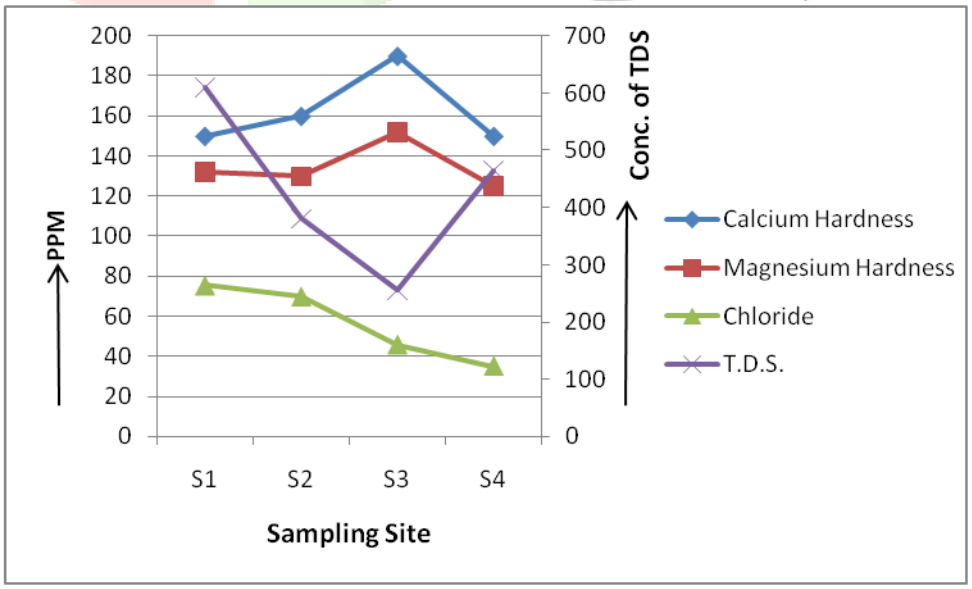

Figure 2. Concentration of physico-chemical parameters TDS, Cl, Ca Hardness and Mg Hardness of April, 2022

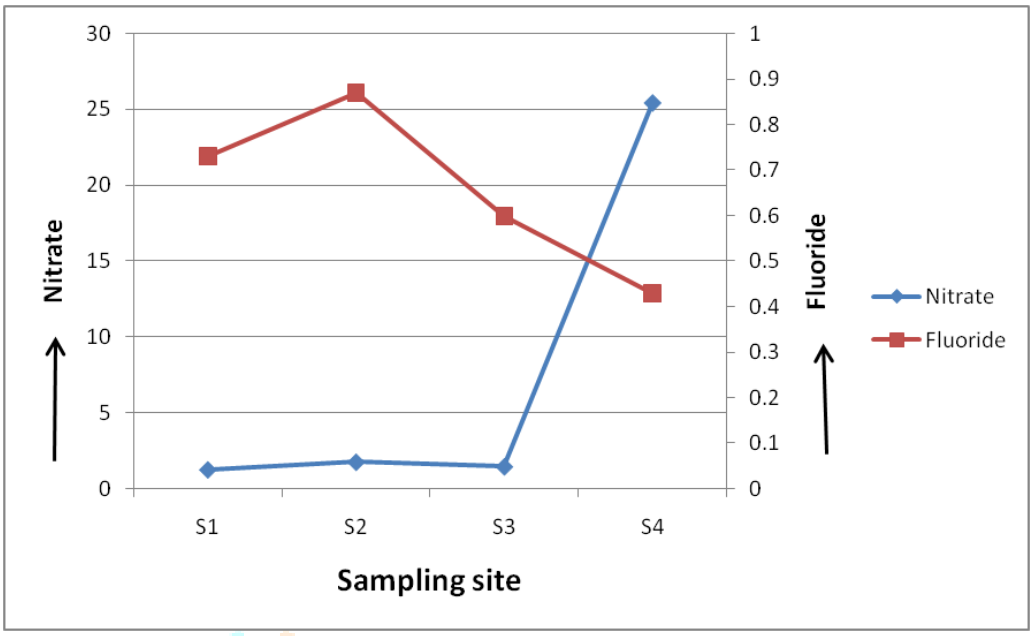

Figure 3 Concentration of physico-chemical parameters NO_3^- and F^- of April, 2022

CONCLUSION

The increasing trend of concentrations of all physico-chemical parameters recorded increasing trend pH <Nitrate <Chloride< Magnesium Hardness< Calcium Hardness <Total dissolved solids. The Temperature, pH, Nitrate, Chloride, Were found more than the permissible limit prescribed by WHO. The high concentrations of calcium and magnesium hardness in the river water were due to presence of lime stone, calcite, dolomite, rocks in plenty in the study area. It is concluded that the water of river is not highly polluted but there is an indicating of increasing pollutant due to anthropogenic activities. Proper monitoring is needed to avoid anthropogenic contamination.

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