



Physio- chemical Study of water of pit lake (pond)/voids of Bhurkunda coal field area, Ramgarh Jharkhand, India

Seema Singh*, K. Swarnim ** R.K. Singh*** and Nit Nayana****

* Research scholar, Dept. of zoology, Sona Devi University, Ghatshila.

** HOD, Dept. of zoology & prof. in charge Science, Ranchi Woman's

*** Professor Dept. of chemistry BIT Sindri &

Joint Director Higher and Technical Education, Govt. of Jharkhand

**** HOD, Biotechnology, Sona Davi University Ghatshila.

ABSTRACT

In Bhurkunda coal field area, extraction of methane gas is facilitated by pumping of ground Water from mines for regular and consistent gas extraction. This water is discharged into near by well pumps or pond, pit lakes or rivers which ultimately percolate into the grand water of the area. water samples collected from such pit Lakes have been analyzed for different Pollution Parameters like pH, electrical conductivity (EC), turbidity (NTU) Bio Carbonate, calcium hardness, magnesium's hardness, chloride, fluoride, sulphate, nitrate, potassium & Sodium etc. The physio-chemical analysis of water of different Sampling sites show high bi carbonate, chloride, fluoride and Sodium Carbonate in all most all sites of the area with low concentration of calcium sulphate and magnesium Sulphate. The water of such pit lakes (ponds)/voids is not suitable as potable as well as irrigation and other purposes without treatment.

Keywords: Pollution, Physio-Chemical, methane & Pit lakes/ponds/voids.

INTRODUCTION

Natural resources one the important wealth of our country, Water is one of them. Water is a Wander of the nature.

" No life without Water" is a Common saying depending upon the fact that water is the one of the naturally occurring essential requirement of all life supporting activities¹. The availability of water through surface and ground water has become critical day to day. only 1% water port is Available on land for drinking, agriculture, domestic power generation, industrial consumption/consummation, transpiration and waste disposal².

The ground water is believed to be comparatively much clean and free from pollution than surface water³.

There are generally three types of loads such as dissolved Load Chemical weathering in rocks produces ions in solutions, suspended load (make Surface water Look Cloudy opaque) and bed load (silt, Sand & gravel) settle on the bottom of the channel.⁴

Generally, there is always a need for and concern over the protection and management of surface water⁵.

The open-cast Coal extraction method is one of the best and appropriate in the mining industries of India requesting into a void or pit which is eventually filled up by surface runoff and ground water seepage becoming a pit-lake, the potential water reservoir⁶.

In India, coal is a major resources and most important primary source of energy. coal mining activities changes drastically different sectors of our environmental The major environmental impacts on the surrounding areas and on human health are well documented by several authors in difference times⁷⁻¹⁰.

pit lakes have unique physical property than other water body. Thus quality of water assessments of selected pit lakes in Coal filled of Bhurkunda, Ramgarh been carried out during 2022-2023 in order to assess present hydrological conditions, bio-profile and strategies for an ecological restoration, Conservation and management.



The present study was conducted to investigate the Physio-chemical parameters of six Sample Sites of pit-lakes/pond/voids of Bhurkund, Ramgarh, Jharkhand, India with the Scope to increase the possibility of proper utilization of water.

MATERIALS AND METHODS

Study Area

The Bhurkunda colliery is situated in Ramgarh district, in the state of Jharkhand and falls in South Karanpura Coalfield. This colliery belongs to the Barka-Sayal area of Central Coalfields Limited, a subsidiary of Coal India Limited

Water Sample Analysis

water samples were collected from fix Site of pit lakes/pond/voids Bhurkunda, Cool field area, Ramgarh during 2022-2023 using standard protocols and guidelines.

RESULT AND DISCUSSION:

The result of the analysis of all the six sites of water. Samples have been presented in table-1 and compared with desirable and permissible limit standard given in table-2.

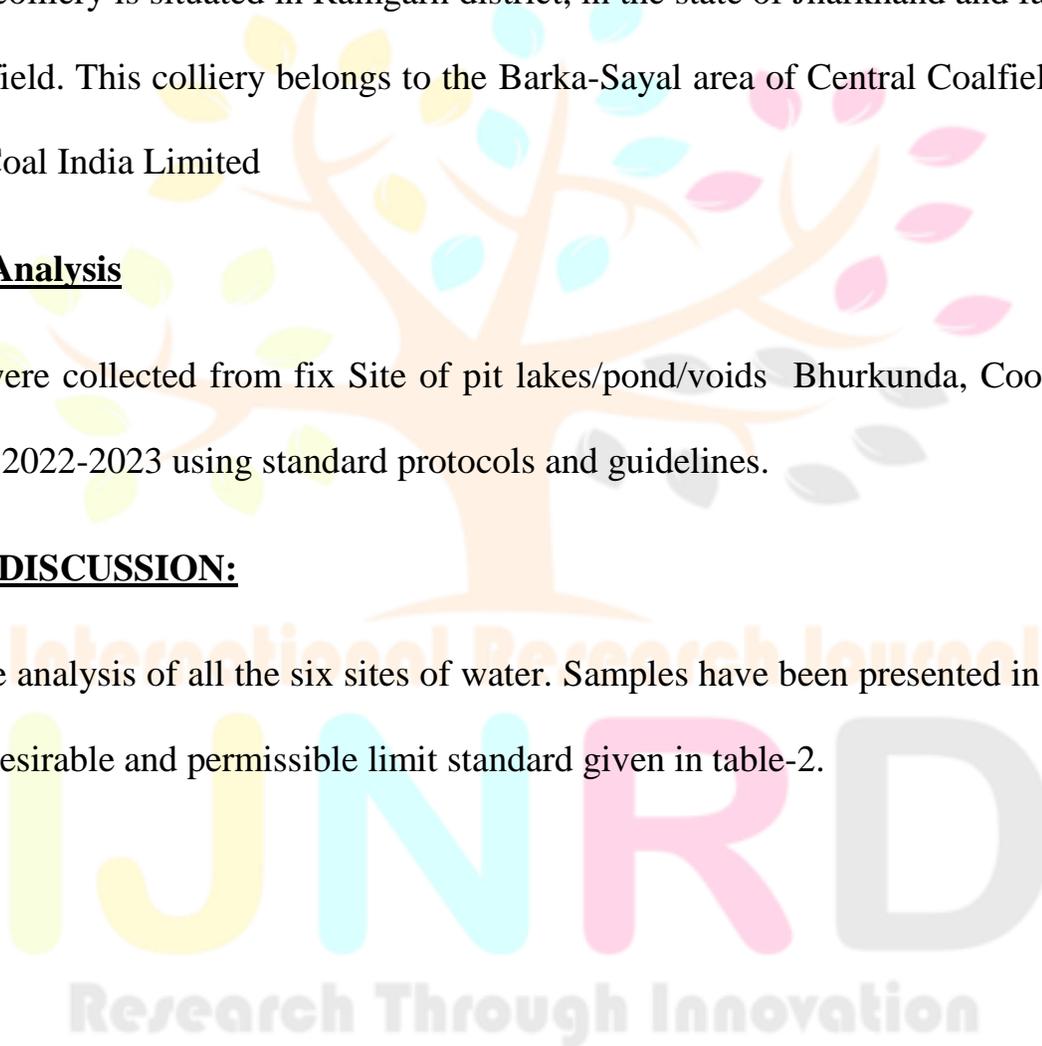
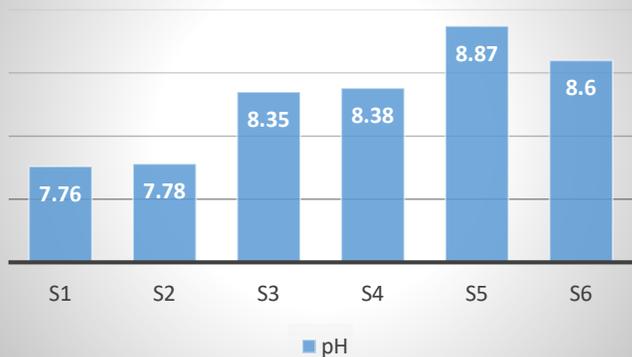
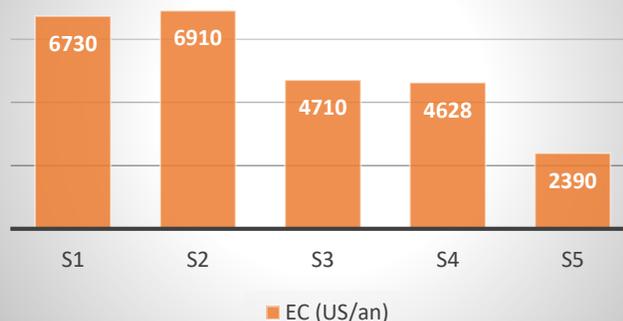
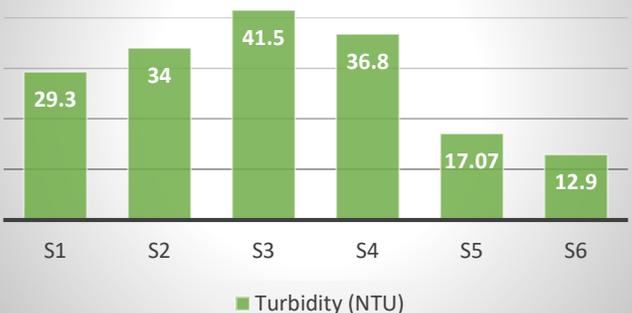
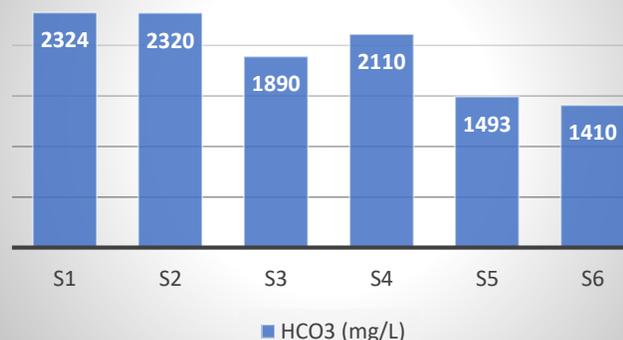


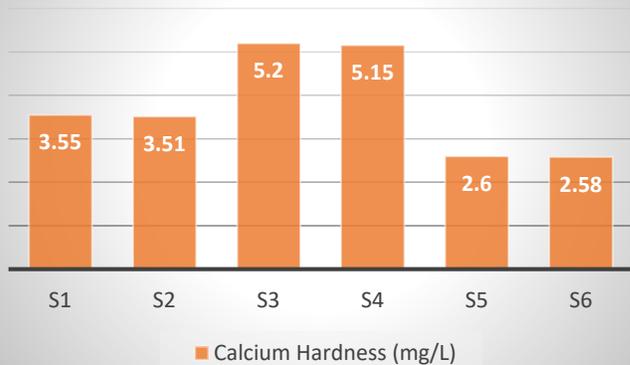
Table – 1

Physical and chemical parameter of water of Bhurkunda coal field region, Ramgarh

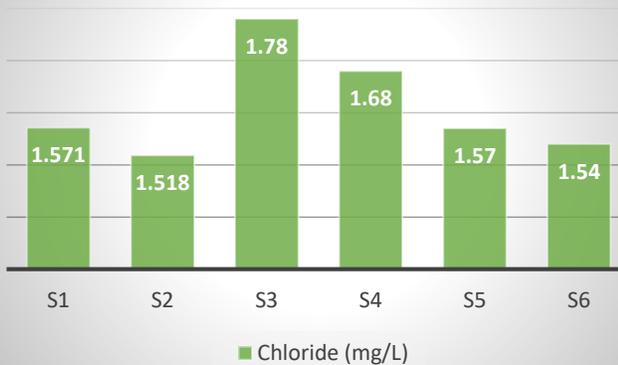
sample number	pH	EC (US/an)	Turbidity (NTU)	HCO ₃ (mg/L)	Calcium Hardness (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Sulphate (mg/L)	Nitrate (mg/L)	Dissolve Sio2 (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Magnesium (mg/L)	SAR mg/L
S ₁	7.76	6730	29.3	2324	3.55	1.571	1156	17.88	2.99	35.41	20.82	1255	6.058	596.78
S ₂	7.78	6910	34.00	2320	3.51	1.518	1154	16.96	2.53	35.20	20.16	1215	6.054	553.78
S ₃	8.35	4710	41.50	1890	5.20	1.78	735	16.10	8.77	8.77	23.76	1243	7.35	494.48
S ₄	8.38	4628	36.80	2110	5.15	1.68	732	16.90	8.73	8.74	23.27	1235	7.55	491.84
S ₅	8.87	2390	17.07	1493	2.60	1.57	117.9	6.08	12.86	12.86	11.37	532.9	3.12	321.30
S ₆	8.6	2350	12.90	1410	2.58	1.54	116.8	6.03	12.36	12.36	11.10	534	3.10	319.45

pH**EC (US/an)****Turbidity (NTU)****HCO₃ (mg/L)**

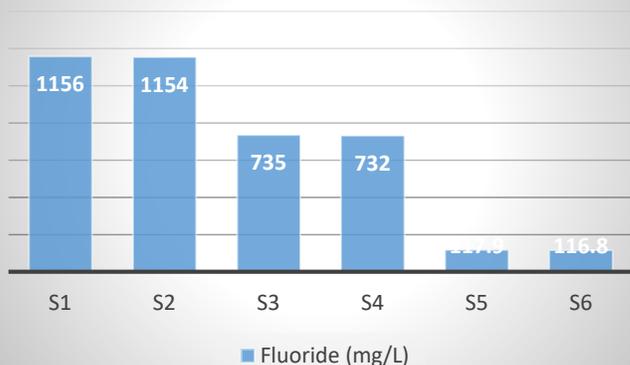
Calcium Hardness (mg/L)



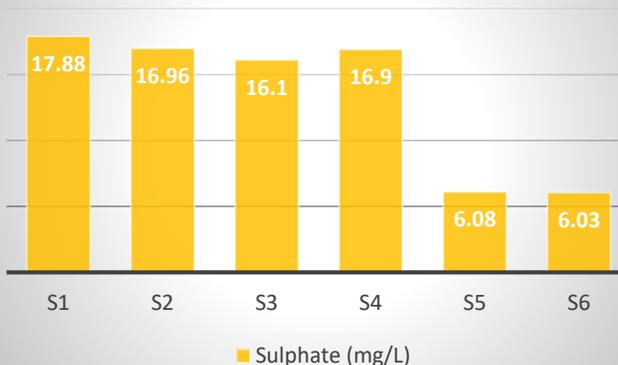
Chloride (mg/L)



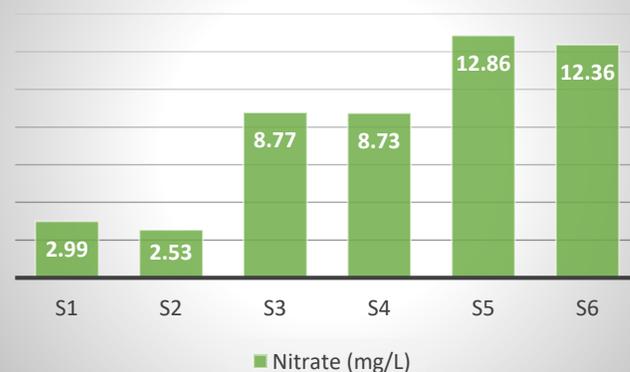
Fluoride (mg/L)



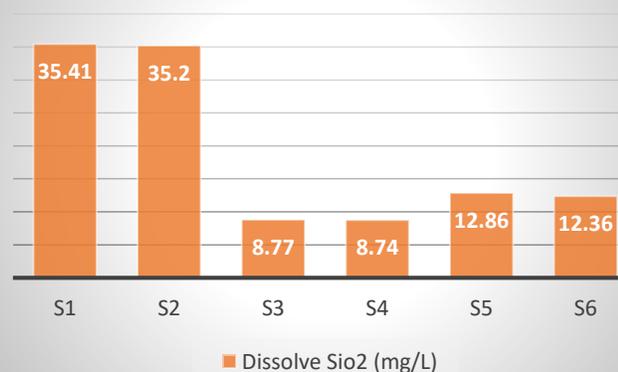
Sulphate (mg/L)



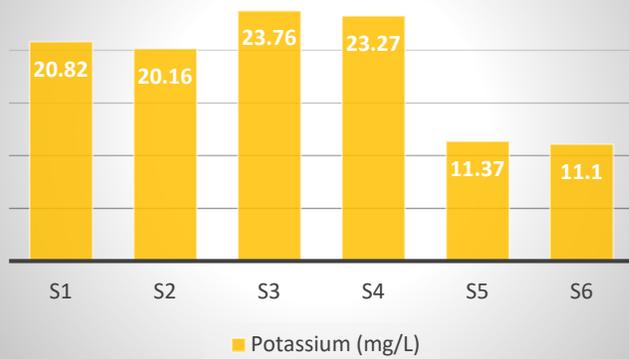
Nitrate (mg/L)



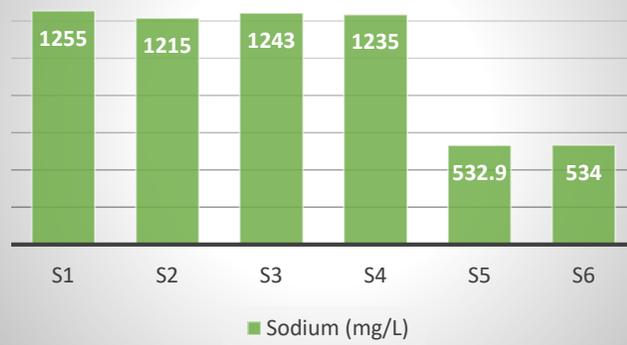
Dissolve Sio2 (mg/L)



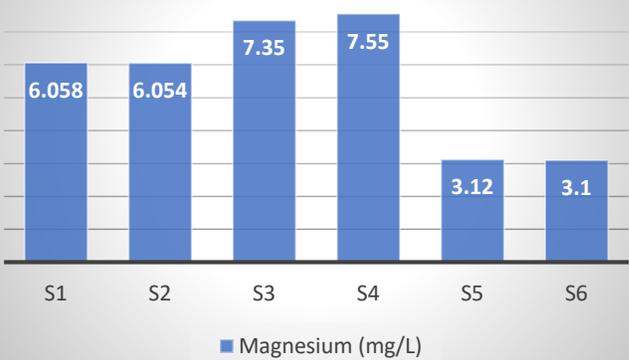
Potassium (mg/L)



Sodium (mg/L)



Magnesium (mg/L)



SAR mg/L

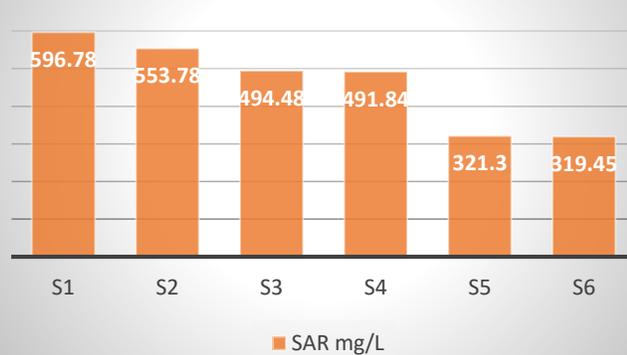


Table – 2

Standard Water Quantity Parameter of WHO and BIS(permissible limit)

S.N.	Parameter	WHO permissible limit	BIS(permissible limit)
1	pH	6.5-8.5	6.5-8.5
2	Turbidity (NTU)	-	5(1)
3	EC (US/an)	1400	-
4	Chloride (mg/L)	250	1000 (250)
5	Fluoride (mg/L)	1.5	1.5 (1.0)
6	Calcium (mg/L)	200 L	200 (75)
7	Magnesium (mg/L)	50	100 (30)
8	Sulphate (mg/L)	500	400 (200)
9	Nitrate (mg/L)	50	45
10	Potassium (mg/L)	12	-
11	Sodium (mg/L)	200	-

The variation in pH for the various Site of water Samples varies from 7.76 to 8.87 with minimum for site S₁ and maximum for Site S₅. The Variation of electrical conductivity of samples varies from

2350 of S₆ to 6910 of S₂. Turbidity values varies from 12.90 of S₆ to 41.50 of S₃ NTU. The distribution of bi-carbonate of different Sample sites have been recorded minimum at Site 1410 at S₆ and maximum at sites 2324 at S₁ and concertation. The Calcium Concentration varies from 2.58 at S₆ to 5:20 at S₃ ppm While magnesium Concentration from 3.10 at S₆ to 7.55 S₄ ppm. However, both the ions have got less concentration than their desirable limit 75 and 30 ppm respectively. On the basis of calcium, magnesium and sodium ions concentration, the values of SAR show high of all sampling sites, which indicate their none Suitability for agriculture purposes also without treatment.

The variation of rest parameters like fluoride, chloride, Sulphate and SiO₂ Concentrations of water, which make it unsafe for drinking & agriculture purposes. The management of the coalfield should be required more specific scientific investigation before the adoption of any disposal method and their water may be used after Complete treatment for the various pollutants.



CONCLUSION

Based on the results of present work of pit lakes/voids/pond of Bhurkunda Coalfield, it can be concluded that water quality shows prominent Changes in their quality. And also we see that water quality of all pit lakes/voids/pond changes with seasonal variation. Water quality of Bhurkunda Coalfield have the potentiality to improve and restore itself with due Course of time.

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