

EFFECT OF POLLUTION ON KELO RIVER WATER**Reenu Mishra¹, Kavita Patel², Vandana Jangde³**¹K.G. Arts & Science College, Raigarh²O.P. Jindal University, Raigarh³Jhada Sirha Government Engineering College, Jagdalpur*Corresponding Author's E mail: reenu.mishra.ap@gmail.com

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<https://dx.doi.org/10.38164/AJPER/13.4.2024.1-21>**ABSTRACT**

Water the extraordinary compound is made of by the combination of hydrogen and oxygen and present in nature in three different state solid, liquid and gas. Life were originate in world's oceans. All the living aqueous solution like blood and digestive juices contain water, that are important for biological process. At our present study we collect water sample from 8 different sampling spot at Post-monsoon session (Oct. 2023 to Dec.2023) and analyse several water quality parameters. In our present study it was found that water is polluted. TS, TSS, Hardness, Nitrate Concentration, Chloride Concentration, DO, COD and BOD, chloride, Turbidity indicates that water is polluted. For aquatic environment. Parameters like dissolve oxygen, chemical oxygen demand, and chlorophyll are important parameters. Oxygen is important for aquatic environment, low DO level exhibit pollution level.

Keywords: WQI, Hardness, Nitrate, Phosphate.**INTRODUCTION**

Kelo is one of the main tributaries of Mahanadi. Kelo originates from Ludeg Phadi and merge into Mahanadi. It is the life line of Raigarh city. Several industries dump their effluents on it. Due to some other anthropogenic activity and natural reasons water is polluted.¹ In present study we collect water sample from eight different spot. And analyse the different water quality parameter. Pollution level of Kelo river have been monetised by studding the various parameters. Heavy metals are persistent, non-biodegradable, and bio-accumulate through food-chain, they did not decay with time, may be useful for plants and animals when present in small amount but can be harmful when exceeding specific threshold.² Total Coli -Form³ is a group of several types of bacteria. The main source of this are-sewage and septic discharge, animal manure, water run -off,⁴ Hardness value indicates the Ca and Mg level in water sources.⁵ Waterborne diseases in human and animals are caused by pathogens present in water.⁶

Organic pollutants like petroleum , hydrocarbons, Volatile organic compounds like organo chloride PCBs and trichloroethylene's are very much toxic.⁷

Inorganic pollutants ammonia (food processing waste), Nitrates and Phosphates(Sewage and agriculture) and Heavy metals(urban storm water run-off)^{8,9} Every year more than twenty million tons of PPCPs are produced.¹⁰ European Union has declared pharmaceutical residues as “priority substance”. For COD measurement standard dichromate method are used.¹¹ COD represents the total pollution load.^{12,13,14} DO were measured by Wrinkler Aside iodide method.^{14,15}

SAMPLE COLLECTION

Water sample is collected from five different spot and labelled. Water sample was collected in plastic bottle.

Table 1: Sampling Spot

Sl. No	SAMPLING SPOT	SAMPLE NAME
1	CHAKRAPATH	S-1
2	CHATT-GHAT	S-2
3	RANIGHAT	S-3
4	KELO -DAM	S-4
5	LAKHA	S-5
6	CHIRAI PANI	S-6
7	TARAIMAL	S-7
8	GERWANI	S-8

Methods

Table 2: Methods

S. No.	Name of Parameter	Method
1	Temperature	Thermo-metrically
2	pH	pH metry
3	EC	Conductometry
4	Turbidity	Nephelometric
5	Total solid	Gravimetric
6	Total dissolved solid	Do
7	TSS	Mathematical method
8	Total alkalinity	Volumetric
9	Total Hardness	Volumetric
10	Ca-Hardness	Titration
11	Mg- Hardness	Titration
12	Fluoride	Spectrophotometrically
13	Chloride	Silver nitrate

14	Fe	Instrumental
15	NO ₃	By Spectrophotometer
16	PO ₄	By Spectrophotometer
17	SO ₄	By Spectrophotometer
18	Total Acidity	Titration with base
19	DO	Titration
20	BOD	Titration
21	COD	Titration

1) Physical Appearances:

The sample contain water, suspended and dissolved matter.

2) Odour

The sampling station don't have any distinguishable odour.

3) Temperature

Temperature measurement is made with mercury filled centigrade thermometer

4) pH

The water sample was measured by pH meter, which operate on the principle of determination of [H⁺] concentration in logarithmic variation in linear relation to voltage, generated at the glass membrane according to Nernst equation. The pH of the water is defined as the negative logarithm of the hydrogen ion concentration.

5) Conductance

The conductance measured concentration of mineral constituents present in water. The conductivity is reciprocal of resistance, which is measured usually between two electrodes kept one cm apart with area of cross section as one cm². Conductivity meter was used for the measuring of conductance.

6) Turbidity

Turbidity is an important parameter for the determination of water quality. Samples containing insoluble particles, scattered the light rather transmitted it. It is an optical property. Turbidity is measured in terms of NTU (Nephelometric turbidity unit)

7) Total Solid

After evaporation of the unfiltered sample the residue which are left as residue are determined as total solid. 100 ml of sample taken in 100 ml capacity bottle and evaporating dish and ignited at 55⁰c in a muffle furnace for about an hour, cool it in a desiccator and weigh. Evaporated unfiltered sample heat at 103-105⁰c in an oven for one hour and take the final weight after cooling in a desiccator.

Calculation

$$\text{Total Solid g/L} = \frac{(A-B) \times 1000}{V}$$

V

A= Final weight of the dish in gram

B= Initial weight of the dish in gram

V= Volume of sample taken in ml.

viii) Total Dissolved Solids

Total Dissolved solids denote mainly the various kinds of soluble minerals present in the water. 100 ml of filtered sample was evaporated in dish (pre-weighted) on a water bath at 98°C. The residue heated at 103-105 °C in an oven for one hour and weight after cooling in a desiccator.

Calculation:

$$\text{Total dissolved Solid mg/L} = \frac{(A-B) \times 1000}{V}$$

A= Final weight of the dish in gram

B= Initial weight of the dish in gram

V= Volume of sample taken in ml.

ix) Total Suspended Solid (T.S.S.)

Total suspended solid mean particles over 1 x 10⁷ nm in size, which are retained on a filter paper. Such as clay, sand various silicates and microorganism. The total suspended solid was calculated by the following formula-

$$\text{Total Suspended Solid (mg/L)} = \text{Total solids} - \text{Total dissolve solids.}$$

x) Acidity

The acidity of water present due to free CO₂ has no significance from public health viewpoint.

Principle

The minerals acids present in water samples, contributed acidity. When sample is titrating samples to pH 4.3. At pH 8.3 sample, the CO₂ and bicarbonates (carbonic acids) present in the sample, were neutralized by continuing the titration.

Interferences- foremost fount of origin of interferences are colour, turbidity, iron, aluminium and residual chlorine. Colour and turbidity are to be avoided. By adding thiosulphate residual chlorine can be avoided.

Reagents-

1. Standard sodium hydroxide solution (0.02N)
2. Phenolphthalein indicator
3. Methyl orange indicator:

Procedure

250 ml conical flask, 50 ml of sample was taken, 2 drops of methyl orange were added as indicator, and titrated it with standard 0.02 N NaOH solution till colour changes to faint orange between pH 4.5 – 4.4 and add 2-3 drops of phenolphthalein indicator in it and continue titrated with NaOH Solution faint pink colour appeared indicating pH reaches 8.3.

CALCULATION

$$\text{Total acidity mg/L as CaCO}_3 = \frac{(A+B) \times N \text{ of NaOH} \times 1000 \times 50}{\text{Volume of sample}}$$

Where

A= Volume ml NaOH used with methyl orange

B= Volume ml NaOH required for sample to raise pH from 4.5 to 8.3

N= Normality of NaOH used.

XI) Alkalinity

The alkalinity of water measures its capacity to neutralize acids.

Principle

Alkalinity is directly determined by titration with 0.02N H₂SO₄ using phenolphthalein and methyl orange indicators.

Interferences

Colour, turbidity, iron aluminium, and residual chlorine are prime sources of interferences. Colour and turbidity are to be avoided. Residual chlorine can be removed by adding thiosulphate.

Reagents

1. Sulphuric acid (1N):

2. Standard H₂SO₄ (0.02N)

3. Phenolphthalein indicator

5. Mixed Indicator – In 100 ml of ethyl alcohol, 20 mg of methyl red and 100 mg bromo-cresol green mixed.

Procedure

In a 250 ml of conical flask 50 ml of sample was taken, few drop of phenolphthalein indicator were added, titrated against 0.02N H₂SO₄ until pink colour disappeared. Then after a few drops of mixed indicator were added and titrated till yellow colour changes to orange.

$$\text{Alkalinity mg/L as CaCO}_3 = \frac{(A+B) \times N \times 1000}{\text{Volume of sample}}$$

A= Volume of H₂SO₄ required to bring the pH to 8.3

B= Volume of H₂SO₄ required to bring the pH to 4.5

N= Normality of H₂SO₄ used.

xii) Hardness

capacity of water to react with soap, to produce lather, measured as Hardness.

Principle-

EDTA is added under alkaline condition. Ca^{++} and Mg^{++} divalent ions get complexes resulting in change, when EDTA is added, end -point indicated by change from wine red to blue. In this titration calcium ion, do not react with the indicator dye. Therefore, a small amount of complex metric ally neutral magnesium salt of EDTA is introduced to the titrate through the addition of buffer to obtained end by colour changes of the indicator.

Interferences:

Metal ions do interfere but can be inhibited.

Reagents

- 1) Buffer solution: Solution A
- 2) Solution B:
- 3) Inhibitor
- 4) EBT -
- 5) STANDARD EDTA 0.02N:
- 6) Standard Calcium solution:

PROCEDURE

In conical flask 50 ml of well mixed solution were taken. 2 ml of buffer solution were added followed by 1 ml inhibitor. EBT is added as indicator and titrate with standard solution of EDTA (0.02N). Colour changes from wine red to blue. (EDTA required A) then run reagent blank. (EDTA B). Calculate vol. of EDTA required by sample C.

$C = (A-B)$ from vol. of EDTA required in various steps.

Total hardness as CaCO_3 mg /L = $\frac{C \times E \times 1000}{\text{Volume of sample}}$

Where

C= Vol. of EDTA required by sample.

E= mg CaCO_3 equivalent to 1.0 ml EDTA titrate for calcium hardness.

xiii) Chloride

The main sources of chloride in water samples are salt deposits, discharge, irrigating drainage and contamination from refuge lactates and in coastal area seawater intrusion.

Argentometric Method

Principle-

When chloride ion reacts with silver nitrate, silver chloride formed. When red colour produces it indicates the completion of reaction. The presence of red colour is due to reaction of silver nitrate with potassium chromate solution, which is added as an indicator.

Interferences

Iron present in excess amount shows interferences. The substances found in portable water don't interfere.

Reagents-

1. Potassium chromate indicator-
2. Standard Silver Nitrate Solution (0.0282N):
3. Standard sodium chloride solution (0.0282 N):
4. To remove colour and turbidity, special reagents

Procedure

100 ml of sample was taken and adjust the pH between 7 to 8 and titrated with standard AgNO₃ solution using 1 ml of K₂CrO₄ indicator solution, AgCrO₄ start precipitation.

$$\text{Chloride in mg/L} = \frac{(A-B) \times N \times 35.45 \times 1000}{\text{Volume of sample}}$$

Where

A= ml AgNO₃ required for sample

B= ml of AgNO₃ required for blank

N= Normality of AgNO₃ Used.

xiv) Fluoride

Fluorides occurs almost all natural water sources. Fluoride in high concentration is not a common constituents of surface water.

Principle

Fluoride ions changes colour with Zirconium -SPADNS complex concentration.

Interferences- None

Reagents

1. Fluoride stock solution

2. Fluoride standard solution

3. Acid Zirconyl- SPADNS reagent

4. Reference Solution

In a beaker 100ml of distilled water was taken and 100 ml of SPANDS solution was added, 7 ml conc. HCl was diluted. It was added to the above solution and mixed well.

1. Sodium arsenite solution

5g sodium arsenite + distilled water diluted up to 1000 ml.

Procedure

1.0, 2.0, 3.0, 4.0, & 5.0 ml fluoride standard solution was taken into 50 ml Nessler tubes and added 10.0 ml acid-zirconyl -SPANDS reagents to each tube and mixed well. By using reference solution spectrophotometer is set to zero absorbance. calibration curve was plotted by measured absorbance. The observe optical density were equivalent to concentration of fluoride ion concentration in the water sample.

$$\text{Mg F-/L} = \frac{A \times B}{\text{Ml sample} \times C}$$

Where

A= $\mu\text{g F}^-$ determine from curve

B= Final volume of diluted sample

C= Volume of diluted sample used for colour

xv) Sulphate

In presence of HCl solution Sulphate is precipitated as Barium sulphate crystal to form uniform size crystal. The precipitated barium sulphate is filtered, dried, ignited and weighed.

Interferences

Colour, turbidity, silica

Reagents

1. Methyl red indicator:

2. Hydrochloric acid.

3. Barium chloride 5%:

4. Silver nitrate-

Procedure

In a beaker 100 ml of sample was taken and by adding distilled water diluted to 200 ml. with the help of HCl pH was adjusted 4.5 -5 , using methyl red as indicator (HCl mixed with orange colour) and boil it at boiling temperature for one more minute, then added to 10 ml hot BaCl_2 solution slowly

with constant stirring. Keep it for digested over a night. By paper Whatman filter paper no. 42 precipitate was filtered and heat precipitate until the complete combustion of paper. Heat at 800oc for an hour, cooled it in a desiccators and weigh.

Calculation

$$\text{Mg/L of SO}_4^{2-} = \frac{\text{mg of SO}_4^{2-} \times 1000 \times 411.5}{\text{Volume of sample taken}}$$

xvi) DO

The Winkler's Metod with Azide Modification

Principle

MnSO₄ is added to the sample containing alkaline potassium iodide, manganous hydroxide is formed, oxidized by the dissolved oxygen of the sample to basic magnic oxide. The manganic oxide liberates from solution, when sulphuric acid added. This is equivalent to that of dissolved oxygen. Standard solution of sodium thiosulphate is titrated with liberated iodine, using starch as an indicator.

Interference

The main sources of interference are ferrous, ferric ion, nitrite, microbial mass and high suspended solids. (ferrous eliminated by Ideal -Stewart method, Nitrites eliminated by Alsterberg method, ferric compounds by phosphoric acid, suspended solids by alum solution.)

Reagents

1) Manganous Sulphate:

2) Alkali -iodide -azide reagents

- Sulphuric Acid : Conc. H₂SO₄
- Phosphoric acid : 85 to 95%.
- Starch indicator
- Stock sodium thiosulphate
- Standard sodium thiosulphate (0.025N)
- Standard K₂CrO₄ (0.125)

Procedure

In a 300 ml of BOD Bottle the sample was collected by using DO sampler, then 2 ml MnSO₄ added followed by alkali 2 ml of alkali -iodide azide reagent in a sample. Allowed the precipitate to settle, 2 ml of conc. H₂SO₄ was added in it and again mixedwell.203 ml of the mixed solution was taken in a conical flask and filtered against Na₂S₂O₃ standard solution and starch was used as an indicator.

1 ml of 0.025 N $\text{Na}_2\text{S}_2\text{O}_3 = 0.2 \text{ mg of O}_2$.

Calculation

$$\text{DO in mg/L} = \frac{\text{ml of Na}_2\text{S}_2\text{O}_3 \times \text{vol of 0.025 N Na}_2\text{S}_2\text{O}_3 \times 0.2 \times 1000}{\text{Volume of sample}}$$

xvii) Biological Oxygen Demand

In the biochemical degradation of organic matter, the amount of oxygen consumed by bacteria and other micro-organism, under aerobic condition is defined as BOD.

Principle

The DO of the sample were determined before and after five days at 20 oC .

Reagents

- 1) Phosphate buffer solution
- 2) Magnesium sulphate solution;
- 3) Calcium chloride solution-
- 4) Ferric Chloride solution:
- 5) Seeding material
- 6) Alkali iodide azide reagents
- 7) Starch indicator solution
- 8) Standard thiosulphate solution (0.0225N)

Procedure

By using pH meter, the sample was neutralized. initial oxygen concentration was determined as soon as possible. to get measurable amount of O_2 after 5 days the water sample was diluted and filled into the sets of BOD bottles. The remaining sample was incubated in BOD incubator at 20 $^{\circ}\text{C}$ for 5 days. After 5 days the oxygen concentration was again determined by the help of Winkler's azide modification method.

$$\text{BOD mg/L} = \frac{(V_1 - V_2 - XD) (X+1)}{X+1}$$

- i) V_1 is the volume of 0.025 N thiosulphate in mL for 200 ml of the original dilution (1st day)
- ii) V_5 = the volume of 0.025 N thiosulphate in mL for 200 ml of the original dilution (5th day)
- iii) X = volume of dilution water in ml to 1 volume of the sample.
- iv) D is the difference between volumes of 0.025 N thiosulphate required for 200 ml of dilution water before and after incubation.

xvii) Chemical Oxygen Demand

The oxygen required for the chemical oxidation of organic matter with the help of strong chemical oxidant is determined as COD.

Principle

$K_2Cr_2O_7$ and H_2SO_4 produce O_2 AND H_2O . The organic matter is oxidized completely. The dichromate consumed gives the oxygen required for the oxidation of the organic and inorganic matter. the remaining $K_2Cr_2O_7$ is titrated with Ferrous Ammonium Sulphate.

Interferences

Fatty acids, straight chain organic aliphatic compounds, chlorides, nitrites and iron are the main interfering radicles. (Chlorides is the most common interfering ion it can be inhibited by mercuric sulphate).

Reagents

- 1) Standard potassium dichromate (0.25N)
- 2) Sulphuric acid
- 3) Standard ferrous ammonium sulphate (0.1N)
- 4) Ferroin Indicator
- 5) Mercuric Sulphate ($HgSO_4$)
- 6) Pottasium Dichromate (0.025 N)
- 7) Sulphamic acid
- 8) Ferrous Ammonium Sulphate (0.01N)

Procedure

In the reflux flask 50 ml of sample was taken and mercuric sulphate was added in it and mixed well. Add 20 ml H_2SO_4 , $AgSO_4$, and few anti—bumping granules in it. Then 25 ml of dichromate was added and attached to the condenser and started cooling. The content is transferred into 500 ml conical flask then cooled well. 2-3 drops of ferroin indicator was added and titrated with (0.1 N) FAS. The end point was the sharp colour change from blue green to reddish brown.

Calculated COD from the following formula.

$$\text{COD mg/L} = \frac{(A-B) \times N \times 8000}{\text{Volume of sample}}$$

Where,

A= ml Ferrous ammonium sulphate for blank

B= mml. Ferrous Amm. Sulphate for Sample

N= Normality of Ferrous Amm. Sulphate

xviii) Nitrate nitrogen

Principle: Sulphanilic acid is diazotized by nitrite and diazo compound is coupled with α - naphthylamine hydrochloride to form a reddish-purple azo dye at a pH 2.0 to 2.5.

Interference

Strong reducing agent, amines interfere, and strong oxidizing agents.

REAGENTS

- 1) Sulphanilic Acid Solution:
- 2) α - naphthylamines hydrochloride solution:
- 3) Sodium acetate buffer solution (2M):
- 4) Nitrite Stock solution:
- 5) Nitrite intermediate solution:
- 6) Nitrite Working Solution
- 7) Aluminium hydroxide suspension:

Procedure

In 50 ml of Nessler tubes Nitrite working solution was added and make up to mark. In another 50 ml Nessler tube transferred clear solution and make up to the mark. In blank 1 ml sulphanilic acid was added and mixed thoroughly. Coloured developed which compared with standards by using spectrophotometer at 250 nm. Calibrated curve of the nitrite was prepared which is equivalent to optical density.

Formula:

$$\text{NO}_2 \text{ nitrogen in mg /L} = \frac{\text{mg of NO}_2 \times 0.01 \times 1000}{\text{Volume of sample}}$$

xix) Total Phosphate

Principle -Molybophosphoric acid formed when Ammonium molybdate reacts with phosphate, by addition of stannous chloride, the acid reduced to blue coloured complex 'molybdenum blue'.

Interferences

Sulphide, that can be eliminated by oxidation with bromine water.

Reagent –

- 1) Strong acid solution:
- 2) Ammonium molybdate reagent:
- 3) Stannous chloride reagent
- 4) Phenolphthalein indicator:
- 5) Phosphate stock solution:

Procedure

In 100 ml Nessler tube, 100 ml water sample was taken and 1 drop of phenolphthalein indicator was added, pink colour appeared, which is destroyed by adding 2 drops of sulphuric nitric acid. In 100 ml Nessler tube, appropriate phosphate solution was taken and made up to the mark. In standard 4 ml of ammonium was added followed by 2-3 drops of stannous chloride. Absorbance was measured, After 10 minutes, by spectrophotometer. prepare calibration curve, optical density of the sample, equivalent to the micro gram phosphorous and concentration expressed as PO₄.

$$[\text{PO}_4^{3-}] \text{ mg/L} = \frac{\text{PO}_4^{3-} \text{ concentration} \times 3.066 \times 1000}{\text{Volume of sample}}$$

RESULTS**Table-3** Post Monsoon Parameters Value

Sl. No	Parameter	Chakra path	Rani Ghat	Chatt Ghat	Kelo Dam	Lakha	Chiraipani	Taraimal	Gerwani
1	Temperature	20	21	20	22	24	23	22	21
2	pH	8.12	8.01	7.96	7.78	7.65	8.12	8.12	7.9
3	EC	560	510	476	480	1678	1732	986	645
4	Turbidity	40.5	10.8	22.4	12.1	21.2	30.3	38.6	13
5	Total solid	1420	323	423	198	1006	1189	1210	1230
6	Total dissolved solid	344	67	98.5	82	72	203	54	146
7	TSS	1076	256	324.5	116	934	986	1156	1084
8	Total Alkalinity	124-7	47.5	53.6	47.43	135.4	91.2	40.43	33.23
9	Total Hardness	66.71	55.5	61.5	56.9	54.54	38.43	126.8	91.8
10	Ca Hardness	- 45.54	23.8	45.34	43.1	43.21	20.5	88.98	75.45

11	Mg	–	21.17	31.7	16.16	13.8	11.33	17.93	37.82	16.35
	Hardness									
12	Fluoride		0.63	0.51	0.34	0.45	0.38	0.48	0.98	0.35
13	Chloride		12.35	11.25	10.64	13.56	14.68	24.4	28.32	21.43
14	NO ₃ ⁻		16.32	22.42	14.2	18.12	18.64	17.42	15.54	18.86
15	SO ₄ ⁻		86	74	64	82	62	20.1	8.6	8.2
16	PO ₄ ³⁻		4.3	3.4	3.8	3.8	5.8	5.4	3.2	4.8
17	Total Coli forms		36	25	3.1	18	09	2.1	1.9	03
18	Faecal Coli forms		17	13	0.0	06	1.4	0.0	0.0	02.5
19	DO		2.1	3.8	2.5	3.6	2.2	2.7	3.1	3.1
20	BOD		6.2	4.6	6.1	8.9	5.6	4.9	6.7	4.7
21	COD		565	197	230	223	168	290	278	330

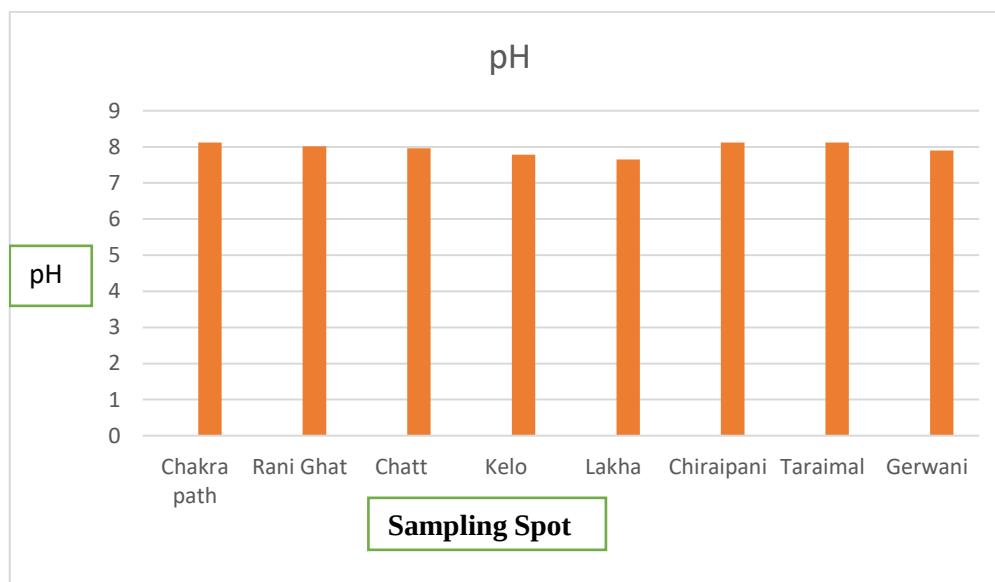


Fig-1- Variation of pH at various sampling spot

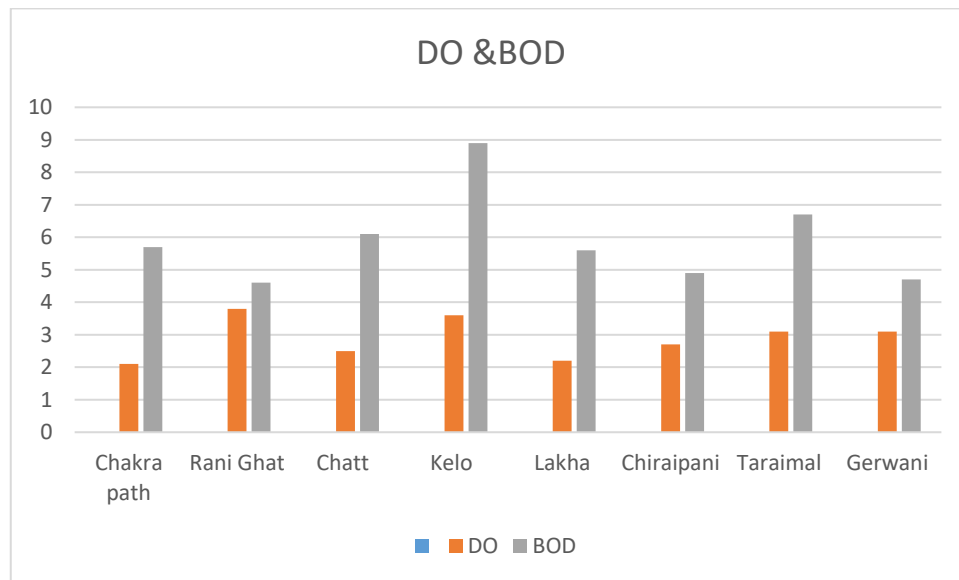


Fig-2- Variation of DO and BOD at various sampling spot

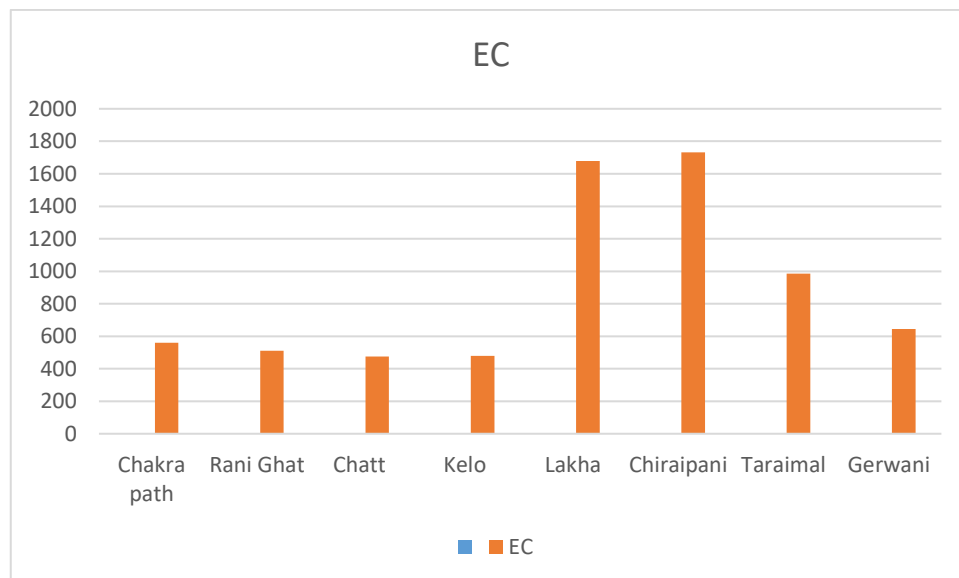


Fig-3- Variation of EC at various sampling spot

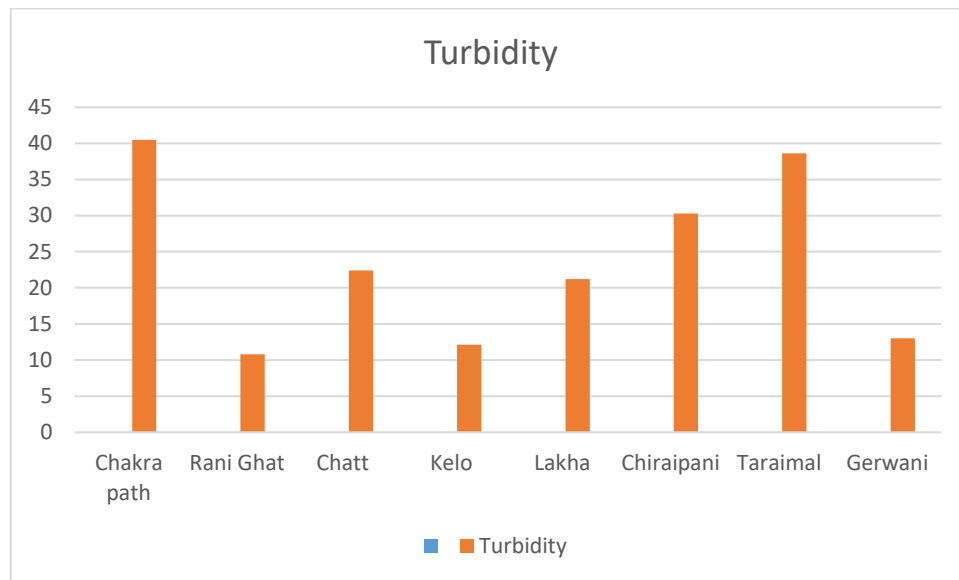


Fig-4- Variation of Turbidity at various sampling spot

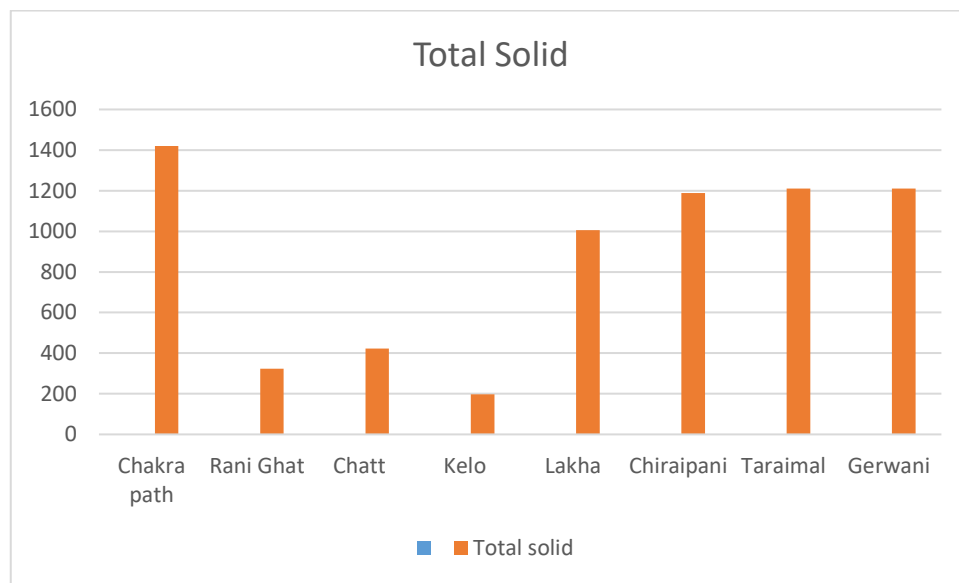


Fig-5- Variation of Total Solid at various sampling spot

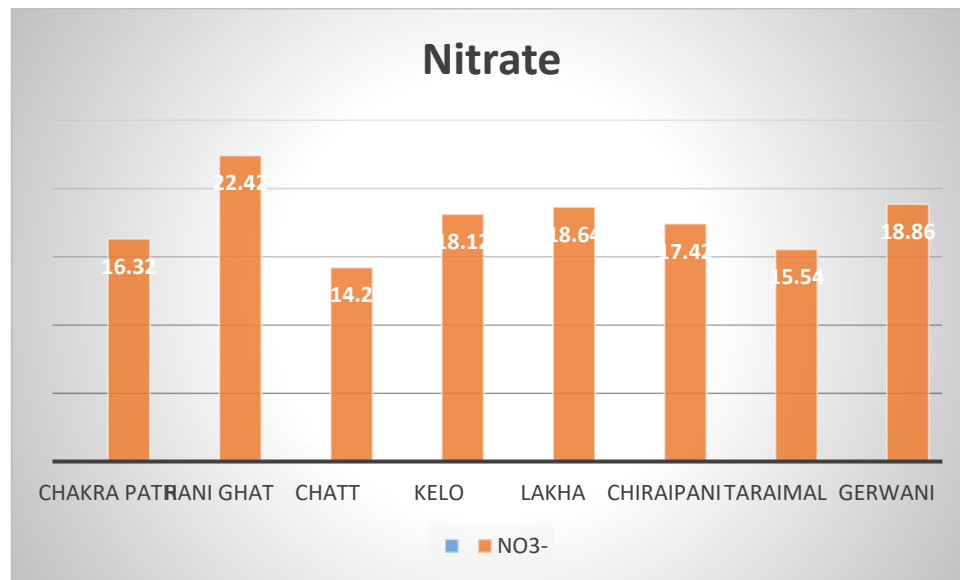


Fig-6- Variation of Nitrate at various sampling spot

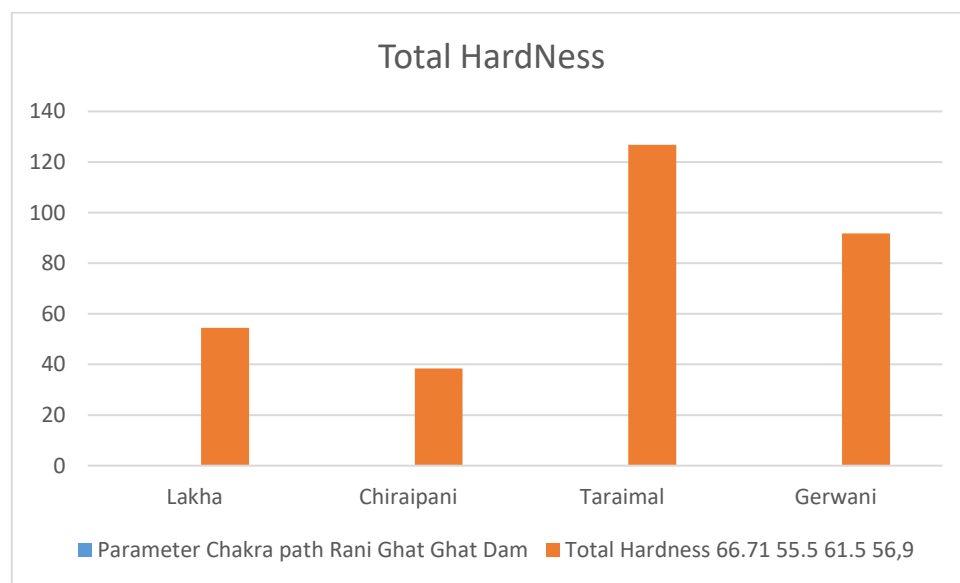


Fig-7- Variation of Total Hardness at various sampling spot

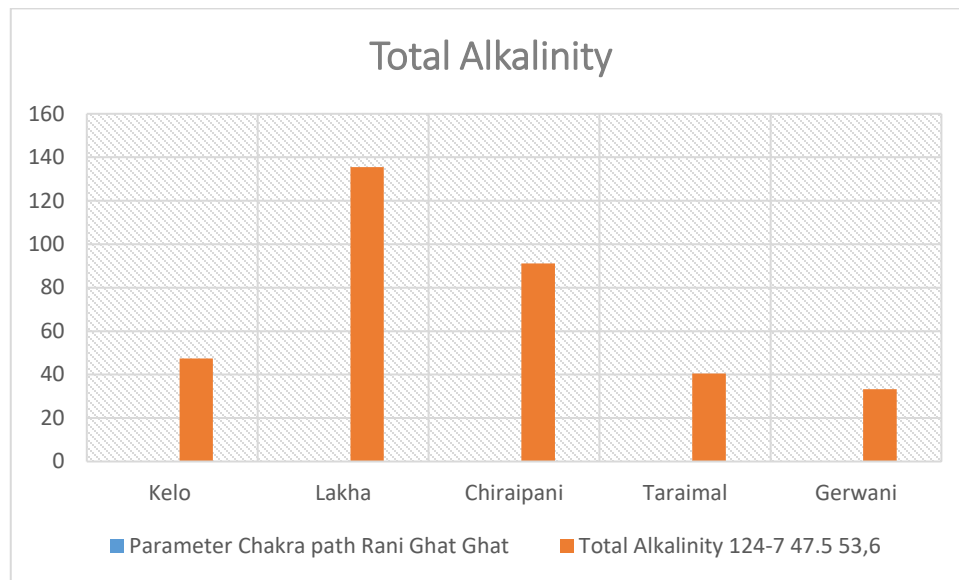


Fig-8- Variation of Total Alkalinity at various sampling spot

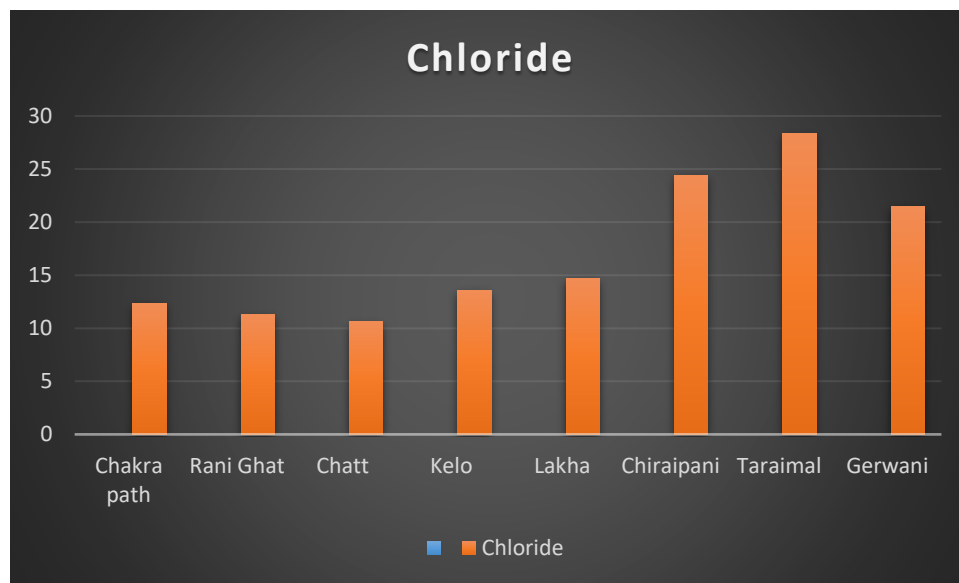


Fig-9- Variation of Chloride at various sampling spot

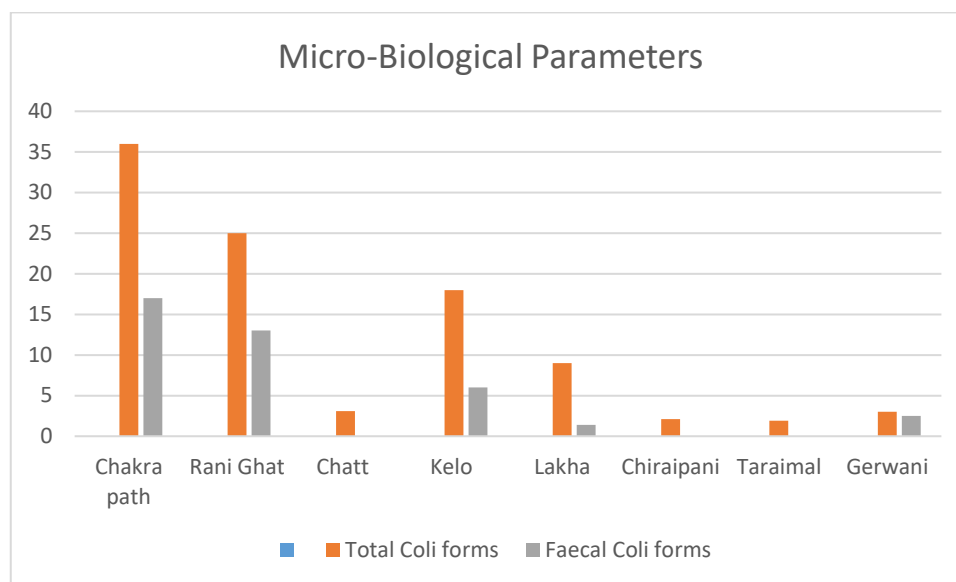


Fig-10- Variation of Micro-biological Content at various sampling spot

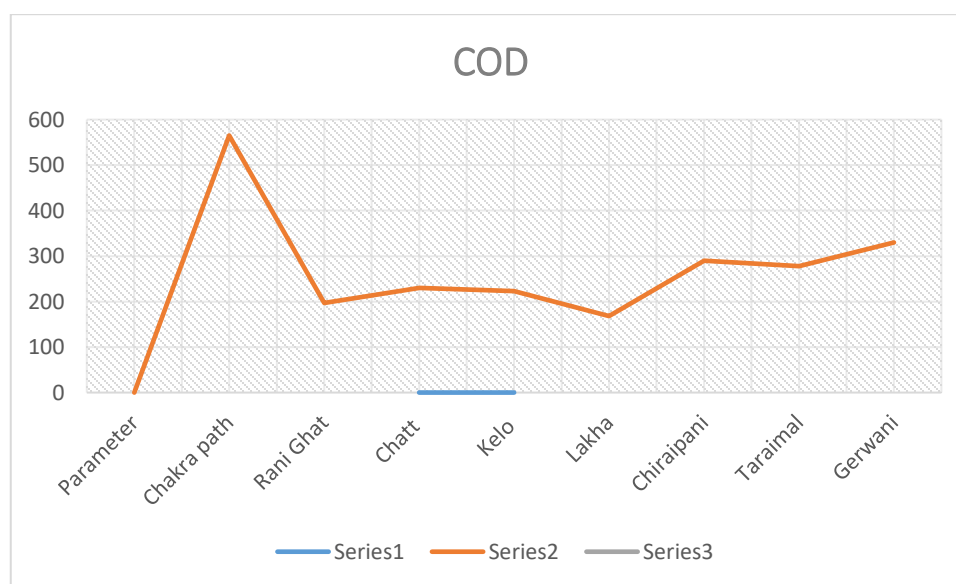


Fig-11- Variation of CODat various sampling spot

DISCUSSION

Study shows that temperature ranges from 20⁰C to 24⁰C during study period. pH value indicates that water slightly alkaline in nature. Hardness value indicates the presence of calcium and magnesium ions. Alkalinity and acidity value is due to presence of cations and anions. These ions helps in maintain pH value. Nitrate ,sulphate and phosphate is due to the industrial and agricultural

run-off. They were work as nutrient for flora. Chloride concentration is highest at sampling spot 7. Which responsible for bleaching. Turbidity value indicates the presence of solid . this was due to presence of soluble and insoluble solids, which come with run-off. Low Do value indicates pollution, DO is minimum at sampling spot. Low DO value represents pollution level value were observed highest at sampling spot 4. Domestic waste, sewage and municipal corporation dumping is responsible for it. it also represents presence of organic pollutants. COD value were highest at sampling spot Chakra path. COD value represents inorganic pollutants. Total coli form and Fecal coli form concentration were highest at sampling spot 1. the presence of pathogen may cause several disease.

CONCLUSION

Our present study indicate that Kelo River Water is polluted. It is the demand of time to analyse the parameters. Polluted water shows hazardous effect on environment. Due to pollution the water quality parameters of Kelo river ranges from permissible limit. Several parameters are influenced by pollutant. Chloride concentration and fluoride concentration adversely affects environment. Low Do level is due to organic pollutants. DO, BOD and COD values were affected by pollution. It is a need of our society to keep our water sources clean.

REFERENCES

1. Hafeez S, Wong MS, Ho HC, Nazeer M, Nichol J, Abdas S, Tang D, Lee KH and Pun L. Comparison of Machine Learning Algorithms for Retrieval of Water Quality Indicators in Case-ii Water: A Case Study of Hong Kong Remote Sens. (Basel). 2019; 11(6): 617. 10.3390/rs1106061
2. APHA. AWWA, WPCF, Standard method for the examination of water and waste water, 19th Edn. American Public Health Association, Washington D.C. 1995.
3. Divya AH and Solomon PA. Procedia Technology. International conference on Emerging Trends in Engineering Science and Technology. 2016; 24: 631-638. (ICETEST 2015)
4. Ramya P, Jagadeesh Babu A. et al. A study of the study of hardness in ground water sample by EDTA titrimetric method. International Journal of recent scientific research. 2015; 6(6): 4504-4507.

5. Das SK, Grewal AS and Banerjee M. A brief review; Heavy Metals and their analysis. 2011;11(1): Article-003. In Trivedi RK and Goel PK. Chemical and biological methods for water pollution Studies. (Environ media, Karad, Maharashtra, India). 1986.
6. Harrison RM.. Harrison RM (ed.). Pollution: Causes, effects and control (5th ed.) Cambridge, UK: Royal Society of Chemistry. 2013. doi:10.1039/9781782626527ISBN978-1-78262-560-5.OCLC1007100256.
7. Laws EA. Aquatic Pollution: An Introductory Text (4th ed.). Hoboken, NJ: John Wiley & Sons. 2018. ISBN978-1-119-30450-0-via Google. Books.
8. Burton Jr GA and Pitt R.. 2nd Stormwater Effects Handbook A Toolbox for Watershed Managers, Scientists and Engineers. New York. 2001. CRC/Lewis Publishers:ISBN0-87371-924-7.Archived from the original on May 19,2009. Retrieved January 26, 2009.
9. Schueler and Thomas R. Cars Are Leading Source of Metals Loads in California.Reprinted in The Practice of Watershed Protection. 2012, at the Wayback Machine 2000. Centre for Watershed Protection .Ellicott City,MD.
10. Wang J and Wang S. Removal of pharmaceuticals and personal care products (PPCPs) from wastewater: A review. Journal of Environmental Management. 2016; 182: 620-640. doi:10.1016/j.jenvman.2016.07.049PMID27552641
11. Moore WA, Kroner RC and Rchoft CC. Analytical chemistry. 1949;21:953.
12. Ahmed T, Bram K, Fatma EG and Gratze L. Water Research, 2002; 36 (1):147.
13. Karim S, Chaudhary MN, Ahmed K and Batool A. Journal of the Chemical Society of Pakistan. 2010; 32: 606.
14. Latif A, Noor S, Shareef QM and Najeebullah M. Journal of the Chemical Society of Pakistan. 2010; 32: 115.
15. Moore WA, Kroner RC and Rchoft CC. Analytical chemistry. 1949; 21: 953.
16. Ahmed T, Bram K, Fatma EG and Gratze L. Water Research. 2002; 36 (1):147.

17. Karim S, Chaudhary MN, Ahmed K and Batool A. Journal of the Chemical Society of Pakistan, 2010; 32: 606.
18. Latif A, Noor S, Shareef QM and Najeebullah M. Journal of the Chemical Society of Pakistan. 2010; 32:115.
19. Wrinkler LW. Berichte der Deutschem Chemischen Gesellschaft. 1888; 21: 2843.
20. Eaton AD, Clesceri LS and Greenberg AE. Standard Methods for the Examination of Water and Wastewater, 20 th Edition, American Public HeALTH Association Method for oxygen (dissolved) Washington DC, APHA. 1998.