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Environmental Assessment & Impact of Lakes in Jabalpur

Rajeev Kumar Vishwakarma[1], Akash Jain[2], Rajkumar Vishwakarma[3]
[1]*P.G. Student, Department of Chemistry, Rani Durgavati Vishwavidyalaya , Jabalpur M.P.India,*
[2,3]*Assistant Professor, Department of Civil Engineering, Takshshila Inst. Of Engg. & Technology, Jabalpur M.P.,India,*

Abstract: ***Water is essential for life. Contamination of such water sources is a big problem creating health hazards. Hence the present study was undertaken to characterize the parameters of five historical lakes of Jabalpur city. These specific contaminants leading to pollution in water include a wide spectrum of chemicals, pathogens and physical changes. Water quality one of the most critical factor besides good feeding in fish production and it varies with culture systems or other factors. Several water quality parameters should normally be sampled and tested to a certain water quality and the data recorded these chemical parameters such as pH, TDS, turbidity, D.O, temperature, alkalinity, hardness, colour, odour and electrical conductivity of five well known lakes of Jabalpur city and it is located in populated areas. To assess the water quality each parameter was compared with the standard desirable limit of that parameter in drinking water as prescribed by BIS 10500-91.The comparison of different parameters and data Provided by the present work is useful in designing water quality management issues.***

Keywords: ***Lake, Pollution, Hydrogeology, Geology Sewage, Balsagar, Supatal, Devtal, Garha Talab, Sangram sagar, DO, TDS, Alkalinity, Jabalpur city.***

I. OBJECTIVES

A. To assess overall water quality of Located Historical Lakes in Jabalpur city.
B. To study Variation of water quality of different points of sources of the area.
C. To identify the major parameters influencing the improvements of the environmental condition of water.
D. To identify Pollution sources (present and expected), including domestic, industrial**.**

II. INTRODUCTION

Water is a transparent and nearly colourless chemical substance that is the main constituent of Earth's streams, lakes, and oceans, and the fluids of most living organisms. Its chemical formula is H_2O, meaning that it is molecule containing one oxygen and two hydrogen atoms that are connected by covalent bonds. Water strictly refers to the liquid state of the substance, that prevails at standard ambient temperature and pressure; but it often refers also to its solid state (ice) or its gaseous state (steam or water vapour). It also occurs in nature in the form of snow, glaciers, icebergs, aquifers, and atmospheric humidity.

Pure water (H20) is colourless, tasteless, and odourless. It is composed of hydrogen and oxygen. Because water becomes contaminated by the substances with which it comes into contact, it is not available for use in its pure state. To some degree, water can dissolve every naturally occurring substance on the earth. Because of this property, water has been termed a "universal solvent." Although beneficial to mankind, the solvency power of water can pose a major threat to industrial equipment. Corrosive reactions cause the slow dissolution of metals by water. Deposition reactions, which produce scale on heat transfer surfaces, represent a change in the solvency power of water as its temperature is varied. The control of corrosion and scaling is a major focus of water treatment technology.

Water impurities include dissolved and suspended solids, some may be useful and potable for public use and some impurities are harmful and unfit. For example, certain minerals like iron calcium, magnesium, fluorine etc. are essential for human health in small quantities but their presence in excess causes hazards to human health. Also there are toxics substances like copper, arsenic, barium, lead, cyanide etc. which are very dangerous to the human health even if they are present in small quantities. Similarly sometimes water may contain harmful bacteria which causes diseases such as cholera, typhoid, dysentery, gastro-enteritis, infectious hepatitis (i.e. jaundice), etc. Hence it is necessary to filter and purify water to eliminate 100% of all the harmful elements present in water for the safety of public health. In present day, various equipment and water treatment devices have been developed for better quality of safe drinking water.

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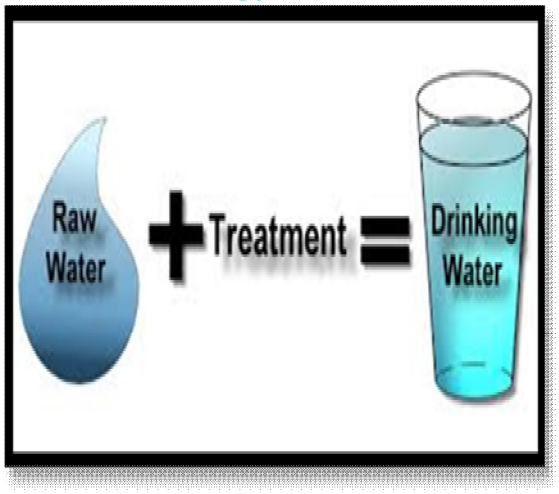

III. LITERATURE REVIEW

A. Assessment of water pollution in lakes of Jabalpur- Prof. Sanjay Kumar Verma, Dr. Saleem Akhtar
B. Status of water quality of India- Central Pollution Control Board
C. Water Quality Analysis of lakes at Jabalpur- Shilpi Shrivastava (Kalinga University, Raipur, C.G.)
D. Singh et al. (1999) on River Damodar,
E. Gyananath et al. (2000) on river Godavari,
F. Kausik et al. (2000) on river Ghaggar,
G. Chatterjee et al. (2001) on river Nunia in Asansol, West Bengal,
H. Kaur et al. (2001) on river Satluj,
I. Garg et al. (2002) on western Yamuna canal from Tajewala (Haryana) to Haiderpur treatment plant (Delhi),
J. bbasi et al. (2002) on Buckinghhum canal,
K. Martin et al.(2003) on river Tamiraparani,
L. Srivastava et al. (2003) on river Gaur at Jabalpur,
M. Sinha et al. (2004) on river Ram Ganga,
N. Singh et al. (2004) on river Yamuna and Guru Prasad et al. (2004) on Sarada river basin.

IV. STUDY AREA

The study area JABALPUR lies between the east longitude 79° 53 ′ and 80° 03 ′ and the north latitude 23° 05 ′ and 23° 15 ′ Physiographically. The area can be divided into the forested and hilly tracts and the plains. Geologically, the area comprise of Assessment and impacts of surface water: Palaeo-Proterozoic rocks of Mahakoshal Group to Deccan Traps (Cretaceous) and alluvium (recent). Mahakoshal rocks are metamorphosed sequence of varying grade and are intruded by the granites. Granites outcrop over quite a large area; the Gondwana rocks form low tracts where as the Lameta rock form conspicuous relief. Basalt occurs on the top of Lametas and it engrosses the terrain absolutely southeastwards.

V. GEOLOGY AND HYDROGEOLOGY

Jabalpur is home of geology since formation ranging from lower proterozoic to Pleistocene age are exposed in the area different types of aquifers are formed by these rocks in the area main geological units of the area are archaens, gondwana, lamheta, deccan traps and narmada alluviums. Occurance and movement of water in hard rocks is mainly controlled by secondary porosity through joints and fractures. Primary porosity in gondwana sand stones and vesicular basalts in deccan traps play important role in ground water movement . lamheta formation forming potential aquifer made up of relatively losse and friable shale and sandstones. Ground water in general occurance under unconfined, semiconfined and confined conditions.
In present working area madan mahal granite and gondwanaa formations represents all 5 lakes balsagar, devtal, supatal is completey situated in granitic terrain and sangram sagar and kachpura lakes are geologically situated in granite-gondwana contact zone.

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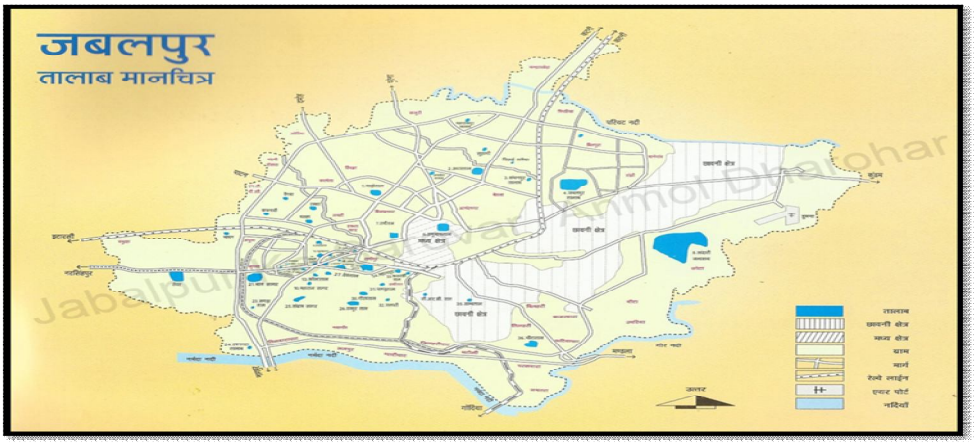
VI. LOCATIONS OF SAMPLE WATER

SERIAL NO.	NAME OF LAKE	SITUATION	AREA	GEOLOGICAL FORMATION
1	BAAL SAGAR	BEHIND MEDICAL COLLEGE JBP.	23.05 HECTER	GRANITE-GONDWANA CONTACT
2	SANGRAM SAGAR	INFRONT OF BAJNAMATH TEMPLE	15.855 HECTER	GRANITIC TERRAIN
3	DEVTAL	GARHA	1.534 HECTER	GRANITIC TERRAIN
4	SUPATAL	GARHA	9.58 HECTER	GRANITE-CLAY TERRAIN
5	GARHA TALAB	GARHA		GRANITE-GONDWANA CONTACT

VII. MAP OF LOCATION OF SAMPLE WATER LAKES



Details Of Some Lakes From Where The Sample Is Collected

A. Dev Tal

Location- longitude 23° 09′ 18″ N, Lattitude-79° 53′ 50″ E, MSL 412 Mtr, Area- 1.534 Hect.

DEVTAL is situated at Garha in NH-7, near Osho Ashram Jabalpur. Disposal of religious remains occurs in this lake. Presently lake is being used for domestic activities affecting water quality of lake.

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B. Supatal

Location- longitude 23° 09′ 23″ N, Lattitude-79° 54′ 03″ E, MSL 398 Mtr, Area- 9.58 Hect.

This wonderful lake Suptal is located in front of Madan Mahal hills is geologically situated in Granite Gondwana Clay contact and well manganged 'M.P. TOURISM'.

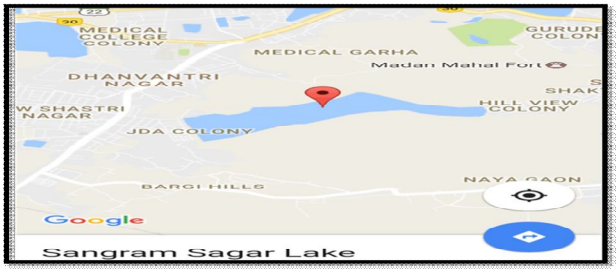
C. Balsagar

Location- longitude 23° 09′ 18″ N, Lattitude-79° 52′ 16″ E, MSL 387 Mtr, Area- 23.05 Hect.

Balsagar is laocated behind the MEDICAL COLLEGE of JABALPUR. All the waste that is carried out of MEDICAL COLLEGE and HOSPITAL is disposed off in the Balsagar. Due to this the water is getting highly polluted.

D. Sangram- Sagar

Location- longitude 23° 08′ 23″ N, Lattitude-79° 53′ 06″ E, MSL 395 Mtr, Area- 15.85 Hect.It is located in the western side of the city. One of the most suitable tourist destiantion in MP with good number of aquatic creatuesand fishes , the migratory birds from the central parts of Western Asia like Pintailed ducks,Koots and red perched pilchards in lake.



E. Garha Talab

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VIII. COLLECTION OF WATER SAMPLES

The water samples were collected from various loctions in plastic cans of 1 liter capacity as per standard procredure . water samples from 5 sampling locations around Jabalpur city where selected atrendem as given in table:

SERIAL NO.	SAMPLING LOCATION	TYPE OF LOCATION
1	SANGRAM-SAGAR	RESIDENTIAL AREA
2	BAAL-SAGAR	RESIDENTIAL AREA
3	SUPATAL	RESIDENTIAL AREA
4	GARHA TALAB	RESIDENTIAL AREA
5	DEVTAL	RESIDENTIAL AREA

IX. ANALYSIS OF WATER SAMPLE

Analysis of water sample was carried out for various physiological chemical parameters such as:-

A. Ph
B. Electrical conductivity
C. Tds
D. Turbidity
E. Do
F. Temperature
G. Alkalinity
H. Hardness
I. Colour
J. Odour

X. METHODOLOGY

We surveyed 5 historical lakes situated in Jabalpur city and its surrounding areas and realised the present situation and the problems associated with it.

To determine the suitable locations of the water collection entire lake areas have been visited. Water samples have been collected such that the samples represent the characteristics of whole lake.

A. Locating points for collection of samples in the lake.
B. Collection of samples from Balsagar, Sangram sagar, Devtal, Supatal, Garha lakes.
C. In situ testing of temperature and colour.
D. Laboratory testing of samples.
E. Compare the Data with quality standards.
F. Assessment of water Quality.
G. Possible Outcomes.
H. Recommendation for further study of water quality assessment.

XI. TEST VALUES OF SAMPLES

SL NO	PARAMETERS	WATER SAMPLES OF DIFFERENT LAKES				
		A	B	C	D	E
1	COLOR	Greenish black	Pale yellow color	Greenish black	Pale yellow color	Pale yellow color
2	ODOUR	Unobjection-able	Unobjection-Able	Unobjection able	Unobjecti onable	Unobjectio nable
3	pH	8.83	7.46	8.70	7.9	9.1
4	ELECTRICAL CONDUCTIVITY	0.85	0.55	0.40	0.90	0.83
5	TDS	390	190	140	490	320
6	TURBIDITY	51	58	111	20	68
7	DO	1.6	1.1	1.3	1.4	1.6

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8	TEMPERATURE	22º	20º	24.5º	21º	21º
9	ALKALINITY	86	94	84	90	87
10	HARDNESS	139	120	146	150	140

XII. IS CODE 10500-91

As per the standards methods the quality of water has been assest by comparing each parameter with the standard desireable limit of that parameter indrinking water standard as prescribed in ISI 10500-91

SERIAL NO.	PARAMETERS	STANDARD VALUES
1	pH	6.5-8.5
2	ELECTRICAL CONDUCTIVITY	1400µ/S
3	TDS	500mg/l
4	TURBIDITY	5NTU
5	DO	5mg/l
6	TEMPERATURE	32ºF
7	ALKALINITY	350-620mg/l
8	HARDNESS	300ppm
9	COLOR	Unobjectionable
10	ODOUR	Odourless

XIII. RESULTS

The data obtained from the cureent investigation shown in table 11.1 which was followed:

A. Temperature

The temperature of water sample slightly varied range from 20º C (SANGRAM-SAGAR) to highest 24.5º (DEVTAL)

B. Ph

The pH of water samples where about ranged from lowest 7.46 (SANGRAM-SAGAR) to highest 9.10 (GARHA TALAB)

C. Tds

The TDS of samples where about ranged from lowest 190mg/l (SANGRAM-SAGAR) to highest 490mg/l(SUPATAL)

D. Turbidity

The turbidity if water samples where ranged from lowest 20ppm(SUPATAL) to highest 111ppm(DEVTAAL)

E. Ec

The EC of samples where about ranged from lowest 0.40 µS/cm to highest 0.90 µS/m (SUPATAL)

F. Do

The DO of samples where found in the range of 1.1 (SANGRAM-SAGAR) - 1.6 (BAL-SAGAR) due to the capacity of water to hold oxygen.

G. Alkalinity

The alkalinity of samples where found in the range of 94ppm(SANGRAM-SAGAR) to 84ppm (DEVTAL)

H. Hardness

The hardness of samples where found in the range of 120ppm(SANGRAM-SAGAR) to 150ppm (SUPATAL)

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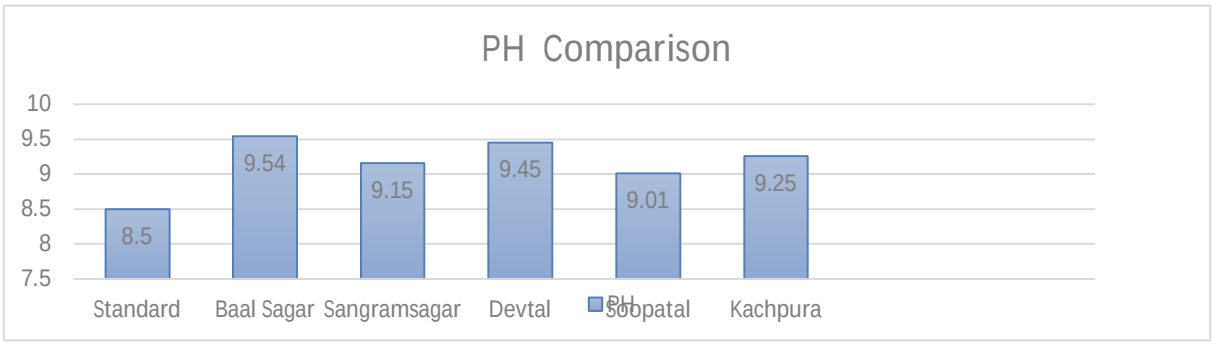
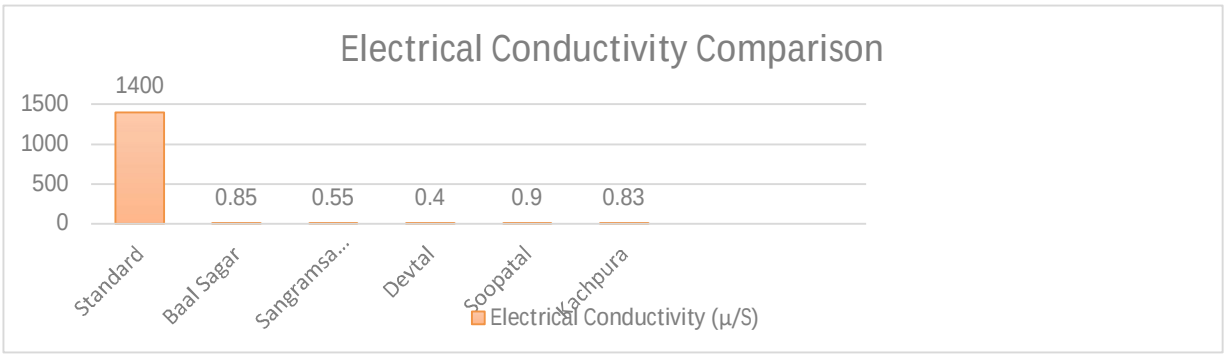
I. Color

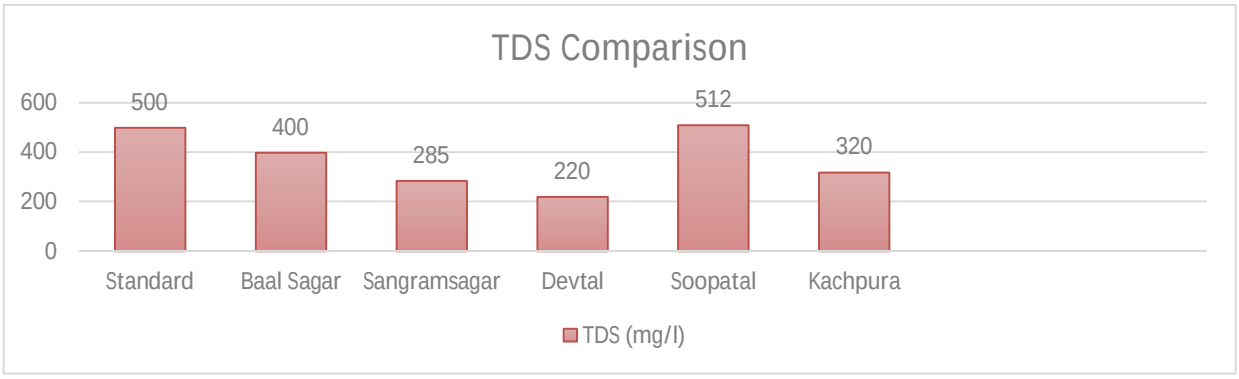
GREENISH BLACK- PALE YELLOW.

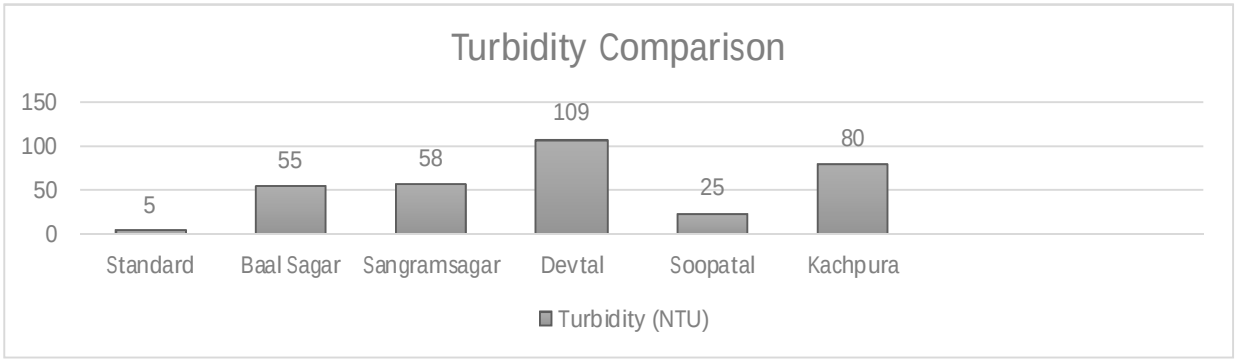
XIV. BAR CHARTS

Comparison Sheet of Water Samples Collected From Different Lakes









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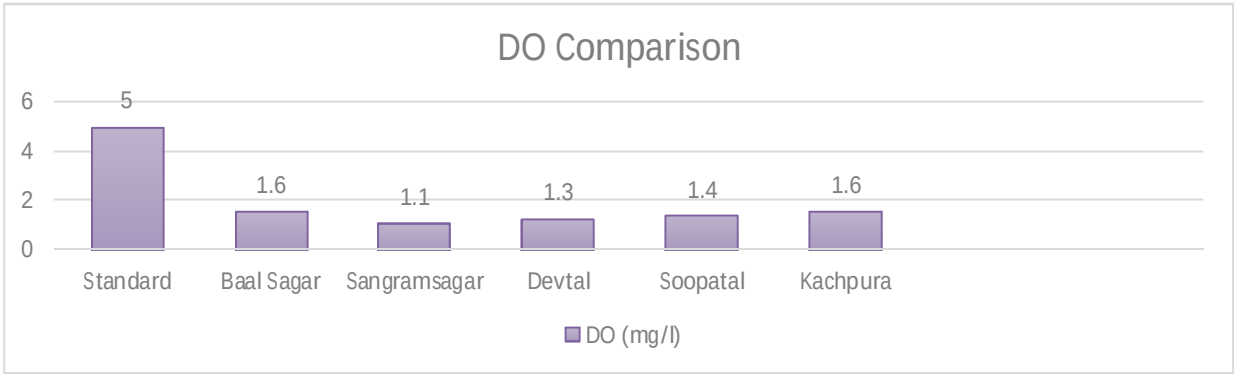

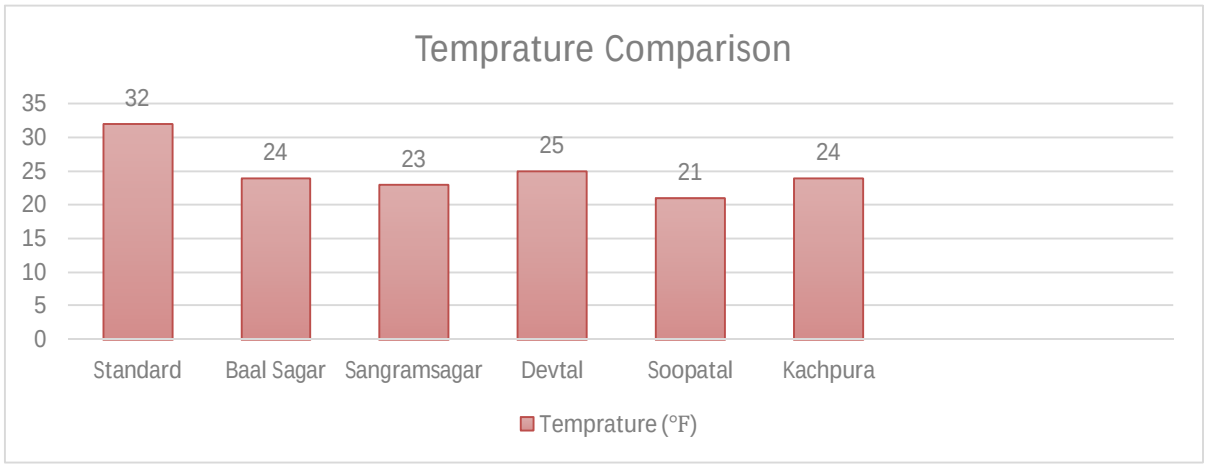

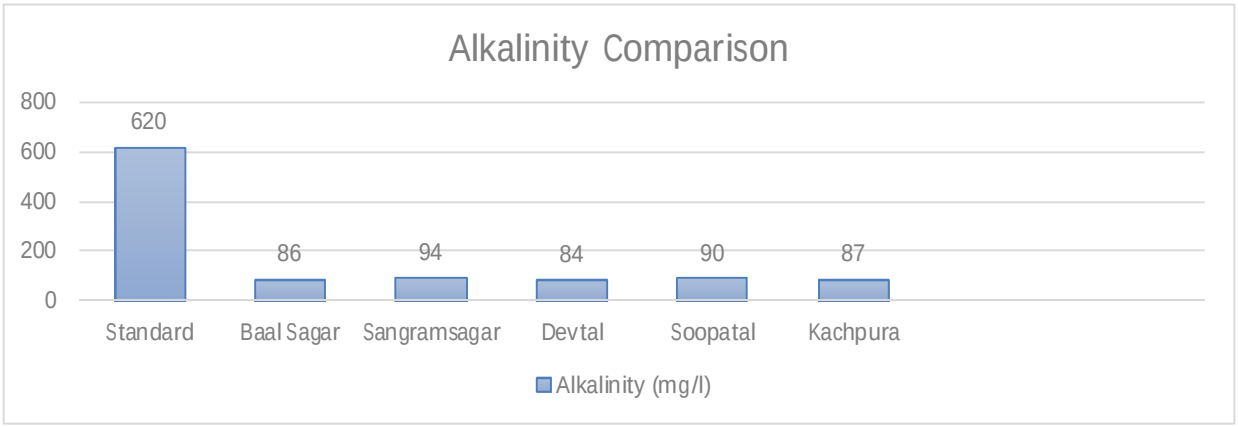

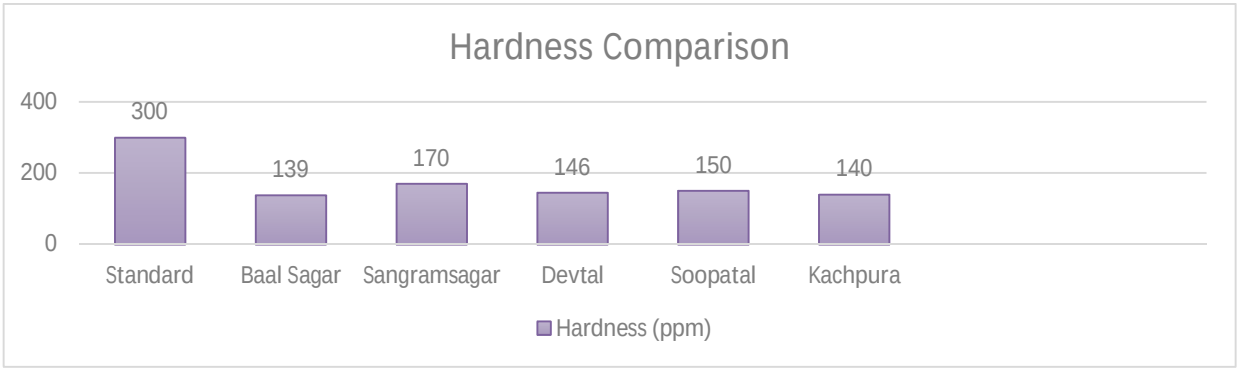

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XV. CONCULSISONS

A. Turbidity, Iron and pH are somewhat above recommended limits.
B. Pale yellow colour gives aesthetically unpleasing appearance.
C. Also presence of chloride shows human waste and hardness is also unwanted.

XVI. RECOMENDATIONS

A. Identification of any new toxic substances, and its pollution control.
B. Prevention and controlling of any harmful discharge.
C. Provisions for reuse of surface water for sustainable development.
D. Preventing environmental issues before they turn into actual problems. Developing water quality and ecosystem health objectives.

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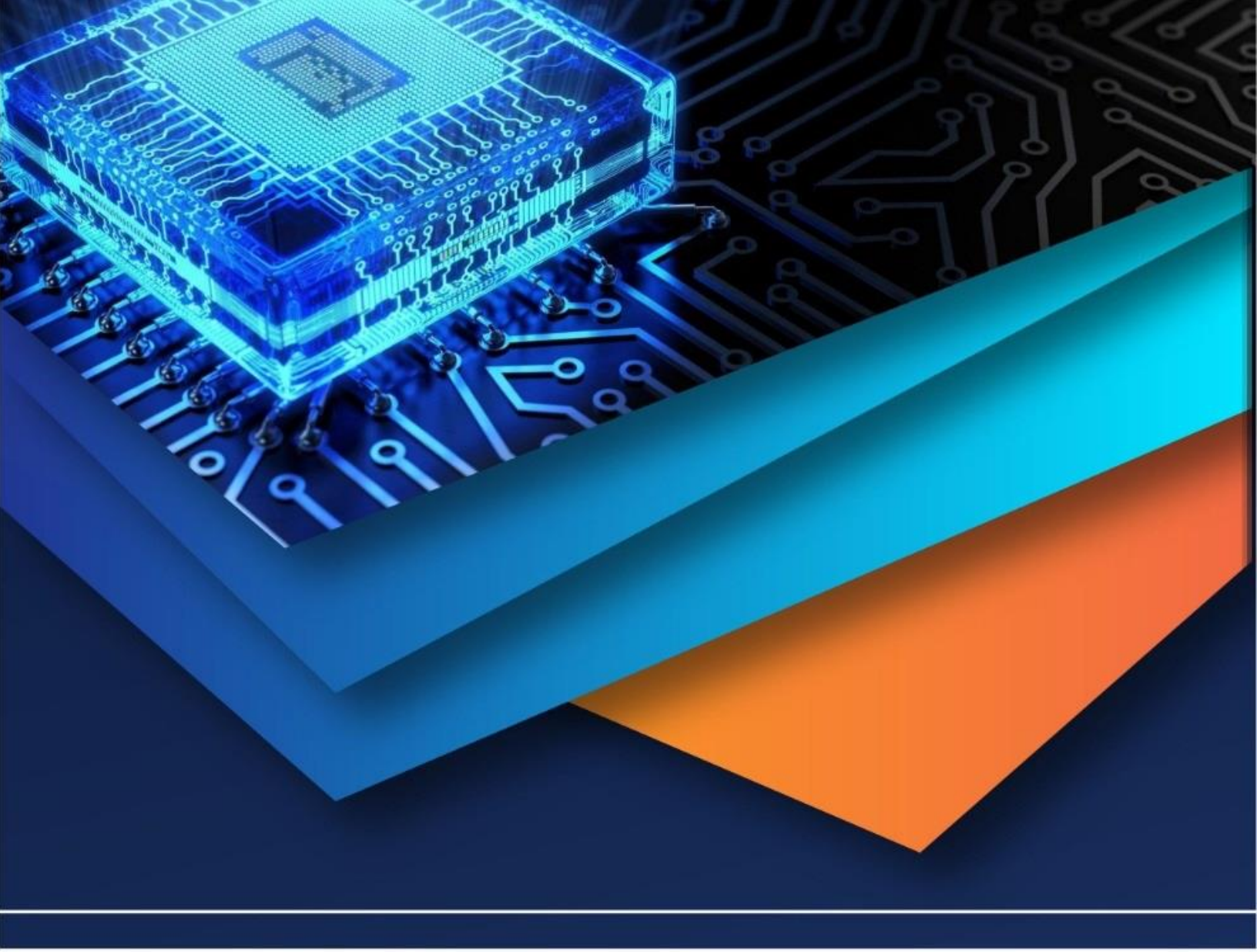

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