

SML GOVT.DEGREE
COLLEGEYEMMIGANUR
CERTIFICATE COURSE

ON

WATER ANALYSIS

ORGANISED

BY

DEPARTMENT OF CHEMISTRY

2019-2020

Srinivas Ganapa

Lec.in Chemistry

Dr.K.NagarajaSetty

Lec.in chemistry

Dr.K.Mahaboob Basha

Principal

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Dr.K.Nagaraja Setty
coordinator

Certificate Course-Water Analysis

Brief report:

The Department of Chemistry SML Govt. Degree college organised a certificate course in water Analysis for B.Sc students during the academic year 2019-20 for a period of 45 days ie. 02-01-2020-05-03-2020.

In this connection, Dr. VVS Kumar, principal of the college presided over the inaugural function and expressed that it was a very useful course for everyone in daily life. He also appreciated the faculty of chemistry department for organising the valuable certificate course. He advised the students to utilise it in a proper manner.

During the above period a few faculty members of the college took part in the course actively and express their views and suggestions for the betterment of the programme. The faculty members involved in the programme are

1. Sri Srinivas Ganapa, vice-Principal, SML GDC
2. Dr. K. Nagarajasetty, Lec. in chemistry, SML GDC
3. Dr. M. Suseelamma, Lec. in Botany, SML GDC
4. Smt. S. Fakrinnisa Begum, Lec. in Zoology, SML GDC
5. Dr. S. Shamshad, Lec. in Zoology, SML GDC
6. Smt. J. Kalpana, Lec. in Chemistry, KVRGDCW, Kurnool

After completion of the course an assessment test conducted for the participants both in theory and practicals. Performance of the participants was well and good.

On March 12th a valedictory function was organised by the Dept. of Chemistry and Dr. K. Mahaboob Basha, principal of the college

addressed the meeting and said that it was a remarkable achievement of the department of chemistry and congratulated all the participants.

Finally, the principal distributed the certificates. All the teaching and non-teaching staff attended the programme and made it a grand success.

I hereby enlighten my utmost gratitude to Dr. V. V. S Kumar, principal SJGC(A), Kurnool, Dr. K. Mahaboob Basha, Principal, SMLGDC, Yemmiganur, teaching and non-teaching staff who involved directly or indirectly and my best wishes to all the participants

(Dr. K. NAGARAJA SETTY)

Coordinator

Ko
18/11/19

To
ThePrincipal
S.M.L Govt Degree college ,
Yemmiganur .

Date :18 -11-2019

Sir ,

Sub :- Department of Chemistry - to start a certificate course in "
WATER ANALYSIS "Permission request – regrading .

-----X-----

I am very kind to inform you that a certificate course in Water analysis for B.Sc students of our college will be started in this semester of 2019 – 20 academic year by the Department of Chemistry before and after the college working hours.

In this connection , I request you kindly to accord us permission to start the course for the benefit of the students as well as the society.

Yours faithfully,


(Dr.K.NAGARAJA SETTY),

I/C of the department of chemistry,
SML GDC Yemmiganur.,

**SML Govt Degree College Yemmiganur,
Department of Chemistry**

Willingness of the students for the certificate course " **water analysis** "

S.no	Regd - No	Name of the student	Group and class	Cell No	Signature
1	173049012	R.THULASI	BSC(BZC) - III YEAR	9010168511	R.Thulasi
2	173049003	B.GOWRAMMA	BSC(BZC) - III YEAR	9703746920	B.Gowramma
3	173049013	S.BASHA	BSC(BZC) - III YEAR	9346515990	S.Basha
4	173049009	M.DURGAPPA	BSC(BZC) - III YEAR	6303070054	M.Durgappa
5	173049014	S.SHASHAVALI	BSC(BZC) - III YEAR	9182612424	S.shashavali
6	173049038	B.VISHNU SWETHA	BSC(MPC) - III YEAR	9666417015	B.Vishnu Swetha
7	173049036	B.NARASAMMA	BSC(MPC) - III YEAR	8919397639	B.Narasamma
8	173049041	P.KASIM	BSC(MPC) - III YEAR	7095244035	P. Kasim
9	173049040	C.SEKHAR	BSC(MPC) - III YEAR	8688699663	c.sekhav
10	18358049004	B.UMA MAHESWARI	BSC(BZC) - II YEAR	7287079148	B.Umamaheswari
11	18358049005	B.VEERA LAKSHMI	BSC(BZC) - II YEAR	7660902193	B.Veeralakshmi
12	18358049006	B.VIJAY	BSC(BZC) - II YEAR	9491910826	B. Vijay
13	18362049002	J.AMPAIAH	BSC(MPC) - II YEAR	9381167092	J Ampaiah
14	18362049001	C.BHASKAR	BSC(MPC) - II YEAR	9985826557	C. Bhaskar
15	18358049012	N.GANESH NAIDU	BSC(BZC) - II YEAR	9908790611	N.Ganesh naidu.
16	18358049014	P.AJARUDDIN	BSC(BZC) - II YEAR	7569324835	P.Ajaruddin
17	18358049016	P.TRIVENI	BSC(BZC) - II YEAR	9505884359	P.Thoniveni
18	19358049002	A.ROOPA	BSC(BZC) - I YEAR	9550336713	A. Roopa
19	19358049017	G.SANDHYA	BSC(BZC) - I YEAR	6304242507	G. Sandhya
20	19358049042	S. MAIMUN	BSC(BZC) - I YEAR	9441535489	S.maimun


PRINCIPAL
S.M.L. Govt. Degree College
Yemmiganur Kurnool (Dist)


K.Nagaraja Setty
Coordinator

9866416445

SML Govt Degree College Yemmiganur,
Department of Chemistry
Certificate course " **water analysis** "
ATTENDANCE REGISTER

S.no	Name of the student	Group and class	1	2	3	4	5	6	7	8	9	10	11	12
1	R.THULASI	BSC(BZC) - III YEAR	x	x	x	x	x	x	x	x	x	x	x	x
2	B.GOWRAMMA	BSC(BZC) - III YEAR	x	x	x	x	x	x	x	x	x	x	x	x
3	S.BASHA	BSC(BZC) - III YEAR	x	x	A	x	x	x	x	x	x	x	x	x
4	M.DURGAPPA	BSC(BZC) - III YEAR	x	x	x	x	x	x	x	x	A	x	x	x
5	S.SHASHAVALI	BSC(BZC) - III YEAR	x	x	x	x	x	x	A	x	x	x	x	x
6	B.VISHNU SWETHA	BSC(MPC) - III YEAR	x	x	x	x	x	x	x	x	x	x	x	x
7	B.NARASAMMA	BSC(MPC) - III YEAR	x	x	x	x	x	x	x	x	x	x	x	x
8	P.KASIM	BSC(MPC) - III YEAR	x	x	x	x	x	x	x	x	x	x	x	x
9	C.SEKHAR	BSC(MPC) - III YEAR	x	x	x	x	x	x	x	x	x	x	x	x
10	B.UMA MAHESWARI	BSC(BZC) - II YEAR	x	x	x	x	x	x	x	x	x	x	x	x
11	B.VEERA LAKSHMI	BSC(BZC) - II YEAR	x	x	x	x	x	x	x	x	x	x	x	x
12	B.VIJAY	BSC(BZC) - II YEAR	x	x	x	A	x	x	x	x	A	x	x	x
13	J.AMPAIAH	BSC(MPC) - II YEAR	x	x	x	x	x	x	x	A	x	x	x	x
14	C.BHASKAR	BSC(MPC) - II YEAR	x	A	x	x	x	x	x	x	x	x	x	A
15	N.GANESH NAIDU	BSC(BZC) - II YEAR	x	x	x	x	A	A	x	x	x	x	x	x
16	P.AJARUDDIN	BSC(BZC) - II YEAR	x	x	A	x	x	x	A	x	x	x	x	x
17	P.TRIVENI	BSC(BZC) - II YEAR	x	x	x	x	x	x	x	x	x	x	x	x
18	A.ROOPA	BSC(BZC) - I YEAR	x	x	x	x	x	x	x	x	x	x	x	x
19	G.SANDHYA	BSC(BZC) - I YEAR	x	x	x	x	x	x	x	x	x	x	x	x
20	MAIMUN	BSC(BZC) - I YEAR	x	x	x	x	x	A	x	x	x	x	x	x

	13	14	15	17	18	19	20	22	24	25	26	27	28	29	$\frac{2}{3}$ $\frac{2}{28}$	3	4	5
1	x	x	x	x	x	x	A	x	x	x	x	x	x	x	x	x	x	A
2	x	x	x	A	x	x	x	x	x	A	x	x	x	x	x	x	x	x
3	x	A	x	x	x	x	x	x	x	x	x	A	x	x	x	x	x	x
4	A	x	x	x	x	x	x	A	A	x	x	x	x	x	x	x	x	x
5	x	x	x	x	A	x	x	x	x	x	A	A	x	x	x	x	x	x
6	x	x	x	x	x	x	x	x	A	x	x	x	x	A	A	x	x	x
7	x	x	A	A	x	x	x	x	x	x	A	x	x	x	x	x	x	x
8	x	x	x	x	x	A	x	A	x	x	x	x	A	x	x	x	A	x
9	x	A	A	x	x	x	x	x	x	A	A	x	x	x	x	x	x	x
10	x	x	x	x	A	x	x	A	x	x	x	x	A	A	x	x	x	x
11	A	x	x	x	A	x	x	x	x	A	x	x	x	x	x	x	A	x
12	x	x	x	x	x	A	A	x	x	x	x	A	x	x	x	x	x	A
13	A	x	x	x	A	x	x	x	x	A	x	x	x	x	x	x	A	x
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18	x	x	x	x	A	x	x	x	x	x	A	x	x	x	x	x	x	x
19	x	x	x	x	x	x	A	x	x	A	x	x	x	x	x	x	x	x
20	A	x	x	x	x	x	x	x	A	A	x	x	x	x	x	x	A	x

	22	23	24	25	27	28	29	30	31	$\frac{1}{2}$ 25	3	4	5	6	7	10	11	12
1	x	x	x	A	x	x	x	x	x	A	x	x	x	x	x	x	x	x
2	x	x	x	x	x	x	A	A	x	x	x	x	x	x	x	x	A	x
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4	x	x	x	x	A	x	x	A	x	x	x	x	x	x	x	x	A	x
5	A	x	x	x	x	x	x	A	A	x	x	x	x	x	x	x	x	x
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8	x	x	x	A	x	A	A	x	x	x	x	x	x	x	A	x	x	x
9	x	x	x	x	x	x	x	x	x	A	x	x	x	A	A	x	x	x
10	A	A	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	A
11	x	x	A	x	x	x	A	x	x	x	x	A	x	x	x	x	A	x
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17	x	x	A	x	x	x	A	x	x	x	x	x	x	x	x	x	x	x
18	x	x	x	x	x	x	x	x	x	A	x	x	A	x	x	x	x	x
19	x	A	x	x	A	x	x	x	x	x	x	x	x	x	x	x	x	A
20	x	x	x	x	x	x	A	x	x	A	x	x	x	A	x	x	x	x

SML.GOV.T.DEGREE COLLEGE,YEMMIGANUR

Department of Chemistry

Certificate Course:Water Analysis

Syllabus-2019-2020


- Chapter:1 Basics Concepts
Source-Physical chemical properties-structure of Water-Hard and Soft
Water-Temporary hardness-Permanent hardness
- Chapter:2 Technology of Water
Methods for the removal of temporary hardness of water
(a).Boiling (b). Clarkes process
Permmanent hardness of Water
(a).Permtit process (b).Ion-Exchange method
Disadvantages of hard water
- Chapter:3 Water pollution
Causes and Effects of Water pollution-Water pollutants-Flourieds-
Organic pollutants-oil pollution-Eutrophication-Defluoridation
techniques for drinking water-(a).Activated Carbon method (b).Ion-
exchange method-(c).Nalgonda technique

Practicals

- 1.Measurement of hardness of Water in different area water
- 2.Estimation of chloride,Flouride,calicium,Magnesium and PH Values

Reference Books

1. Chemistry of Engineering Materials by C.P. Murthy, C. V. Agarwal and A. Naidu
B. S. PublicationHyderabad
2. Engineering Chemistry by J. C. Kuriacose and J. Rajaram, Tata McGraw-Hill Co.
New-Delhi.
3. Fundamentals of Electrical Engineering by Sahdev, Uneek Publication, Jalandhar
4. Basic Electrical Engineering by PS Dhogal, Tata McGraw Hill Education Pvt. Ltd.,
New Delhi
5. Electrical Science by VK Mehta, S Chand and Co., New Delhi


(R. NAGARAJABETTY)

MATERIAL FOR WATER ANALYSIS

INTRODUCTION

Water is one of the most important of all natural resources known on earth. It is important to all living organisms, most ecological systems, human health, food production and economic development. The safety of drinking water is an on going concern within the global village. Traditionally, the safety of potable water supplies has been controlled by disinfection, usually by chlorination and coliform population estimates. However, it has been reported that coliform-free potable water may not necessarily be free of pathogens.

Many congenital diseases such as goiter and cancer have been associated with presence of high concentration of a chemical or its inadequate supply in water. Low concentration of iodine in *Homo sapiens* results in goiter. Infants have been considered as a potential high risk group to the toxic effects of sodium from drinking water. Currently, about 20% of the world's population lacks access to safe drinking water, and more than 5 million people die annually from illness associated with safe drinking water or inadequate sanitation. If everyone had safe drinking water and adequate sanitation services, there would be 200 million fewer cases of diarrhoea and 2.1 million fewer deaths caused by diarrhoeal illness each year. Biofilms in drinking water distribution system has generated health concerns. Biofilms are coating of organic and inorganic materials in pipes that can harbor, protect and allow the proliferation of several bacterial pathogens, including *Legionella* and *Mycobacterium avium complex* (MAC). Factors that affect bacterial growth on biofilms include water temperature, type of disinfectant and residual concentration, biodegradable organic carbon level, degree of pipe corrosion and treatment/distribution system characteristics. Chloramines are considerably more effective than chlorine for controlling legionella in biofilms distribution system deficiencies linked to a number of water born disease outbreaks.

Amazingly, current drinking water standards don't even require testing for any of the more than 7,000 pharmaceutical compounds being prescribed; pharmaceutically active compounds such as analgesics, antibiotics, antiepileptics, anti-rheumatics, beta blockers, chemotherapeutics, steroid hormones and X-ray contrast media have been detected in tap water in Europe and Americas. As water is one of the most important compounds of the ecosystem, but due to increased human population, industrialization, use of fertilizers in the agriculture and man-made activity. The natural aquatic resources are causing heavy and varied pollution in aquatic environment leading to pollute water quality and depletion of aquatic biota. It is therefore necessary

that the quality of drinking waters should be checked at regular time of interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases.

Water is one of the principal natural resource for the survival of mankind. With the ever increasing population and simultaneously decrease of surface water resources, groundwater resources have become more important. In our country, more than 60 percent of the irrigation requirements and 85 percent of the drinking water supplies are dependent on groundwater. The constitution of India through the provisions of Article 47 guaranteed the states to provide clean drinking water improve public health. The constitutional jurisprudence of the country developed by the judiciary has placed drinking water as a derivative right within the purview of right to life under Article 21. Since independence various programmes have been undertaken by the government to provide water to the rural habitations. A number of water quality parameters are measured to determine water quality. These parameters include physical properties like pH, colour, turbidity, suspended solids, temperature, conductivity, odour etc. Chemical properties like COD, BOD, total nitrogen, total phosphorus, total pesticides etc. Biological properties include total coliform bacteria, fecal coliform counts, faecal streptococci counts, salmonella counts etc.

The chemical attributes that are being tested are as follows:-

pH

Total alkalinity

Calcium hardness

Electrical Conductivity

Chloride

Dissolved Oxygen

Biological Oxygen Demand

Chemical Oxygen Demand

Total Dissolved Salts

Total Suspended Salts

Hardness of water

Hardness is defined as the concentrations of calcium and magnesium ions expressed in terms of calcium carbonate. These minerals in water can cause some everyday problems. They react with soap and produce a deposit called *soap curd* that remains on the skin and clothes and, because it is insoluble and sticky, cannot be removed by rinsing.

Hard water may also shorten the life of plumbing and water heaters. When water containing calcium carbonate is heated, a hard scale is formed that can

plug pipes and coat heating elements. Scale is also a poor heat conductor. With increased deposits on the unit, heat is not transmitted to the water fast enough and overheating of the metal causes failure. Build-up of deposits will also reduce the efficiency of the heating unit, increasing the cost of fuel.

Types of Hardness

Soft water: It lathers with soap. Water which is obtained from the rains is soft water. This water is suitable for household purposes for example laundry and cleaning.

Hard water: It is known as hard water because of the presence of salts of calcium and magnesium. Hard water does not lather with soap instead forms a precipitate

There are two types of water hardness, temporary and permanent.

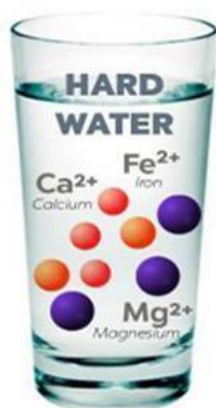
Temporary Hardness is due to the bicarbonate ion, HCO_3^- , being present in the water. This type of hardness can be removed by boiling the water to expel the CO_2 , as indicated by the following equation:



Permanent hardness is due to calcium and magnesium nitrates, sulphates, and chlorides etc. This type of hardness cannot be eliminated by boiling.

Water supply classification	
Hardness	Concentration of Calcium carbonate (mg/L)
Soft Water	0 to 75
Medium Hard Water	75 to 150
Hard Water	150 to 300
Very Hard Water	over 300

HARD WATER

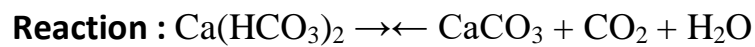


The hardness of Water and its Treatment

Removal of Temporary Hardness

By Boiling:

Soluble bicarbonates are converted into insoluble carbonates which are removed by filtration.



By Clarks Method:

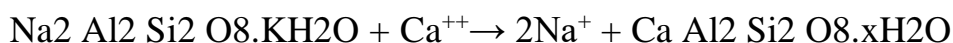
Calcium hydroxide is Clark's reagent. It removes the hardness of water by converting bicarbonates into carbonate.



Removal of Permanent Hardness of Water

Gan's Permutit Method:

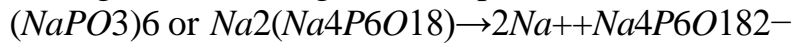
- Permutit is a manmade zeolite. sodium aluminum ortho silicate known as permutit or zeolite The chemical formula of a zeolite is $\text{Na}_2 \cdot \text{Al}_2\text{O}_3 \cdot n\text{SiO}_2 \cdot x\text{H}_2\text{O}$. Zeolite is made up of micro-porous minerals which have the capacity of exchanging ions. Hence zeolite is used to removes the hardness of the water because the zeolite contains Sodium (Na) and Aluminium (Al) which makes the water soft in nature.
- Calcium (Ca) and Magnesium (Mg) is mainly responsible for the hardness of the water. A permutit is packed into the reservoir from which the hard water is allowed to pass. When the water passes through the permutits, exchange of ions takes place i.e. Calcium and Magnesium is replaced by the Sodium and Aluminium



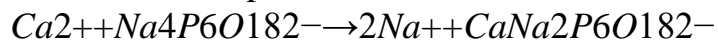
Calgon's Process:

In this method..Calgon is a trade name of a complex salt. sodiumhexametaphosphate ($(NaPO_3)_6$) known as Calgon . It is used for softening hard water. The hardness in water is removed by the adsorption of Ca^{++} and Mg^{++} ions

Calgon ionizes to give a complex anion:



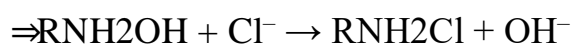
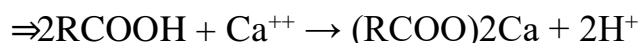
The addition of Calgon to hard water causes the calcium and magnesium ions of hard water to displace sodium ions from the anion of Calgon.



This results in the removal of calcium and magnesium ions from hard water in the form of a complex with Calgon. The water is softened and sodium ions are released into water

Ion Exchange Resin Method:

In this method, the permanent hardness of water is removed by using resins. Ca^{++}/Mg^{++} ions are exchanged with Cl^- , SO_4^{2-} ions are exchanged with anion exchange resin (RNH_2OH). Demineralized water is formed in this process.



Harmful Effects of Hard Water

Some of the most common signs of hard water include:

- Linens and clothes look dull and feel rough.
- Ugly stains on white porcelain and scale buildup on faucets
- Low water pressure from showers due to clogged pipes.
- Chalky, white residue or spots appear on dishes.
- Strains appearing in the shower.

VARIOUS METHODS FOR DEFLUORIDATION

Fluoride is anionic form of fluorine. Geological formation is the main source of fluoride in the groundwater. It is well known that small supplies of fluoride ion (1 ppm) are useful in preventing tooth decay and higher intakes (>1.5 ppm) can be injurious for human health (like mottled teeth, dental and bone fluorosis). As per EPA [1] at levels markedly over 1.5 mg/l an inverse effect occurs and mottling of teeth (or severe damage at gross levels) will arise.

For this reason there is a constraint on fluoride levels, the effects of which vary with temperature. Although a lot of methods have been developed to be removing fluoride from ground water

II

The removal of fluoride from ground water has been many attempts over the years, using a wide variety of material giving various efficiencies.

Following are the various methods.

1. Nalgonda Technique
2. Activated Carbon
3. Sulphonated coal
4. Magnesium compound
5. Iron and aluminium salt
6. Alumina and Iron Oxide
7. Alumina and Calcium minerals
8. Red Mud
9. Clays and Soil
10. Bioadsorbent
11. Membrane bioreactor technology
12. Aluminium oxide coated bauxite (AOCB)
13. Aluminium oxide coated charcoal (AOCC)
14. Reverse Osmosis and Electro dialysis
15. Fill and draw technique for small communities
16. Bone char
17. Poly Aluminium Hydroxy Sulphate (PAHS)

The de-fluoridation methods are divided into three basic types of mode of action

1. Based on some kind of chemical reaction with fluoride – Nalgonda technique
2. Based on adsorption process- Bone Charcoal, Processed bone, tricalcium phosphate, activated carbon, activated magnesia, tamarind gel, serpentine, activated alumina, plant material, burnt clay.
3. Based on ion- exchange process- Anion/ Cation exchange resins

Brief discussion on above methods-

1. The Nalgonda technique employs flocculation principal. This technique is a combination of several unit operations and the process involves rapid mixing, chemical interaction, flocculation, sedimentation, filtration, disinfection and sludge concentration to recover water and aluminium salts. Hydrated aluminium salts a coagulant commonly used for water treatment is used to flocculate fluoride ions in the water. Since the processed best carried out under alkaline condition, lime is added. For the disinfection bleaching powder is added. After through stirring, the chemical elements coagulant in to flocs and settle down in the bottom.

2. Surface adsorption retains a major place in de-fluoridation research and practice because of its general greater accessibility and lower cost. The nature of adsorption of fluoride on some adsorbents especially clays which contain oxides of iron, aluminum and silicon has been reviewed by Puka (2004) a background for his own experimental studies to improve the understanding of fluoride-adsorbent interactions. Theoretically, the adsorption of fluoride on the solid particles normally takes three essential steps.

When aluminium and iron (III) hydroxides are co-precipitated from chloride mixture in equal-molar quantities using ammonia, the resulting mixed hydroxide after aging and drying, is a better adsorbent for fluoride than either aluminum hydroxide or iron (III)

3. For Small communities (200 to 2000), a defluoridation plant of fill and drawtype is useful. The plant consists of a hopper-bottom cylindrical tank (Depth 2m). The diameter depends upon how much water should treat. In same vessel of mixing, flocculation and sedimentation are performed with stirring mechanism, which can be either hand operated or power driven. Raw water is pumped to the unit and required quantity of alum; lime and bleaching powder are added.

The contents are stirred for 10 min and allowed to settle for 1-2 hours.

The settled sludge is discarded and the defluoridated supernatant is filtered and supplied through stand posts

4. Activated alumina used in domestic defluoridation plant lunched by UNICEF in rural India

5. Carbon-based biomolecules very effective in defluoridation like, *Phyllanthus Emblica* (Indian Gooseberry), active seeds and bark of trees and bone charcoal. Prepared adsorbent shows enchanted removal of fluoride by 82.1 % at equilibrium contact time of 15 min.

6. Red mud (Iron and Aluminium oxides) with adsorbent has been extensively adsorbent. The raw pots are subjected to heat treatment as in the case of brick production. Hence the mud pot also will act as an adsorbent media

7. A polymeric aluminum compound, poly-aluminium-hydroxy-sulphate (PAHS) is found to require less flocculation time and settling time. Detention time of 20 to 30 minutes will suffice for complete settlement of all flocks. Cost of PAHS is much less than the alum.

8. Precipitation methods are based on the addition of chemicals (coagulants and coagulant aids) and the subsequent precipitation of a sparingly soluble fluoride salt as insoluble fluorapatite.

9. Bone char (adding calcium chloride (CaCl_2) and monosodium phosphate (NaH_2PO_4) to the water the precipitates of fluorapatite and calcium fluoride) in defluoridation is the method of contact precipitation. In bone char method the chemical added water pass through bone char and get defluorinated water

10. The membrane bioreactor (MBR), an innovative combination of membrane technology and biological process

For waste water treatment, has been exhibiting great advantages over the conventional activated sludge (CAS) process owing to its preponderantly higher efficiency for solid-liquid separation than that of a secondary sedimentation tank

11. Aluminum oxide coated bauxite (AOCB) and aluminum oxide coated charcoal (AOCC) as versatile and potential fluoride adsorbents

CONCLUSION

Almost 19 states of India is affected due to the presence of fluoride in ground water. Due to fluoride toxicity are mild to severe dental fluorosis, skeletal fluorosis, genu valgum, crippling fluorosis in human body. Many cattle's are affected by fluoride. A mini review on defluoridation of water has been presented with variety of methods. Adsorption (Conventional technique) with different adsorbents in the fields of fluoride removal has been reviewed. These techniques should also apply for cattle's water feeding. Nalgonda technique is the most suitable technique for Indian rural communities' so far.

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By Mark M. Benjamin, Desmond F. Lawler 904 pages June 2013
2. **Harry's Cosmeticology 9th Ed. Water Technology & Water Treatment**
Fireworks Technology
3. Water Quality and treatment, A hand book of public water supplies. 3rd edition, McGraw Hill Book, Company. 65

4. David M. Nielson, ed (1979). Practical handbook of water quality monitoring, In Biological Indicators of water quality, John Wiley and Sons, N.Y

PRACTICALS

ESTIMATION OF HARDNESS OF WATER BY EDTA METHOD

Experiment No.

Date:.....

Aim: To estimate the amount of total hardness present in the given sample of water by EDTA titration method.

Apparatus required: 50 ml Burette, 20 ml Pipette, 250 ml Conical flask, 100 ml Beaker, 250 ml beaker, Glass funnel.

Reagents: EDTA solution, Standard CaCO_3 solution, Eriochrome Black-T indicator, Buffer solution.

Theory: EDTA (Ethylenediamine tetra acetic acid) forms colorless stable complexes with Ca^{2+} and Mg^{2+} ions present in water at $\text{pH} = 9-10$. To maintain the pH of the solution at 9-10, buffer solution ($\text{NH}_4\text{Cl} + \text{NH}_4\text{OH}$) is used. Eriochrome Black-T (E.B.T) is used as an indicator.

The sample of hard water must be treated with buffer solution and EBT indicator which forms unstable, wine-red colored complex s with Ca^{2+} and Mg^{2+} present in water.

Procedure

1. Standardization of EDTA

- (i) Pipette out 20 ml of standard hard water into a conical flask.
- (ii) Add 5 ml of buffer solution and few drops of Eriochrome Black-T. The indicator, which is originally blue color would acquire a wine-red color.
- (iii) Titrate with EDTA solution taken in the burette, till the wine red color changes to blue which is the end point.

Let the burette reading of EDTA be V_2 ml.

1. Standardization of EDTA

SNO	Vol. of Hard water taken (ml)	Burette Reading		Vol. of EDTA Consumed ml
		Initial	Final	
1				
2				
3				

$$M_1V_1 = M_2V_2$$

Where, M_1 = Molarity of standard hard water

V_1 = Volume of standard hard water in conical flask

M_2 = Molarity of EDTA

V_2 = Volume of EDTA consumed (burette reading)

2. Determination of Total hardness

Repeat the above titration method for sample hard water instead of standard hard water. Let the burette reading of EDTA be V_3 ml.

Determination of Total hardness

SNO	Vol. of Hard water taken (ml)	Burette Reading		Vol. of EDTA Consumed ml
		Initial	Final	
1				
2				
3				

$$M_2V_2 = M_3V_3$$

Where, M_3 = Total hardness of sample water

V_1 = Volume of sample hard water in conical flask

3. Determination of Permanent hardness

Take 100 ml of sample hard water in 250 ml beaker. Boil it to remove temporary hardness to about half of this volume and cool to room temperature. Filter through filter paper to remove insoluble CaCO_3 and MgCO_3 . Make up the volume to the original 100 ml by adding distilled water. Now pipette out 20 ml of this solution into a clean conical flask. Then repeat the process of titration steps as mentioned above. Let the burette reading of EDTA be V_4 ml.

Determination of Permanent hardness

SNO	Vol. of Hard water taken (ml)	Burette Reading		Vol. of EDTA Consumed ml
		Initial	Final	
1				
2				
3				

$$M_2V_2 = M_4V_4$$

Where, M_4 = Permanent hardness of sample water

V_4 = Volume of sample hard water in conical flask

Note: Multiply M_3 and M_4 with 105 to convert hardness into parts per million (ppm).

4. Determination of Temporary hardness

Temporary hardness = Total hardness – Permanent hardness

5. Result: The hardness of the given water sample has been found to be as follows:

Total hardness = _____ ppm

Permanent hardness = _____ ppm

Temporary hardness = ----- ppm

CODE: WA/Chem-19-20

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DEPARTMENT OF CHEMISTRY

CERTIFICATE COURSE IN WATER ANALYSIS

QUESTION PAPER

TIME: 2 HOURS MAX MARKS:50

SECTION -A

Answer any SIX questions

6x5=30

1. Water is Universal solvent Justify?
2. Explain the temporary hardness ?
3. Define BOD and DOD ?
4. Explain the Eutrophication ?
5. Write any three physical and chemical properties ?
6. Explain the Ion-Exchange method ?
7. Write brief note on Acid rains ?

SECTION-B

Answer any TWO questions

2x10=20

- 8 What is permanent hardness ? Explain the Permitt process?
- 9 .Explain the water pollution ?
- 10 .Explain the any two defluoridation methods ?

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AWARD LIST-2019-20 Date:08-03-2020

S.no	Regd - No	Name of the student	Theoty (Max.50)	Practicals (Max.50)	Grade
1	173049012	R.THULASI	42	45	A
2	173049003	B.GOWRAMMA	44	45	A
3	173049013	S.BASHA	38	42	A
4	173049009	M.DURGAPPA	35	36	B
5	173049014	S.SHASHAVALI	32	38	B
6	173049038	B.VISHNU SWETHA	45	46	A
7	173049036	B.NARASAMMA	43	47	A
8	173049041	P.KASIM	42	45	A
9	173049040	C.SEKHAR	43	45	A
10	18358049004	B.UMA MAHESWARI	44	42	A
11	18358049005	B.VEERA LAKSHMI	41	43	A
12	18358049006	B.VIJAY	33	32	B
13	18362049002	J.AMPAIAH	38	37	A
14	18362049001	C.BHASKAR	32	40	B
15	18358049012	N.GANESH NAIDU	24	25	C
16	18358049014	P.AJARUDDIN	26	28	B
17	18358049016	P.TRIVENI	42	42	A
18	19358049002	A.ROOPA	36	42	A
19	19358049017	G.SANDHYA	37	39	A
20	19358049042	MAIMUN	37	38	A

A Grade >75% ,B Grade >50%,C Grade <50%

Dr.K.Nagaraja Setty

Coordinator

Innugural function -Certificate Course 02-01-2020



Addressing by Dr.K.Nagaraja setty, Coordinator ,Certificate course



Message by Dr.V.V.S.Kumar garu, principal



Gathering the students

Classes 02-01-2020 –05-03-2020



Explain the Water Analysis certificate course by Dr. K. Nagaraja Setty, Incharge of the dept



Explain the Water pollution by S. Fakrunnisa Begum, Lec. in Zoology



Expalin the Hardness of Water by Dr.S.Shamshad,Lec.in Zoology



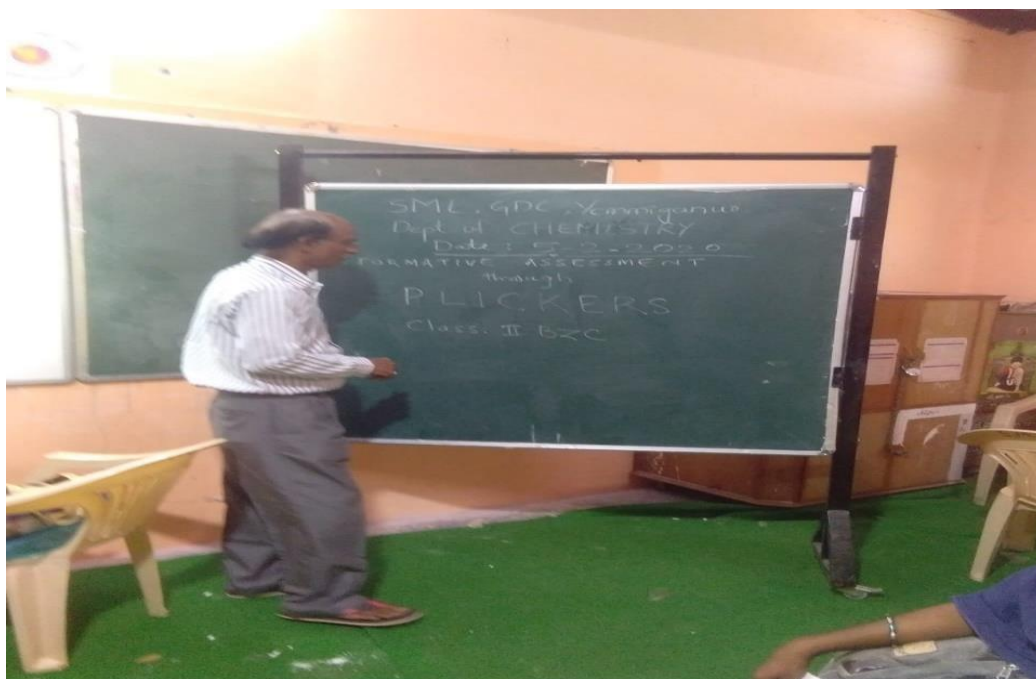
Explain the removal methods of permanent hardness
by Dr.K.Nagaraja Setty,lec.in Chemistry



Explain the disadvantages of water pollution and control measures by Dr.M.Suseelamma,Lec.in Botany



Explain the defluoridation methods by J.Kalpana
Lec.inChemistry,KVRGDC(W),Kurnool



Explain the Water management by srinivasa ganapa

CERTIFICATES DITRIBUTION—08-03-2020(VALIDICTORY)



Addressing by Dr.K.Nagaraja Setty,Coordinator



Message by Dr.K.Mahaboob Basha,Principal



Certificate distributed by Dr.K.Mahaboob Basha,Principal



Certificate distributed by Dr.M.Suseelamma,IQAC Coordinator



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1.Name of the student:R.THULASI

2. Class & group : III BZC

3.Regd No :173049001

4. Opinion :1.Excellent 2. Good 3. Satisfactory

5. Signature of the student:

1.Name of the student: B. Gowramma

2. Class & group : III BZC

3.Regd No :173049003

4. Opinion : 1.Excellent 2. Good 3. Satisfactory

5. Signature of the student:

1.Name of the student:S.Basha

2. Class & group : III BZC

3.Regd No :173049013

4. Opinion :1.Excellent 2. Good 3. Satisfactory

5. Signature of the student:

1.Name of the student:M.Durgappa

2. Class & group : III BZC

3.Regd No : 173049009

4. Opinion :1.Excellent 2. Good 3. Satisfactory

5. Signature of the student:

1.Name of the student:S.Shashavali

2. Class & group : III BZC

3.Regd No : 173049014

4. Opinion : 1.Excellent 2. Good 3. Satisfactory

5. Signature of the student:

1.Name of the student:B.Vishnu Swetha

2. Class & group : III MPC

3.Regd No : 173049038

4. Opinion :1.Excellent 2. Good 3. Satisfactory

5. Signature of the student:

1.Name of the student:B.Narasamma

2. Class & group :III MPC

3.Regd No : 173049036

4. Opinion :1.Excellent 2. Good 3. Satisfactory

5. Signature of the student:

1.Name of the student:P.Kasim

2. Class & group : III MPC

3.Regd No :173049041

4. Opinion :1.Excellent 2. Good 3. Satisfactory

5. Signature of the student:

1.Name of the student:C.Sekhar

2. Class & group : III MPC

3.Regd No : 173049040

4. Opinion : 1.Excellent 2. Good 3. Satisfactory

5. Signature of the student:

1. Name of the student: B. Uma Maheshwari

2. Class & group : II BZC

3.Regd No 18358049004

4. Opinion : 1.Excellent 2. Good 3. Satisfactory

5. Signature of the student:

1.Name of the student:B.Veera Lakshmi

2. Class & group : II BZC

3.Regd No : 18358049005

4. Opinion : 1.Excellent 2. Good 3. Satisfactory

5. Signature of the student:

1.Name of the student: B. Vijay

2. Class & group : II BZC

3.Regd No : 18358049006

4. Opinion : 1.Excellent 2. Good 3. Satisfactory

5. Signature of the student:

1.Name of the student: J. Ampaiah

2. Class & group : II MPC

3.Regd No : 18362049002

4. Opinion : 1.Excellent 2. Good 3. Satisfactory

5. Signature of the student:

1.Name of the student:C.Bhaskar

2. Class & group : II MPC

3.Regd No : 18362049001

4. Opinion :1.Excellent 2. Good 3. Satisfactory

5. Signature of the student:

1. Name of the student:N.Ganesh Naidu

2. Class & group : II BZC

3.Regd No 18358049012

4. Opinion :1.Excellent 2. Good 3. Satisfactory

5. Signature of the student:

1.Name of the student:P.Azaruddin
2. Class & group : II BZC
3.Regd No : 18358049014
4. Opinion : 1.Excellent 2. Good 3. Satisfactory
5. Signature of the student:

1. Name of the student:P.Triveni
2. Class & group : II BZC
3.Regd No : 18358049016
4. Opinion : 1.Excellent 2. Good 3. Satisfactory
5. Signature of the student:

1.Name of the student:A.Roopa
2. Class & group : I BZC
3.Regd No : 19358049002
4. Opinion : 1.Excellent 2. Good 3. Satisfactory
5. Signature of the student:

1. Name of the studentG.Sandhya
2. Class & group :I BZC
3.Regd No 19358049017
4. Opinion :1.Excellent 2. Good 3. Satisfactory
5. Signature of the student:

1.Name of the student:S.Maimun
2. Class & group : I BZC
3.Regd No : 19358049042
4. Opinion :1.Excellent 2. Good 3. Satisfactory
5. Signature of the student:

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Accredited with 'B' Grade by NAAC



Certificate COURSE in WATER ANALYSIS

This is to certify that Mr. /Miss **A.ROOPA** of I BZC with Registration No: **19358049002** has been trained in **WATER ANALYSIS Certificate Course** organised by Dept. of Chemistry SML. Govt. Degree College, Yemmiganur Kurnool(Dt) during the academic year **2019-2020** from **02-01-2020** to **05-03-2020**

Coordinator
(Dr.K.NAGARAJA SETTY)

Vice-Principal
(SRINIVASA GANAPA)

Principal
(Dr.K.MAHABOOB BASHA)

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Certificate COURSE in WATER ANALYSIS

This is to certify that Mr. /Miss **G.SANDHYA** of I BZC with Registration No: **19358049017** has been trained in **WATER ANALYSIS Certificate Course** organised by Dept. of Chemistry SML. Govt. Degree College, Yemmiganur Kurnool(Dt) during the academic year **2019-2020** from **02-01-2020 to 05-03-2020**

Coordinator
(Dr.K.NAGARAJA SETTY)

Vice-Principal
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Certificate COURSE in WATER ANALYSIS

This is to certify that Mr. /Miss *MAIMUN* of I BZC with Registration No: **19358049042** has been trained in **WATER ANALYSIS Certificate Course** organised by Dept. of Chemistry SML. Govt. Degree College, Yemmiganur Kurnool(Dt) during the academic year **2019-2020** from **02-01-2020** to **05-03-2020**

Coordinator Vice-Principal
(SRINIVASA GANAPA)

Principal
(Dr.K.MAHABOOB BASHA)

(Dr.K.NAGARAJA SETTY)

THANK YOU

BY

Dr.K.NAGARAJA SETTY

SRINIVASA GANAPA

DEPARTMENT OF CHEMISTRY