RAYAT SHIKSHAN SANSTHA'S

MAHATMA PHULE ARTS, SCIENCE AND COMMERCE COLLEGE, PANVEL.

DISTRICT - RAIGAD, MAHARASHTRA. 410 206

Best College Award by University of Mumbai
Accredited at 'A' Grade by NAAC (Third Cycle CGPA Score 3.18)
ISO 9001:2015 Certification by International Accreditation Forum
Recipient of DBT Star College Grant

DEPARTMENT OF CHEMISTRY

MANUAL OF THE PRACTICALS CONDUCTED UNDER DBT-STAR COLLEGE SCHEME IN THE ACADEMIC YEAR: 2022-23

RAYAT SHIKSHAN SANSTHA'S

MAHATMA PHULE ARTS, SCIENCE AND COMMERCE COLLEGE, PANVEL, DIST-RAIGAD

ACADEMIC YEAR: 2022-23

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Rayat Shikshan Sanstha's
Mahatma Phule Arts, Science and Commerce College,
Panvel, District- Raigad (Maharashtra)
DEPARTMENT OF CHEMISTRY
EXPERIMENT UNDER DBT STAR COLLEGE SCHEME
Academic Year: 2022-23

Class : F.Y.B. Sc. **Date:**
Name of the Student: **Roll Number:**

AIM : RAPID DETECTION OF CHEMICAL ADULTERANTS OF MILK (UREA BY COLORIMETER)

THEORY: Urea is a natural constituent of milk and it forms a major part of the non-protein nitrogen of milk. Urea concentration in milk is variable within herd. Urea is one of the ingredients of synthetic milk along with caustic soda, detergent, sugar and foreign fats. Adulteration of natural milk with synthetic milk increases the level of urea to such an extent that on consumption of this adulterated milk causes toxicological hazards. Estimation of urea concentration in milk may serve as a tool for checking the menace of adulteration of natural milk with synthetic milk.

REQUIREMENTS:

- **INSTRUMENT/APPARATUS/GLASSWARES :**

Colorimeter, Weighing balance, 250 ml Glass beaker, 100 ml Volumetric flask, 10 ml Glass cylinder, Glass rod, Glass dropper.

- **Reagent(s) required:**

i. Dimethylaminobenzaldehyde (DMAB)
ii. Concentrated HCl
iii. Trichloroacetic acid (TCA)
iv. Anhydrous potassium di-hydrogen orthophosphate (KH_2PO_4) and anhydrous di-potassium mono-hydrogen orthophosphate (K_2HPO_4)
v. Urea.

- **Reagent(s) preparation:**

i. 1.6% (w/v) DMAB reagent: Dissolve 1.6 g DMAB in 100 ml ethyl alcohol and add 10 ml concentrated HCl.

ii. Trichloroacetic acid (TCA): 24% (w/v, aq.).

iii. Phosphate buffer (pH 7.0): Dissolve 3.403 g anhydrous potassium di-hydrogen orthophosphate (KH_2PO_4) and 4.355 g anhydrous di-potassium mono-hydrogen orthophosphate (K_2HPO_4) in distilled water and make the volume to one liter with distilled water.

iv. Diluting reagent: Equal volumes of 24% (w/v) TCA and phosphate buffer (pH 7.0) are mixed to make the diluting reagent.

v. Standard urea solution (1 mg/ml): Weigh 100 mg of AR Grade quality urea and dissolve in phosphate buffer (pH 7.0). Make up the volume to 100 ml with the above phosphate buffer.

PROCEDURE:

A. Take 10 ml of milk sample and add 10 ml of 24% TCA in 50 ml glass stoppered bottle. Mix the content and filter through Whatman filter paper grade 42.

B. Take 5 ml of the above filtrate in a test tube and add 5 ml of 1.6% DMAB reagent..

C. Take the absorbance of the yellow colour so obtained at 425 nm in a spectrophotometer against reagent blank.

D. For reagent blank take 5 ml of diluting reagent and add 5 ml of 1.6% DMAB reagent.

E. For standard curve preparation, take different concentration of urea solution (0.1, 0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6 mg) separately in different test tubes and make the total volume to 5 ml in each case with diluting reagent. Then add 5 ml of 1.6% DMAB reagent to each test tube to develop yellow colour. Take the absorbance at 425 nm against the reagent blank.

F. Draw a standard curve by plotting the absorbance along Yaxis and urea concentration (in mg) along X-axis.

CALCULATION AND OBSERVATION TABLE:-

Standard amount of Urea in mg	Volume of Diluting Reagent	Volume of 1.6 % DMAB Reagent	Absorbance
Blank	5 ml	5 ml	
0.1	5 ml	5 ml	
0.2	5 ml	5 ml	
0.4	5 ml	5 ml	
0.6	5 ml	5 ml	
0.8	5 ml	5 ml	
1.0	5 ml	5 ml	
1.2	5 ml	5 ml	
1.4	5 ml	5 ml	
1.6	5 ml	5 ml	
Sample (5 ml Filtrate)	-	5 ml	

Calibration Curve: - Plot the calibration curve of concentration of urea (x-axis) corresponding to absorbance (y-axis)

Calculation:- Read from the graph the concentration of urea (mg) corresponding to absorbance of the sample. Say the absorbance for the sample be X and the corresponding concentration from the standard curve for urea is = Y mg

RESULT:

5 ml of filtrate from sample has = Y mg urea

REFERENCES:

i) IS: 1479. (1960). Methods of test for dairy industry. Part I. Rapid examination of milk. Bureau of Indian Standards, New Delhi.

ii) Bector, B.S., Ram, M. and Singhal, O.P. (1998). Rapid platform test for the detection/determination of added urea in milk. Indian Dairyman, 50(4): 59-62.

iii) Kavita, P. (2000). Studies on the levels of urea in milk. M. Sc. Thesis NDRI Karnal.

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DEPARTMENT OF CHEMISTRY
EXPERIMENT UNDER DBT STAR COLLEGE SCHEME
Academic Year: 2022-23

Class : F.Y.B. Sc. **Date :**
Name of the Student: **Roll Number :**

TITLE : PHYSICO-CHEMICAL STUDY OF WATER SAMPLE OF NEARBY WATER BODIES

AIM : To determine the turbidity of the given sample of water by using the Nephelometer / turbidimeter.

THEORY : In water supply turbidity data information can be helpful to know the effectiveness and adequacy of the treatment delivered with various coagulants and the necessary doses. According to IS 10500:1991 the maximum limit of turbidity is 10 NTU and up to 5 NTU water is acceptable and above 5 NTU the consumer acceptance decreases. Turbidity is an indicator of poor treatment plant efficiency, filter run timing, contamination of distribution system, and can fix the measurements of coagulants. Turbidity is depended on the comparison of the intensity of light scattered by the sample under characterized conditions with the power of the light scattered by a standard reference suspension under similar conditions. The turbidity of the sample is thus estimated from the amount of light scattered by the sample taking a reference with standard turbidity suspension. The higher the power of scattered light the more is the turbidity.

REQUIREMENTS:

- **INSTRUMENT/APPARATUS/GLASSWARES :**
  Nephelometer / turbidimeter, Weighing balance, 250 ml Glass beaker, 100 ml Volumetric flask, 10 ml Glass cylinder, Glass rod, Glass dropper.

- **REAGENTS:**
  - ***Turbidity free water***:-
    Generally, Distilled water is considered turbidity-free water for any test.
  - ***Stock turbidity solutions***:-

Solution 1:- For making solution dissolve 1.0 grams hydrazine suplate $(NH_2)_2.H_2SO_4$ in distilled water and dilute it to 100 ml.
Solution 2:- For the 2nd Solution Dissolve 10.0 grams hexamethylenetetramine $(CH_2)_6N_4$ in minimum quantity of distilled water and dilute it to 100 ml.
Solution 3:- Now, Mix each 5ml of solution 1 and solution 2 in 100ml flask and left it stand for at least 24 hrs., then dilute it to 100ml and mix thoroughly. The turbidity of this solution is 400 NTU.

- ***Standard Turbidity Solution***:- Take 10 ml of solution 3 in 100 ml volumetric flask and dilute it upto the mark with turbid free water. The turbidity of this suspension is 40 NTU.

PROCEDURE:

1. Set the instrument at 100 with 40 NTU standard suspension. In this case, every division on the scale will be equal to 0.4 NTU turbidity.
2. Shake thoroughly the sample, and keep it for some time to eliminate the air bubbles.
3. Put the sample in the nephelometer sample tube and find out the value on the scale.
4. If sample is suspected to have more turbidity (more than 40 NTU), dilute it so that turbidity values come below 40 NTU, and take the reading.

CALCULATION:-

- **Original/Undiluted sample:**

  Turbidity = Instrument reading x 0.4

  = ----------NTU

- **Diluted sample:**

  Turbidity = Instrument reading x 0.4 x Dilution factor*
  = ---------- x 0.4 x ----------

  = ---------- NTU

*(*Dilution factor will depend on the dilution of original sample having turbidity more than 40 NTU. For example. If Original sample is diluted to its half concentration by mixing equal volumes of original sample and distilled water then dilution factor will be 2.)*

RESULT :

The turbidity of the given sample of water is ----------NTU

REFERENCES :

1. Khopkar S.M. "*Enviromental Pollution: Monitoring And Control*" New age international limited publishers, Mumbai (2004).
2. APHA, AWWA, WPCF,*Standard methods for examination of water* 14 edition, American public health association, Washington, D.C. (2019).

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DEPARTMENT OF CHEMISTRY
ACADEMIC YEAR: 2022-23
EXPERIMENT UNDER DBT STAR COLLEGE SCHEME

Class : S.Y.B. Sc. **Date:** **Time:**
Name of the Student: **Roll Number:**

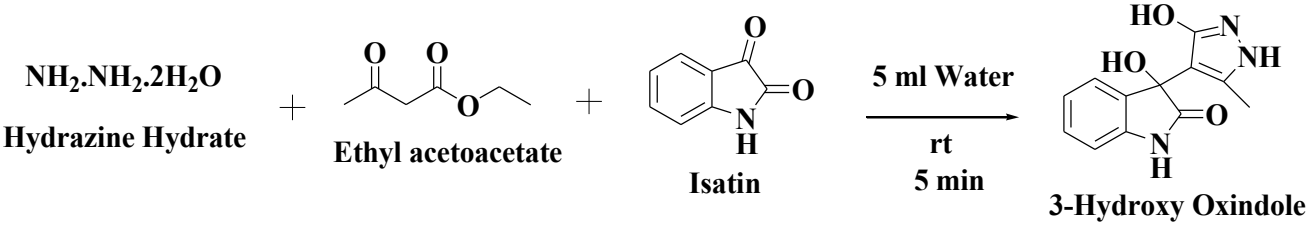
TITLE: GREEN SYNTHESIS OF DIVERSELY FUNCTIONLIZED OXINDOLE

AIM: Green Synthesis of 3-hydroxy oxindoles by using one pot, 3-component reaction of hydrazine hydrate, ethyl acetoacetate and Isatin in water.

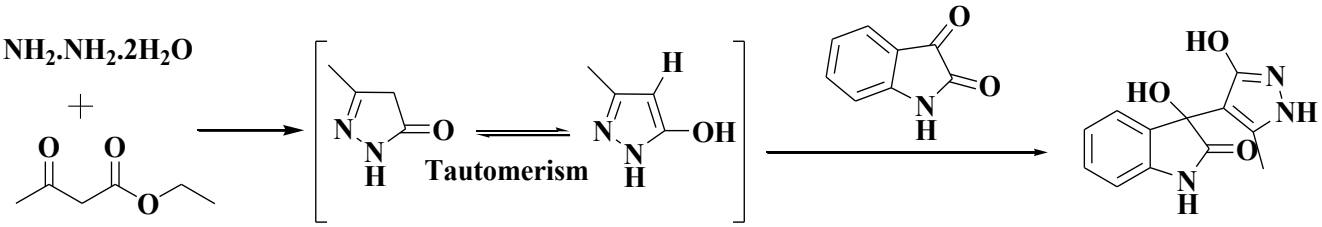
REQUIREMENTS: Hydrazine hydrate, Ethyl acetoacetate, Isatin, Distilled water, Test tube, Glass rod, funnel, Filter papers etc.

THEORY: The term "Green Chemistry" was coined by Paul Anastas in 1991. It is defined as "The invention, design and application of chemical products and processes to reduce or to eliminate the use and generation of hazardous substances". Goal of Green Chemistry is to create better, safer chemicals while choosing the safest, most efficient ways to synthesize them and to reduce waste. In the context of the Green Chemistry, now a day's use of Multi-component reactions (MCRs) for the synthesis of biologically imperative heterocyclic compound become highly important tool in organic synthesis. 3-Substituted 3-hydroxy oxindole is important molecular framework found in range of natural products and pharmaceutically important compounds. In this context, green synthesis of 3-hydroxy-3-(3-hydroxy-5-methyl-1H-pyrazol-4-yl)indolin-2-ones molecules by one pot, 3-component reaction of Hydrazine hydrate, Ethyl acetoacetate and Isatin using water at room temperature is desirable.

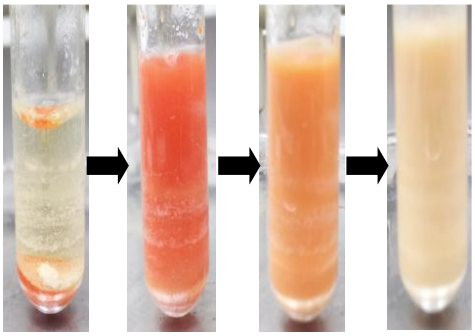
REACTION:



MECHANISM:



PROCUDURE:



1. In a Test tube, take 5 ml of distilled water.
2. To the above test tube, add 0.5 ml of Hydrazine hydrate, 0.5 ml of Ethyl acetoacetate and mix it well using glass rod. (*The test tube will become warm at this stage*)
3. Then add 0.5 gm of Isatin to the above solution.
4. Now mix it using glad rod till the buff white precipitate is formed.
5. Filter the precipitate, wash with 10 ml distilled water and dry it.
6. Measure the weight of the compound and record the melting point.

OBSERVATIONS:

Supplied weight of the reactant (Isatin) : ---------- gm (**A**)

Observed weight of the product 3-Hydroxy Oxindole) : ---------- gm (**B**)

Melting Point of Compound: ---------- °C (Expected 226-228 °C)

CALCULATIONS:

Theoretical Yield:

147 gm of Isatin = 245 gm of 3-Hydroxy Oxindole

So, **A** gm of Isatin = _____ gm of 3-Hydroxy Oxindole

$$\textbf{Theoretical Yield} = \frac{245 \times (A)}{147} = \frac{245 \times \_\_\_\_}{147} = \textbf{------ gm (C)}$$

Percentage Yield:

$$\textbf{Percentage Yield} = \frac{\text{Observed weight of Compound (B)}}{\text{Theoretical Yield (C)}} \times 100$$

$$\textbf{Percentage Yield} = \frac{(B)}{(C)} \times 100 = \frac{\textbf{----------}}{\textbf{----------}} \times 100$$

Percentage Yield = ---------- % (D)

RESULTS:

- **Observed Yield (B) = ---------- gm**
- **Theoretical Yield (C) = ---------- gm**
- **Percentage Yield (D) = ---------- %**
- **Melting Point = ----------°C**

Signature of the Student ***Signature of the Teacher***

***REFERENCES*:**

1. Thakur, P. B., Meshram, H. M. *RSC Advances* 4 (2014): 6019-6026
2. Thakur, P. B. *The Patent office Journal No, 52/2020 (201921024078)*

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DEPARTMENT OF CHEMISTRY
EXPERIMENT UNDER DBT STAR COLLEGE SCHEME
Academic Year: 2022-23

Class: S.Y.B.Sc. **Roll number:** **Date:**
Name of the student:

TITLE : ANALYSIS OF MICRONUTRIENTS OF SOIL SAMPLE.

Requirements: A Stock Solution of K containing 1 X 10-3 g/cm3 of the metal can be prepared by dissolving 0.477 g of KCl in 250 cm^3 of distilled water in standard measuring flask (i.e. Strength of stock solution is 1000 ppm.) Sample solution, Potassium Chloride, Distilled water, Flame Photometer, 250 & 100 cm^3 standard measuring flask, 10 & 25 cm3 calibrated pipette, 100 & 250 cm3 beaker etc.

Theory: Flame Photometer is concerned with the emission of radiation in flame by individual elements & correlation of the emission intensity with the concentration of these elements. It is also called as flame emission spectroscopy. Because of a flame to provide the energy of excitation to atoms introduced into the flame.

The sample is usually presented for analysis in the form of solution. It is transformed in to a mist of fine droplets & sprayed in to the flame in a reproducible & constant manner. The series of complex processes that occur in the flame being with the evaporation of the solvents vaporization of the solute & dissociation of the solute compounds. The excited atom which are unstable, quickly emit photons & return to lower energy state, eventually reacting the unexcited state. The measurements of emitted photon i.e.radition form the basis of flame photometry.

Procedure: (Calibration curve method)

1.Dilute 10 cm^3 of the supplied stock solution i.e.1000 ppm. concentration to 100 cm^3 in a standard measuring flask with distilled water. This gives standard solution of 100 ppm.

2. Dilute the supplied sample solution to 100 cm^3 in a standard measuring flask with distilled water.

3. Take six serially number 100 cm^3 standard measuring flasks.

4.Add 5, 10, 15, 20, & 25 of 100 ppm of K solution to the standard measuring flasks numbered from 1 to 5 Dilute each flasks to 100 cm^3 with distilled water.

5. Pipette out 10 cm^3 of the diluted sample solution of K in 100 cm^3 standard measuring flask & dilute up to the mark (flask No. 6)

6. Measure the emission intensity for each solution as described. Note the emission intensities of the different solution of known concentration & sample solution as shown in table.

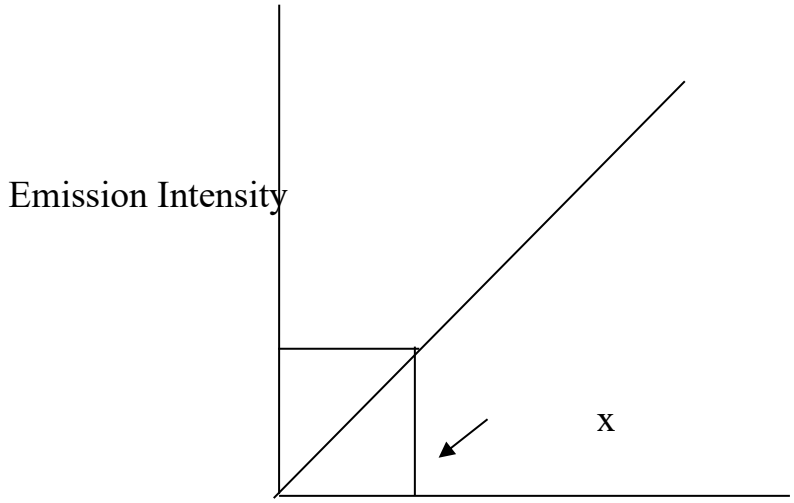
7. Plot the graph of concentration of solution (in ppm) against emission intensities. This forms the calibration curve.

8. With the help of emission intensity of the of the sample solution obtain the concentration of K from the calibration curve.

OBSERVATION TABLE:

Flask Numbers	Volume of standard solution in cm^3	Final volume of solution in cm^3	Concentration of solution in ppm.	Emission intensity (I)
1.	05	100	05	
2.	10	100	10	
3.	15	100	15	
4.	20	100	20	
5.	25	100	25	
6.	10.0(sample)	100	Unknown	

Graphs: For the concentration of calibration curve plot the graph of emission intensity for the solution against concentration of solution in ppm.



Where x = unknown concentration.

Calculations:

Concentration of K^+ ions in the given sample solution = x ppm.

Therefore, amount of K^+ ions in the given solution= x mg/L

Result: The amount of K^+ ions in the given sample solution = mg.

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DEPARTMENT OF CHEMISTRY
EXPERIMENT UNDER DBT STAR COLLEGE SCHEME
Academic Year: 2022-23

Class: S.Y.B. Sc. **Date:**
Name of the Student: **Roll Number:**

AIM: PREPARATION OF SANITIZER, SOAP, HANDWASH AND PERFUMES.

REQUIRMENTS:

Sodium lauryl ether sulphate (70%), Cocodiethanolomide, Cocomonoethanolomide, E.D.T.A.,Methyl paraben,perfumes,Stainless steel pot,burner,stirrer,dist. Water, measuring cylinder,digital balance etc.

THEORY:

Hand hygiene is one of the most important elements of infection control. Liquid hand wash is an anti-bacterial liquid that has an active substance used to inhibit, destroy, or render harmless the active bacteria on hands. Liquid hand washes are generally preferred over soaps due to ease of use and the ability of liquid soaps to maintain the skin's natural moistureuid hand wash is an anti-bacterial liquid that has an active substance used to inhibit, destroy, or render harmless the active bacteria on hands. Liquid hand washes are generally preferred over soaps due to ease of use and the ability of liquid soaps to maintain the skin's natural moisture.

PROCEDURE:

1. Weigh 225gm Sodium lauryl ether sulphate (70%).
2. Transfer in stainless steel pot. Add 15 ml Cocodiethanolomide in 200 ml of distilled water.
3. Stir well for 20 minutes(clockwise and anti-clockwise direction). Milky solution is obtained. (Say Pot A).
4. Take 200 ml distilled water add 10 g Cocomonoethanolomide, 1g E.D.T.A. and 1 g methyl paraben in stainless steel pot.
5. Heat the above mixture on burner upto dissolve properly. (Say pot B).
6. Mix the solution from Pot B into Pot A slowly. Mix it thoroughly.
7. Cool the reaction mixture at room temperature.
8. Add colour (as per choice).
9. Add 2 ml perfume (as per choice).
10. Keep the solution in container and place a stopper on it. Liquid soap is ready to use.

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EXPERIMENT UNDER DBT STAR COLLEGE SCHEME
Academic Year: 2022-23

Class : T.Y.B. Sc. **Date :**
Name of the Student: **Roll Number :**

AIM: SYNTHESIS OF ZINC OXIDE (ZnO) NANOPARTICLES USING THE HYDROTHERMAL METHOD

THEORY:

Nanomaterials are broadly defined as material that has at least one dimension less than 100 nm. Zinc Oxide (ZnO) is a wide band gap semiconductor material. Nanoparticles of zinc oxide with a size below 100 nm have a large surface area and high catalytic activity. The exact physical and chemical properties of zinc oxide nanoparticles depend on the different ways they are synthesized, size, morphology, etc. Zinc oxide nanoparticles are useful in a variety of industries, including paints, rubber, cosmetics, and wastewater treatment.

REACTION:

$Zn(NO_3)_2.6H_2O$ + NaOH ⟶ ZnO nanoparticles

REQUIREMENT:

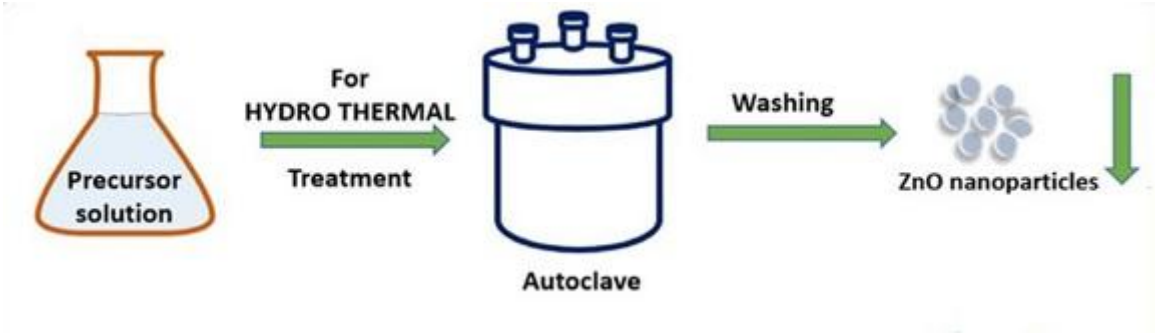
CHEMICALS: Zinc nitrate [$Zn(NO_3)_2.6H_2O$], sodium hydroxide [NaOH], distilled water.

INSTRUMENTS/APPARATUS/GLASSWARE: Autoclave, oven, beaker, glass rod, magnetic stirrer.

PROCEDURE:

(1) Take 20 mL of 0.5 M zinc nitrate solution in a 100 mL beaker.
(2) Add 20 mL of 5 M sodium hydroxide solution to another 100 mL beaker.
(3) Then after, the above NaOH solution is added dropwise to the zinc nitrate solution under continuous stirring until the P^H of the reactants/solution becomes 12.
(4) This solution mixture was transferred into a Teflon-lined sealed stainless-steel autoclave and kept in an oven at a temperature of 100°C for 2 h.
(5) After the completion of the reaction, the stainless-steel autoclave was taken outside and allowed to cool naturally to room temperature.
(6) The resultant solution was filtered, washed with distilled water, and kept for drying under the lamp.
(7) After proper drying take the weight of the obtained material and records the yield.

SCHEMATIC REPRESENTATION:



OBSERVATIONS AND CALCULATIONS:

(1)	Weight of the obtained precipitate	----------grams.

RESULT:

Weight of the obtained ZnO nanomaterials	----------grams.

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REFERENCES:

(1) Mohan, S.; Vellakkat, M.; Aravind, A.; U, R. Hydrothermal Synthesis and Characterization of Zinc Oxide Nanoparticles of Various Shapes under Different Reaction Conditions. *Nano Express* **2020**, *1* (3), 030028. https://doi.org/10.1088/2632-959X/abc813.

(2) Liu, B.; Zeng, H. C. Hydrothermal Synthesis of ZnO Nanorods in the Diameter Regime of 50 Nm. *J. Am. Chem. Soc.* **2003**, *125* (15), 4430–4431. https://doi.org/10.1021/ja0299452.

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EXPERIMENT UNDER DBT STAR COLLEGE SCHEME
Academic Year: 2022-23

Class: T.Y.B. Sc. **Date:**
Name of the Student: **Roll Number:**

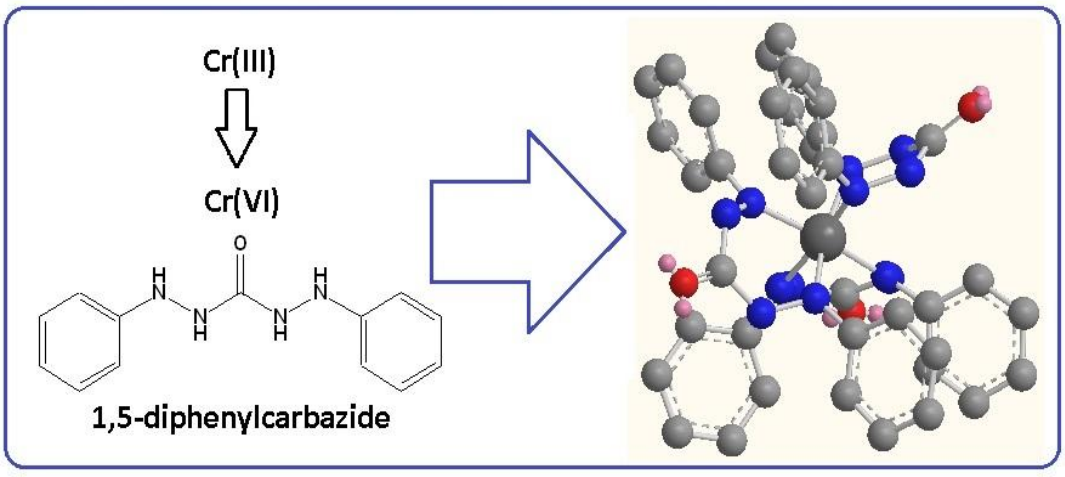
Title: Heavy metal analysis of Industrial waste water Cr (VI) by UV-Visible spectrophotometer

Aim: TO DETECT THE Cr (VI) PRESENT IN INDUSTRIAL WASTE WATER BY UV-VISIBLE SPECTROPHOTOMETER.

Requirements: 100 cm3 beakers, 250 cm3 beakers, 100 cm3 volumetric flask, quartz cuvettes, 50 cm3 measuring cylinder, glass rods, Industrial waste water, distilled water, methanol, $K_2Cr_2O_4$, diphenyl carbazide, phosphoric acid, ammonium hydroxide buffer, weighing balance.

Theory: Chromium is a heavy metal which occurs in the environment primarily in two valence states, trivalent Cr(III) and hexavalent Cr(VI). Chromium (III) is an essential micro-nutrients for the human body, while the Cr(VI) is highly toxic and carcinogenic. Toxic chromium enter into the water system, derived from nature and from waste or industrial waste such as metal industrial waste water, electroplating, wood preservation, fertilizers, leather preservation industry. Cr(III) is in the form of hydroxide compounds as Cr(OH)n (3-n)+.

Reaction:



Procedure:

1. Cr(VI) sample (2 cm^3) was transferred to a beaker.
2. Sulphuric acid (0.2 M, 1 cm3) and 1,5-diphenylcarbazide (0.5% w/v, 1 cm3) were added, and the mixture was gently shaken and left for five minutes.
3. Likewise different concentrations of Cr(VI) samples were prepared from the stock solution.
4. The absorbance was measured for different concentrations of Cr(VI) samples in nm against reagent blank.

Observations and Calculations:

1. The absorbance of the 10 ppm Cr(VI) sample = _____
2. The absorbance of the 50 ppm Cr(VI) sample = _____
3. The absorbance of the 100 ppm Cr(VI) sample = _____

Results:

1. λ_{max} was observed at _____ nm

References:

Annija Lace, David Ryan , Mark Bowkett and John Cleary Chromium Monitoring in Water by Colorimetry using Optimised 1,5-Diphenylcarbazide Method, International Journal of Environmental Research and Public Health 2019, https://doi.org/10.1155/2016/3468635

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Academic Year: 2022-23

Class: T.Y.B. Sc. **Date:**
Name of the Student: **Roll Number:**

TITLE: - SYNTHESIS OF MIXED LIGAND COMPLEXES OF LANTHANUM.

Aim: Synthesis of mixed ligand complexes of La(III) with 1-nitroso-2-naphthol (1N2N) and L-valine amino acid (HL).

Requirements: -

Chemicals: Lanthanum Chloride [$LaCl_3.7H_2O$], 1-nitroso-2- naphthol, L-valine, Ethyl Alcohol, diluted ammonia, Distilled Water.

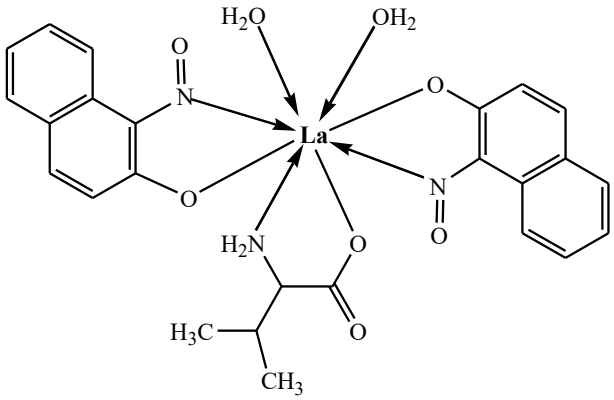
Apparatus: 100cm^3 Beakers, 250 cm^3 beaker, Glass rod, pH meter, water bath, Clay pipe triangle etc.

THEORY: La(III) ions form green colored mixed ligand complex when treated with 1-nitroso-2-napthol and L-valine. The 1-nitroso-2-naphthol is yellowish brown solid and act as a bidentate ligand. Similarly, L-valine is a colorless bidentate ligand contains -N and or -O donor atoms. Both ligands react with $LaCl_3$ $.7H_2O$ and forms mixed ligand complex at neutral medium.

Reaction:

$$LaCl_3 .7H_2O + 2(1N2N) + HL \rightarrow [La\ (1N2N)_2(L).2H_2O] + 3HCl + 5H_2O$$

Structure:



Structure of [La(1N2N)$_2$(Val)·2H$_2$O

Procedure:

(1) Dissolve 1.113 g or the supplied sample of $LaCl_3.7H_2O$ in a 10 cm^3 distilled water in a 100 cm^3 beaker

(2) Weigh 1.038 g of 1-nitroso-2-naphthol in a 20 cm^3 ethyl alcohol in another 100 cm^3 beaker. If required, heat it on a boiling water bath to dissolve it.

(3) Transfer the solution of 1-nitroso-2-naphthol in a solution of $LaCl_3.7H_2O$ with constant stirring and reflux it in water bath for 10 minutes.
(4) To this refluxed solution add 10 cm^3 solution of L-valine (0.351 g) in distilled water. Stir the solution vigorously and warm it in water bath for 10 minutes.
(5) Then raise the pH of the above reaction mixture up to 7.0 by slow addition of diluted ammonia solution for complete precipitation of the complex.
(6) Filter the precipitates through Whatman filter paper no. 41 using Buchner funnel at the suction pump.
(7) Wash the complex with distilled water 2-3 times and then with 2-3 cm^3 ethyl alcohol.
(8) Dry the complex in an electric oven at 110°C.
(9) Weigh the product to obtain the yield (x g).

Observations and Calculations:
Yield of the Complex:
(A) Theoretical yield of the complex
271 g of $LaCl_3.7H_2O$ gives 635.39 g of the complex

1.113 g $LaCl_3.7H_2O$ = $\frac{635.39 \times 1.113}{271}$

= 2.60 g of the complex

(B) Observed yield of the complex (x g) = _____
(C) Percentage yield of the complex:
2.60 g of the complex = 100 % yield

x g of the complex = $\frac{x \times 100}{2.60}$

= 38.46 x %

(D) Magnetic Behavior of Complex:
The $[La(1N2N)_2(Val)\cdot 2H_2O$ mixed ligand complex contains La(III) metal ion.
The electronic configuration of La is [Xe] $4f^0\ 5d^1 6s^2$.
La^{3+} = [Xe] $4f^0\ 5d^0 6s^0$
The number of unpaired electrons in La^{3+} metal ion = ----------electron
Therefore magnetic behavior of the complex = ----------

Result:
(1) Yield of the complex:
(A) Theoretical = ----------g
(B) Observed = ----------g
(C) Magnetic behavior of the complex = ----------

References:

1. N.K. Fayad, T.H. Al-Noor and F.H. Ghanim, Chem. Mater. Res., 2(5) 18-29, (2012).
2. G. A. Thakur, U. N. Dhaigude and P. B. Thakur, Orient. J. Chem. 36(4), 632-639, (2020)

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Mahatma Phule Arts, Science and Commerce College,
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DEPARTMENT OF CHEMISTRY
EXPERIMENT UNDER DBT STAR COLLEGE SCHEME
Academic Year: 2022-23

Class: T.Y.B. Sc. **Date:**
Name of the Student: **Roll Number:**

TITLE : EXTRACTION OF CHEMICAL CONSTITUENTS FROM MEDICINAL PLANTS.

AIM : Extraction of Chemical constituents from medicinal plants present in college campus.

THEORY : Extraction involves the separation of medicinally active constituents from complex matrix of plant by using selective solvent in standard extraction condition. Active constituent extracted from different parts of plant such as leaves, root, stem and fruits. The present experiment primarily concerns with basic extraction procedure by using Rotary shaker for estimation of amount of chemical constituents present in a particular part of plant sample.

REQUIREMENT:

CHEMICALS:
Methanol, Ethanol, Ethyl Acetate, Dichloromethane, N-Hexane, Pet-Ether, Chloroform.

INSTRUMENTS/APPARATUS/GLASSWARES:
Rotary Shaker, Mortal Pestal, Electric water bath, conical flask.

PROCEDURE:

1. Freshly collected sample of plant is crushed by using mortal pastel for extraction.
2. Place 5g crushed sample in a conical flask & add 50 ml of solvent in it
3. Then Keep the flask on rotary shaker for 2 hours.
4. Then the contents of the flask were filtered separate it through Whatman filter paper no. 41 in pre- weighed dry beaker and solvent was evaporated to dryness on a water bath.
5. The dried residue then weighed and percentage extract were calculated.

CALCULATION:

1. % Extract = $\frac{W-W1}{W2}\ x\ 100$

   = ------ %

Where:
W1 = Weight of empty beaker in g.
W = Weight of empty beaker with extract in g.
W2 = Weight of sample in g.

RESULT :

The Percentage extract of chemical constituent in the given plant sample is ----------%.

REFERENCES :

1. Harborne.J.B, "Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis." 2nd Edition, Chapmann and Hall Publishers, London, 1998.

2. Handa SS, Khanuja SPS, Longo G, Rakesh DD. Extraction Technologies for Medicinal and Aromatic Plants. International centre for science and high technology, Trieste, 2008, 21-25

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Academic Year: 2022-23

Class: T.Y.B. Sc. **Date:**
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Aim: TO ESTIMATE THE PROTEIN USING BIURET METHOD.

Theory / Principle: The -CO-NH- bond (peptide) in polypeptide chain reacts with copper sulphate in alkaline medium to give a purple colour which can be measured at 540 nm.

Apparatus: Test tubes, Pipettes, Colourimeter, thermostat etc.

Chemicals: 1. Protein standard (5 mg BSA/ ml)

2. Biuret Reagent: Dissolve 3 gm of copper sulphate

($CuSO_4.5\ H_2O$) and 9 gm of sodium potassium tartarate in 500 ml of 0.2 mol/ litre sodium hydroxide , add 5 gm of potassium iodide and make up to 1 litre with 0.2 mol/litre sodium hydroxide.

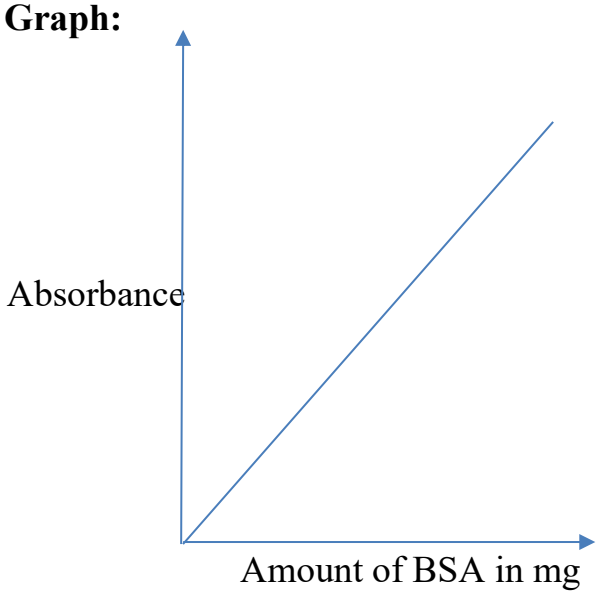
Procedure:

1. Pipette out 0.0, 0.2, 0.4, 0.6, 0.8, and 1 ml of working standard into the series of labeled test tubes.
2. Pipette out 1 ml of the given sample in another test tube.
3. Make up the volume to 1 ml in all test tubes. A test tube of 1 ml of distilled water serves as blank.
4. Now add 3 ml of Biuret reagent to all the test tubes including the test tubes labeled as 'blank' and 'unknown'
5. Mix the contents of the tubes by overtaxing / shaking the tubes and warm at 37^0C for 10 minutes.
6. Now cool the contents to room temperature and record the absorbance at 540 nm against blank
7. Then plot the standard curve by taking concentration of protein along X- axis and absorbance at 540 nm along Y-axis.
8. Then from this standard curve, calculate the concentration of protein in the given sample.

Observation Table:

Volume of standard BSA (ml)	Volume of Distilled water (ml)	Concentration of protein (mg)	Volume of Biuret reagent (ml)		Absorbance
0.0	1.0	00	3	Incubate at 37 ^{0}C for 10 minute and cool	0.0
0.2	0.8	1	3		
0.4	0.6	2	3		
0.6	0.4	3	3		
0.8	0.2	4	3		
1.0	0.0	5	3		
Unknown	0.0	To be estimated	3		

Nature of the Graph:



Result: The given unknown sample contains …… mg protein/ml.

References:

1. A manual Laboratory Techniques, 1983. Editors: Raghuramulu N. Nair, National Institue of Nutrition, Hydrabad , India.

2. An Introduction of Practical biochemistry , 3rd Edition, Tata Mc Graw Hill publishing Company, New Delhi, pp 159.

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