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QUALITATIVE ANALYSIS IN ORGANIC CHEMISTRY AND NANO TECHNOLOGY APPLICATIONS

Chemistry

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ABSTRACT

Qualitative analysis is used to purify a chemical compound. It is used for finding impurities and removing it slowly.The qualitative analysis helps in finding acidity or basicity. It helps in determining the exact addition needed for the required transformation.Qualitative analysis could be titration, flame test, and other chemical tests that shows up results properly and helps in understanding the structure of the substance. Qualitative analysis finds application in organic chemistry, organic chemistry and bio in organic chemistry. It is used in the regular chemical laboratory, research laboratory,field testing(Soil testing for salinity, water testing for finding acidity) and applications in industries.Qualitative analysis has become varied, accurate and responsive to the problems of modern world.

KEYWORDS

Qualitative analysis has become interdisciplinary in approach and application.In the recent periods, the glassware, electronic measuring instruments, and the equipment and the control of the parameters have improved to show more accurate results exhibiting characteristic properties for example, in the first transition series of elements there is a remarkable change in the properties as the oxidation number changes.The lower oxidation number gives the normal reaction under STP conditions.The higher oxidation number shows good variation and comparison that shows in colour during tests, molecular organization and finer rearrangements that takes place due to resonating molecules. The arrangement sometimes shows in quadranary structure and the other time, the molecules reaarange into hexagonal structure to follow the symmetry and balance.The chelate structures in cobalamine and other substances shows definite properties that determines stability of the substance. Lesley,T et.al.(2002) Royal Society of Chemistry has developed meaningful experiments, modules and schedules for students and teachers.It is an interesting reading that shows progress through videos. Brookline laboratory in England have interesting experiments. Organic chemistry laboratory in California shows interesting improvements in the glassware, new schedules and testing procedures and measurements.They have developed 'U" tube and videos for selective viewing.The Global Microscale experiments in environmental chemistry shows titration, science kits, experiments to test purity. The Energy Centre, Penang, Malaysia and National University Sans Malaysia have drawn national programme to train their students and teachers in energy efficiency and effectiveness successfully. Understanding Chemistry by Rao, describes the project of the Department of Science and Technology.In the following paragraphes a few commonly used tests are presented for observation,analysis and discussion:It is presented in the following order.The name of the test, observation and inference.

1.Flame test: Heat the organic compound (50mg) on a nickel spatula over a low flame, raising the temperature gradually.

Observation: Non -sooty flame-Aliphatic compounds,
Sooty flame -shows aromatic compounds

Ammonical odour charring with smell of burning sugar- shows the presence of Urea, thio Urea etc. The charring of sugar shows the presence of carbohydrates, tartrates, citrates, etc.Malhotra,Abhilasha 1999(M.Ed) used this test for childrens experiment.Lesley,T(2002) gives a pictorical presentation of the flame test in the book.

2. Action of Alkali: Treat the organic compound(100 mg) with aqueous sodium hydroxide (2-3 ml, 20%) first in the cold and then heat for 1-2 minutes.

Observation: Smell of ammonia shows the presence of primary amides, the smell of chloroform shows the presence of chloral , Smell of amine on prolonged boiling shows the presence of Anilides.

3. Conc. Sulphuric acid: Treat the organic compound (100 mg) in a dry test tube with Conc. H_2SO_4(one ml) at room temperature and then heat.

Observation: Evolution of Carbon mono oxide shows the presence of Foramates, Evolution of Carbon mono oxide and Carbon di oxide shows citrates, oxalates also.

Rapid charring with effervescence shows the presence of carbohydrates and tartrates.,Evolution of halogens shows the presence of N-halogeno compounds.

(Note:Carbon di oxide turns lime water milky, Carbon mono oxide burns with a blue flame and halogens(I_2,Br_2,Cl_2) are detected by the colour of vapours.precipitate(no change on addition of further Hcl)

Note: The neutral ferric chloride solution is prepared by adding a dil. Ammonium hydroxide solution dropwise to the ferric chloride solution until a faint precipitate is formed, which does not dissolve on shaking. The solution is filtered and the filtrate is used for the test.

4.Potassium permanganate test $KMNO_4$

To a solution of the organic compound (100mg) in water or acetone add dil. Sodium carbonate solution(0.5 ml,5%) and then treat dropwise with dil KMNO4solution(2-3 drops,1-2%) . Disappearance of the purple colour of Potassium permanganate indicates the presence of unsaturation or the presence of an easily oxidisable group like -CHO in the organic compound.

5.Bromine test : To a suspension or a solution of a the organic compound(100mg) in water or CCl_4(1-2ml) dropwise add a solution of Bromine in the same solvent (2%). Rapid disappearance of colour without evolution of hydrogen bromide indicates unsaturation.If the colour disappears with the evolution of hydrogen bromide it indicates the substitution of bromine, e.g. as in phenol or aniline.

6.Lassaigne's test: It is mostly used for the detection of Nitrogen, Sulphur and halogens. In this organic compound is fused with sodium to give the sodium salts .Thus, N_2,S,Halogens give Sodium cyanide, Sodium sulphide and Sodium halide respectively.

$Na + C + N \rightarrow NaCN$
$2Na + S \rightarrow Na_2S$
$Na + X \rightarrow NaX\ (X = Cl, Br, I)$
$Na + C + N + S \rightarrow NaSCN$

Procedure: Take a small piece of clean dry sodium(approx..50-75 mg) in a clean and dry ignition tube. Heat the tube slowly. Remove it from the flame and add the compound (20-25mg) or 1-2 drops . A paste of liquid compound with Sodium carbonate may be used and solid sodium carbonate may be added to compensate for evaporation.First test on low flame and on stronger flame until it becomes red hot. Keep it for 1-2 minutes and plunge into 10 ml of distilled water kept in a porcelain basin.Boil the contents of the porcelain basin for 2-3 minutes and filter. Use the filtrate for testing the extra elements.

Precautions: 1. Do not touch the sodium with your fingers it may burn the fingers. Always use a forcepts.

2. A slight explosion may take place with compounds like nitroalkanes, azides, diazonium salts, Chloroform and CCl_4.Safety goggles should be worn to avoid accidents.

3.Unreacted sodium should be carefully decomposed by reacting it with a small amount of ethyl alcohol.

7.Test for Nitrogen:(a)Reaction with Ferrous sulphate as follows:
$6NaCN+FeSO_4 \rightarrow Na_2[Fe(CN)_6]+Na_2SO_4$
$3Na_4[Fe(CN)_6]+2Fe_2(SO_4)_3 \rightarrow Fe_4[Fe(CN)_6]_3$Prussian blue$+6Na_2SO_4$

Procedure: To the lassaigne's or sodium extract (1-2 ml) add solid ferrous sulphate(50-75mg). A dark greenish grey precipitate of ferrous hydroxide is obtained;incase sulphur is present, a black precipitate of ferrous sulphide is obtained.Boil the mixture gently for one minute and acidify with dilute sulphuric acid(3-4ml) . A blue precipitate (Prussian blue) or a blue colour indicates the presence of nitrogen in the compound.

$Fe_2(SO_4)_3$is obtained in situ by oxidation of Alkaline ferrous salt solution in presence of atmospheric oxygen.

8.(b)Benzidine-Copper sulphate test:Acidify the sodium extract (1-2ml) with acetic acid (3-4 drops). Add freshly prepared Benzidine solution(1% in50% acetic acid,2-3 drops) to the above solution(1% in 50% acetic acid , 2-3 drops) to the above solution and shake the mixture.Treat with Copper sulphate solution (1%,1-2 drops). Appearance of blue colour or a precipitate indicates the presence of Nitrogen. If Iodine is also present along with nitrogen,a greenish precipitate is obtained in this test.

Identification of a compound: Identifying a compound is generally possible through study of its characteristics. The physical and chemical properties generally place the compound to enable the identification. The systematic observation of the transformation of the compound is also equally important due to various reasons accounted for the purpose. The literature review also helps in the organization of the properties for identification. The sure way of identifying the compound is through its characteristic testing. The compound may be a unknown salt, a mineral, ion.The boiling point, melting point, vapour pressure , solubility , relative molecular mass, density of the substance, acidity, or the amount and frequency of electromagnetic radiation absorbed will facilitate the identification.

The other methods of identification is through comparison of the new compound with the known substance and its characteristics. The atomic decay, irradiation studies are the other technique selectively used.Wilkinson has observed in inorganic analysis sometimes the techniques used may be more than one. The combustion analysis process also helps in identification of certain compounds of carbon, nitrogen and hydrogen.Smart,L (2002) has provided some elemental analysis for the identification of carbon, hydrogen and nitrogen in the given compound.

Determination of the amounts of carbon, hydrogen present through combustion analysis. The accurately weighed amount of compound is burnt in oxygen to form carbon di oxide, water and nitrogen respectively.These are selectively collected on weighed adsorbents and the increase in mass of the adsorbent is determined.The combustion analysis is a destructive technique and it can be expensive.It can not be employed until other characterizingtests are employed.It is also needed that the experiment is conducted with care(if radiation or explosion is observed it could destroy the matter).It could be conducted under the supervision of senior person.

Carbon,Hydrogen and Nitrogen analysis: The presence of oxygen is usually inferred as a residual mass from the quantities of the other elements.

Sulfur: The sulfur in organic and biological materials is determined by burning a stream of oxygen. The sulfur dioxide produced is reacted with hydrogen per oxide to form sulphuric acid, which can then be titrated.

S+O2(g) SO2(g)
SO2(g)+ H2O2aq H2SO4(aq)

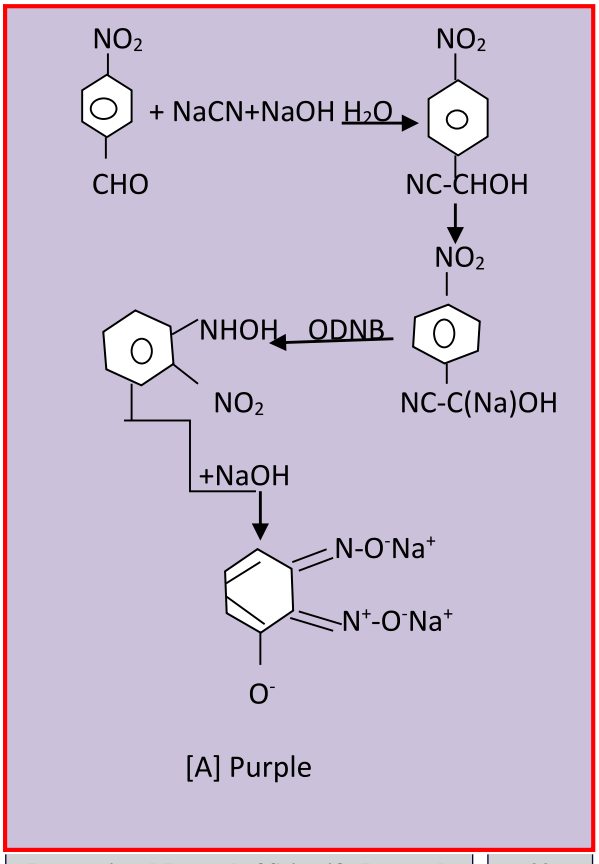
Nitrogen:The alternative combustion analysis is the Kjeldahl method.The nitrogen containing compound is decomposed in hot concentrated sulphuric acid which converts the bound nitrogen to the ammonium ion. The solution is cooled, diluted, and made basic to release ammonia. The released ammonia is collected and titrated. This is the standard method of determination of protein content of grains and meats, as multiplication of the percentage of nitrogen by a suitable factor(6.25 for meats and 5.7 for cereal) will give the percentage of protein in the sample.

Table No.1Showing summary of some elemental analysis methods
Element Converted to Absorption products

Titration:Nitrogen NH_3
NH3+H3O+NH4++H2O
Excess HCl withNaoH
Sulfur So_2
$SO_2+H_2O_2$ H_2SO_4
NaOH
Carbon:CO_2
$CO_2+Ba(OH)_2$ $BaCO_3+H_2$Excess $Ba(OH)_2$with HCl
ChlorineHCl
$HCl+H_2O$ $Cl^-+H_3O^+$
(Bromine)
NaOH
FluorineSiF4
SiF_4+H_2O H_2SiF_6
NaOH
Reaction with PNB and ODNB:
No2 + NaCN+ NaOH H2O
CHO

9. Ferric chloride test: To a solution of (50mg) in alcohol or water(5ml) add one drop of neutral Ferric chloride solution through the sides of the test tube. Observe the colour produced and one more drop after shaking the test tube and observe the change.

Observation: One observes intense purple green, blue or red colour.Indicating the presence of phenols and enols.Buff coloured precipitate green precipitate.It shows as some aromatic acids, or Quinol.



[A] Purple

phenylenediamines are also inferrred.Red colour (decolourised on addition of dil. HCl) Intense reddish brown colour or Reaction with PNB and ODNB: Nitrogen can also be detected in the Lassaigne's extract by treating it with p-nitro benzal dehyde [PNB] andO-dinitrobenzene[ODNB]. Development of a purple colour indicates a positive test. Purple colour results due to the formation of O-nitrophenyl hydroxylamine from ODNB and its conversion to the O-quinonoid form [A] in Alkaline medium.

Note: Use 0.1 M solution of PNB and ODNB in mdthylcellosol(2-mehoxyethanol).

Test for Sulphur (a) Lead acetate test: Acidify the socium extract(2ml) with acetic acid(2ml) and add a few drops (4-5 drops) of lead acetate solution. Apperance of a black precipitate of lead sulphide indicates the presence of sulphur.

$Na_2S+Na_2[Fe(CN)_5NO]$ ⟶

Sodium nitroprusside

$Na_4[Fe(CN)_5NOS$

Sodium sulphonitroprusside

Reddish violet colour

Conductometric titrations: This method is used when there is a significant difference in conductance between the original solution and the reagent or the products of reaction. It is not necessary to know their cell values since the relative values are sufficient to permit locating the equivalence point.

However, It is pertinent to observe that the position of electrodes do not change in the experiment-titration.The contribution of any ion to the conductance of a solution is proportional to its concentrations, but in titration, as reagent added is more water also is added to change correction needed for the effect of dilution.Hydrolysis of reactants or products or partial solubility of a precipitate, may also cause departures from linearity.

The shape of a titration curve can be predicted easily. Figure No. 1(a) and 1(b) are conductometricTitration curve for the titration of HCl by NaOH (a) Instrument response (b) Instrument response showing contribution of specific ions. The diluted dilution effect is assumed to be negligible.

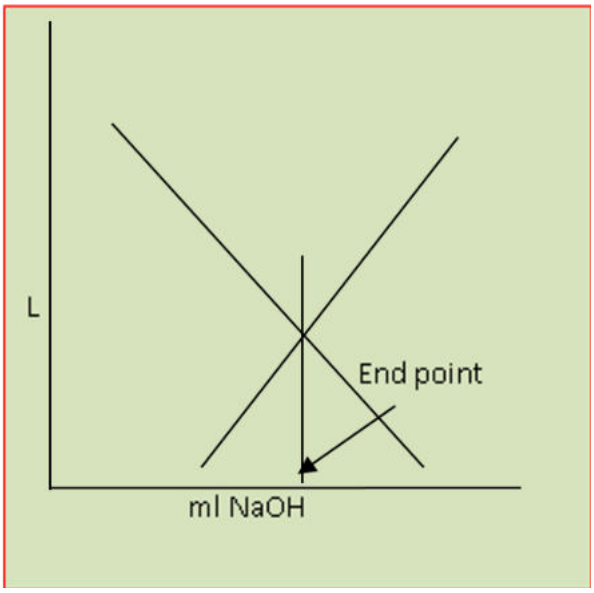
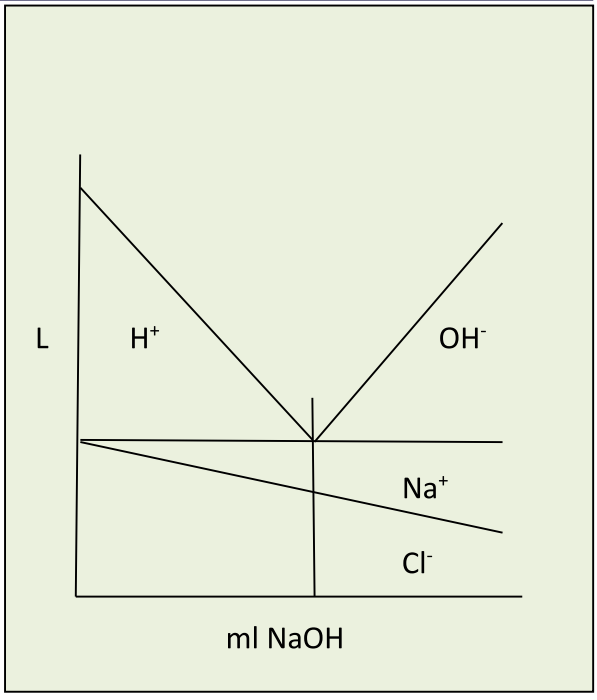


Figure No.1 (a)Titration



1 (b)

The conductance of the solution is proportional to its concentration,but in titration, as reagent is added and so more water is added to dilute the same.The change of conductance must be corrected for the effect of dilution. Hydrolysis of reactants or products or partial solubility of a precipitate may also cause departure from linearity.

The shape of titration curve could be constructed by using different measured dilution. The ions and their stoichiometry,equilibria and dilution is related and the concentration value multiplied by its $_0$ Value gives the relative change from point to point represented as a curve.

The spectroscopic technique are high precision technique to identify the molecular arrangement.The absorption of radiant energy in the Ultraviolet and visible spectra regions depends generally on the number and arrangement of electrons in the absorbing molecule or ions. Among in organic substances selective absorption may be expected whenever an unfilled electrons energy level is covered or protected to a completed level usually formed by co-ordinate co-valences with other atoms.

Selective absorption among organic molecules is related to the deployment of electrons in the molecule.Completely saturated compounds show no selective absorption throughout the visible and the accessible UV regions. Compounds that contain a double bond absorb strongly in the far UV(195nm for ethylene) conjugated double bonds produce absorption at longer wavelengths. The more extensive the conjugated system, the longer will be the wave lengths.

The more extensive the conjugated system, the longer will be the wave length at which absorption is observed.If the system extends for enough, the absorption enters the visible region , and colour results.Thus, ß-Carotene, with 11 conjugated double bonds absorbs strongly in the region 420 to 480 nm and hence is yellow-green in appearance. The complete conjugated system in a compound is called the chromophore.

The wave length's of the absorption maxima of a compound provide a means for identifying the chromophores it contains.

The spectra are in general modified by the presence of various atomic groups, when these are substituted for the hydrogen atoms

Table No.1Shows the representative chromophores and their solvent.

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Compound	Chromophore	Solvent	λmax	log e
Octene-3	C=C	Hexane	185	3.9
			230	0.3
Acetylene	C≡C	Vapour	173	3.8
Acetone	C=O	Hexane	188	2.9
Diazoehyl	N=N	Ethanol	253	3.9
Acetate			371	1.1
Butadiene	C=C-C=C	Hexane	217	4.3
Crotonaldehyde	C=C-C=O	Ethanol	217	4.2
Dimethyl glyoxime	N=C-C=N	Ethanol	321	1.3
			226	4.2
Octatrienol	C=C-C=C-C=C	Ethanol	265	4.7
Decatetraenol	$[-C=C-]_4$	Ethanol	300	4.8
Vitamin A	$[-C=C-]_5$	Ethanol	328	3.7
Benzene		Hexane	198	3.9
			255	2.4
1,4 Benzo-quinone	O=  =O	Hexane	245	5.2
			285	2.7
			435	1.2
Naphthalene		Ethanol	220	5.0
			275	3.7
			314	2.5
Diphenyl		Hexane	246	4.3

on the carbons of the chromophore. Such substituents usually have the effect of shifting the absorption bands toward longer wave lenghes and changing their absorbance values. Substituents that produce these effects are known loosely as auxochromes.

Data shown in the Table No. 1 are collected from various sources and therefore , it needs to be taken as illustrative only.

Electronegative atoms of Oxygen and Nitrogen are polar.Water shows more of polarity. Among the hydrocarbons, alkanes are non polar and the compounds having Carbon and Hydrogen are non polar.The organic substances show more of solubility and thus, the solubility shows more of polarity. The table No. 2 shows the common solvents that have decreasing order of polarity.The polarity of the organic compounds allows for flexible orientation and magnetic properties such as dipole moment. It has found applications in artificial bio sensors.As the light absorbing properties of organic compounds are less and they become subject of investigation for marine application in more varying climates.

Mukherjee et.al. tried to measure the sea surface temperature and to study the climate change.The sonads placed in the sea acted as sensors that give regular change in the sea.Dr. Vikram Sarabhai had placed such sonads in different parts of the sea to study the change in temperature and climate.

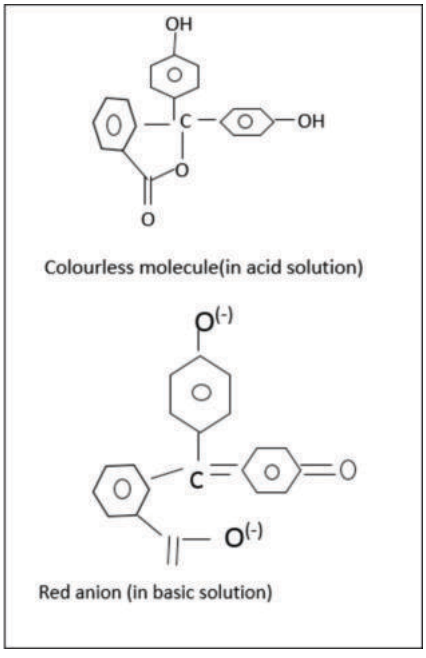
The Chromophore with double bond have more absorbance of the radient energy than the triple bond compounds.There is considerable variation observed from molecule to molecule in terms of molecular space and arrangement. Ethanol or Hexane have become common solvents for the organic compounds.

The solubility of the organic substances becomes a important factor for the analysis.The following

Table No. 2 common solvents in decreasing order of polarity

		Polarity	
Water	H_2O	Yes	most polar
Ethanoic acid (Acetic acid)	CH_3COOH	Yes	
Methanol	CH_3OH	Yes	
Ethanol etc	ROH	Yes	
Propanone (Acetone)	$(CH_3)_2C=O$	Yes	Intermediate
Ethyl Ethanote (Ethyl acetate)	$CH_3COOC_2H_5$	No	
Ethoxy ethane (diethyl ether)	$CH_3CH_2OCH_2CH_3$	No	
Trichloromethane	CH_4Cl_3	No	
Dichloromethane	CH_2Cl_2		
Methyl benzene (Toluene)	$C_6H_5CH_3$	No	
Benzene	C_6H_6	No	
Hydrocarbons	$CH_3(CH_2)_3CH_3$	No	Least polar
Alkanes &compounds with C and H are nonpolar			

In aromatic compounds the benzene ring is the simplest chrophore. Two or more of rings in conjugation, as in either naphthalene or diphenyl again increases the absorption and shift it toward the visible. As the resonance increases with increase in rings, the stretch on double bond increases that facilitates the shift towards the visible.Table No. 3 shows the effect of some auxochromes on the absorption of benzene. Perhaps, this property of benzene explains more interaction to form benzene compounds.The quinoid ring is much more effective as a chromophore than is the benzene ring. An example, contrasting the two types is found in phenolphthalein, which has the following structures in acid and basic solutions respectively.



In the colourless form conjugation does not extend outside the individual rings(except that one ring is conjugated with a carbonyl group). In the red form, however , one ring has been converted to the corresponding quinine which results in extending the conjugation to include the central carbon and through it the other two rings . It may be concluded that the entire anion constitutes a chromophore, whereas in acid solution, the molecule contains three separate and nearly identical lesser chromophores, the benzene rings.

One important feature that is being studied across the globe is the acidity and its increase in the environment. The strength of aqueous solution of some concentrated acids and bases are presented in Table No. 3 for their systematic study.

Table No. 3 Showing strength of aqueous solution of some concentrated acids and bases

Compound	Mol. Mass	Mol. % of solute by weight	Specific gravity	Mola lity	vol. req to make 1M Sol (ml)
HCl	36.5	36	1.18	11.65	85.8
HNO_3	63.0	70	1.42	15.8	63.3
H_2SO_4	98.0	98	1.84	18.4	54.3
CH_3COOH	60.0	99.5	1.05	17.5	57.5
H_3PO_4	98.0	85.5	1.71	14,8	67.5
NaOH	40.0	50.5	1.53	19.4	51.5
NH_3	17.0	25.1	0.91	13.4	74.6

The strength of aqueous solution of some concentrated acids and bases are listed in Table No. 3. Sulphuric acid and Phosphoric acid(indicated in red colour) are very strong acids and it is less used in organic reactions directly. It finds use on its required dilution.All other acids listed show varied applications and general chemical reactions that gives the characteristic products. It may be observed that the Lewis acids or the Pearsons HSAB theory equally identify the acids as strong reagents for common organic reactions.Titration of a strong base with a strong acid.The pH changes rapidly at the endpoint.Figure No.2 Titration of a strong base.

The exploration from Dr. Qasim of Antartica shows that there is gradual disintegration of the glacial features in the Antarctica due to the increasing temperature and platectonic movement.The ice is being converted to water and the flow of water is subteranian in some places and in overall situation the volume of water has gradually increased.The animals in the sea such as penguins are affected by the change in the climate.

Nano technology in Organic Chemistry:

The Prefix nano actually stands for a billionth (10^{-9}) of a metre. i.e. one nano metre means one billionth of a metre($1n.m=10^{-9}$).When you imagine aligning ten hydrogen atoms side by side the combined width of all these ten hydrogen atom equals to one nano metre.Infact, the properties and behavior of materials undergo sea change as one goes from the macro world to nano scale.The transition from the atomic to the bulk properties occur at the nano metre scale.At this scale, the atoms combine to form clusters.

These clusters are variously called nano particles, quantum dots, Q particles, artificial atoms and so on. The diameter of a cluster usually ranges from 1 to 100 nanometres. These clusters are too large to be considered as molecules and too small to be treated as bulk material. Therefore they give rise to an entirely new class of material called nano material.

For example, nano material as metal alloys have desirable properties of more strength and tenacity. The interesting thing would be that the same length of carbon thread would be more stronger than the thread of fine steel.

The Origin and discovery of Nano properties:In 1987, Bart J.Van Wees of the Delft University of Technology and Henk Van Houten of the Philips Research Laboratories were studying the flow of current resulting from the movement of electrons through narrow conducting paths within a semi conductor. By symmetrically varying the width of the conduction paths, the researchers measured the changes in the conductance values.They were surprised to observe a staircase pattern. Later, David Wharam and Michael Pepper of the University of Cambridge observed similar results. The studies clearly revealed that the electrical conductance is qunantised. Later, Michael Houskes, M Thomas Tighe and Keith Scwab discovered that thermal conductivity is also quantized. Another phenomenon seems to manifest at the nano scale. In 1985, Konstantin Likharev, a young physics professor at Mascow state university , working with Alexander Zorin and Dmitri Averin, proposed that it would be possible to control the movement of single electrons on and off a special conductor and it was called coulomb island, that is weakly coupled to the rest of a nano circuit. This phenomenon wherein the coulomb island allows conduction of only one electron at a time is called coulomb blockade.

This could form the basis for an entirely new type of device called single electron transistor (Mukherjee, P.K. (2007). Professor Banerjee, Principal, Regional Institute of Education, Mysore developed a quantum dot that can be swithed on and off as desired by the experimenter.

There are attempts to device instruments to provide the quantum electrical stimulation when required to the heart for example,pace maker.With these developments, Japanese have tried to develop the devices with nano technology applications more successfully than others.

Potentiometric titrations: In an acid-base titration , the pH changes rapidly as the neutralization point is reached. The slope of a plot of pH versus volume of added reagent is maximum but the end point(See the figure No.2) With a strong acid .The pH changes rapidly at the endpoint.

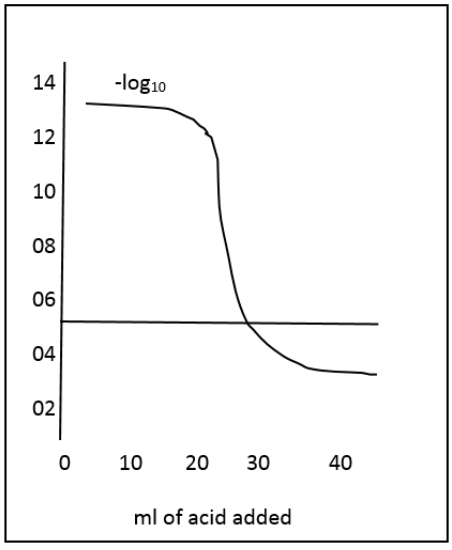


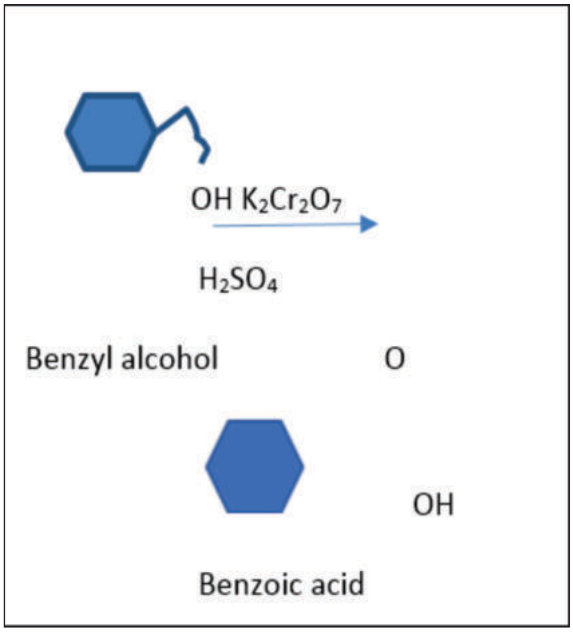
Figure No.2. Titration showing reaction of strong acid with a strong base. The pH changes rapidly at the endpoint.

Monitoring the pH with a pH meter enables the endpoint to be determined. The solution being titrated is solution X in cell. Redox titrations can be done potentiometrically by making the solution being titrated part of a galvanic cell whose emf is monitored.

Ion selective membrane elctrodes: Glass micro electrodes are used to measure activities of H^+,Na^+,andK^+in biological tissues. Glass is made up of cooling a molten mixture of $SiO_2$and metal oxides.By varying the composition of the glass , one can produce a glass electrode that is sensitive to an ion other than H^+. Examples of such ions are Na^+,K^+,Li^+,NH_4^+,and Ti^+.The .glass membrane can be replaced by a crystal of salt that is insoluable in water and that has significant ionic conductivity at room temperature for example, a crystal of LaF_3,gives a membrane that is sensitive to F^-There is an equilibrium between F^- adsorbed at the crystal surface and F^- in the solution and holds with F^- replacing F.

Separation of Mixture

Solvent extraction: Benzoic acid has been produced by the oxidation of Benzyl alcohol with acidified potassium di chromate and the organic product has to be separated from the remaining in organic reagents.This activity should take approximately ten minutes to complete.It is shown by the reaction of Benzyl alcohol with Sulphuric acid in the presence of $K_2Cr_2O_7$It is shown in the following chemical reaction :



Separation is also useful when an organic mixture contains a mixture of acidic,basic and/or neutral organic substances. A chemical reaction with an added basic or acidic solution can be used to effect a separation.

Recrystallization:

Solid substances are often purified by this method. The impure solid is dissolved in the minimum amount of an appropriate hot solvent and after the filteration of the hot solution to remove any insoluable impurities, the solution is allowed to cool, crystals of the required substance starts to crystallize out, leaving the soluable impurities in solution when cool, the crystals can be filtered off. All in organic compounds that are typically purified by crystallization and filteration with appropriate solvents.

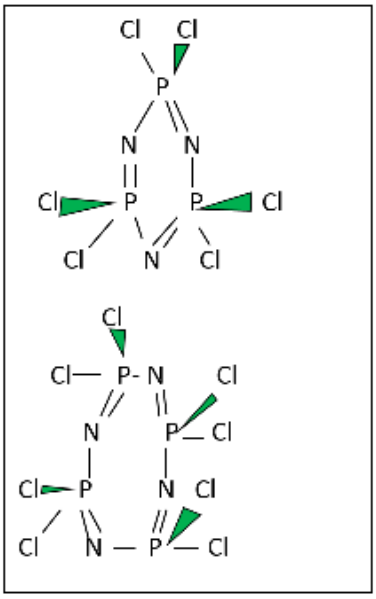


Table No.4 Effect of auxochromes on the benzene chromophore There are several methods of filteration such as filteration under gravity and filteration under suction for example, recrystallization of Benzoic acid. These methods are used by in organic and organic chemists. The preparation of many in organic salts and complexes leads to the formation of solid crystals, which can be purified by recrystallization andfilteration for example transition metal complexes such as [CO(NH3)5Cl]Cl2 and [CO(NH3)6(NO3)3 main group species like [PCl4[SbCl6] and the inorganic heterocyclic compounds.

Compound	Solvent	Ethylene Band / max nm	Benzonoid Band ¢max / max,nm	¢max
Benzene	Hexane	204 7900	256	200
Anilinium Cation	Aq.acid	203 7500	254	166
Chlorobenzene	Ethanol	210 7600	265	240
Phenol	Water	210.5 6200	270	1450
0-Catechol	Water.pH3	214 6300	276	2300
Anisole	2% Methanol	217 6400	269	1480
Aniline	water	230 8600	280	1430
Phenolate anion	Aq. Alkali	235 9400	289	2600
Thiophenol	Hexane	236 10000	269	700
0-Catechol anion	water,pH11	236.5 6800	292	3500
Diphenyl ether	Cyclohexane	255 11000	272	2000
			278	1800

Ewing,G.W.(1985) Organic chromophores Benzonoid band shows more of variation Benzenoid band is more than the Ethylene band.The solubility of the Benzene chromophore is more in the organic solvent than water.Aqueous acid or aqueous base has been more effective in terms of dissolving the substances to produce relevant bands.

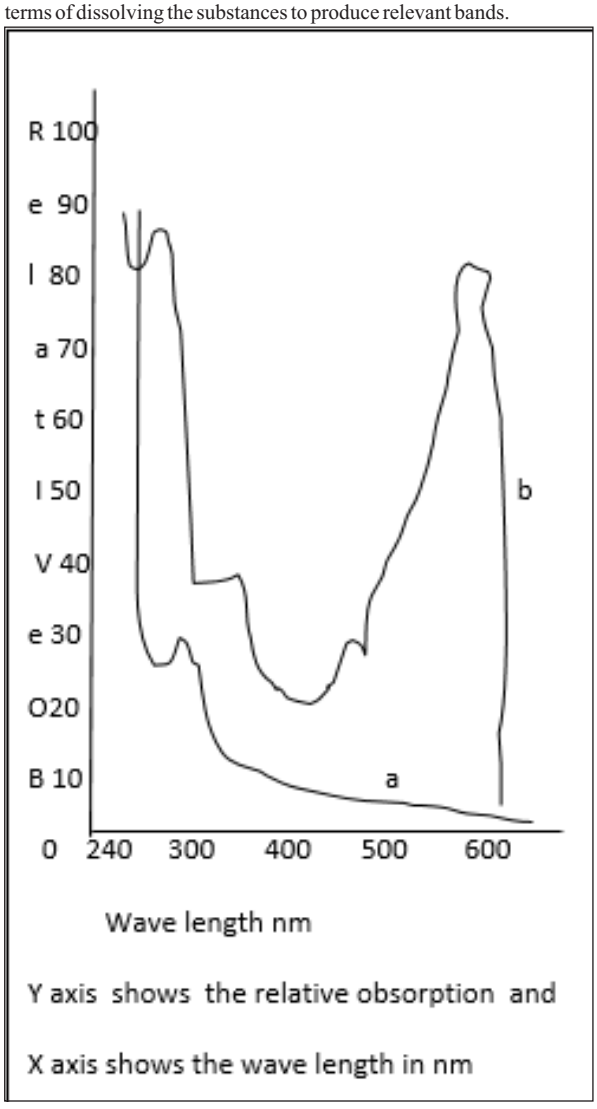


Figure No.3 Absorption spectra of Phenolphthlein(a) in acid solution ,(b) in basic solution .The vertical scale is relative absorbance.

The absorption of spectra of Phenolphthlein is found to be more in acid solution than the in basic solution. The Figure No.3 Shows the relative absorbance.This shows that the solubility is a important factor in the representation of the absorption spectra.

Sharma,R.K. and Sharma R.D. (2004) have presented the green chemical changes that could be visualized in the present context.Some of the examples are presented as follows:

- Catalytic dehydrogenation of diethanolamine.The new technique facilitates the environmentally friendly herbicide, avoiding the use of cyanide and formaldehyde and maximum atomic usage has been recorded.
- Upto 99% enhanced production of ibuprofen obtained avoiding the usage of solvents and its wastes on mass scale.
- Use of carbon-di-oxide as blowing agent in the manufacturing of packaging material, polystyrene. The process avoided every year the effluent of 3.5 million pounds of Chlrofluorocarbon, an Ozone depleting agent.
- Sea mine a safer marine antifouling compound designing , which degrades rapidly and also non-polluting as compared to organotins.
- Development of series of oxidation processes where the oxidizing agent has been hydrogen per oxide. The process is used in pulp and paper industry and also in laundries.
- Synthesis of anti convulsant drug, where the waste products 34000 litres of solventand 300 Kg of chromium for the production of 100 Kg of drug were avoided.

Organic substances show more solubility in the organic solvent than water.The presence of warm or slightly acidic aqua feature also brings the solubility.

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