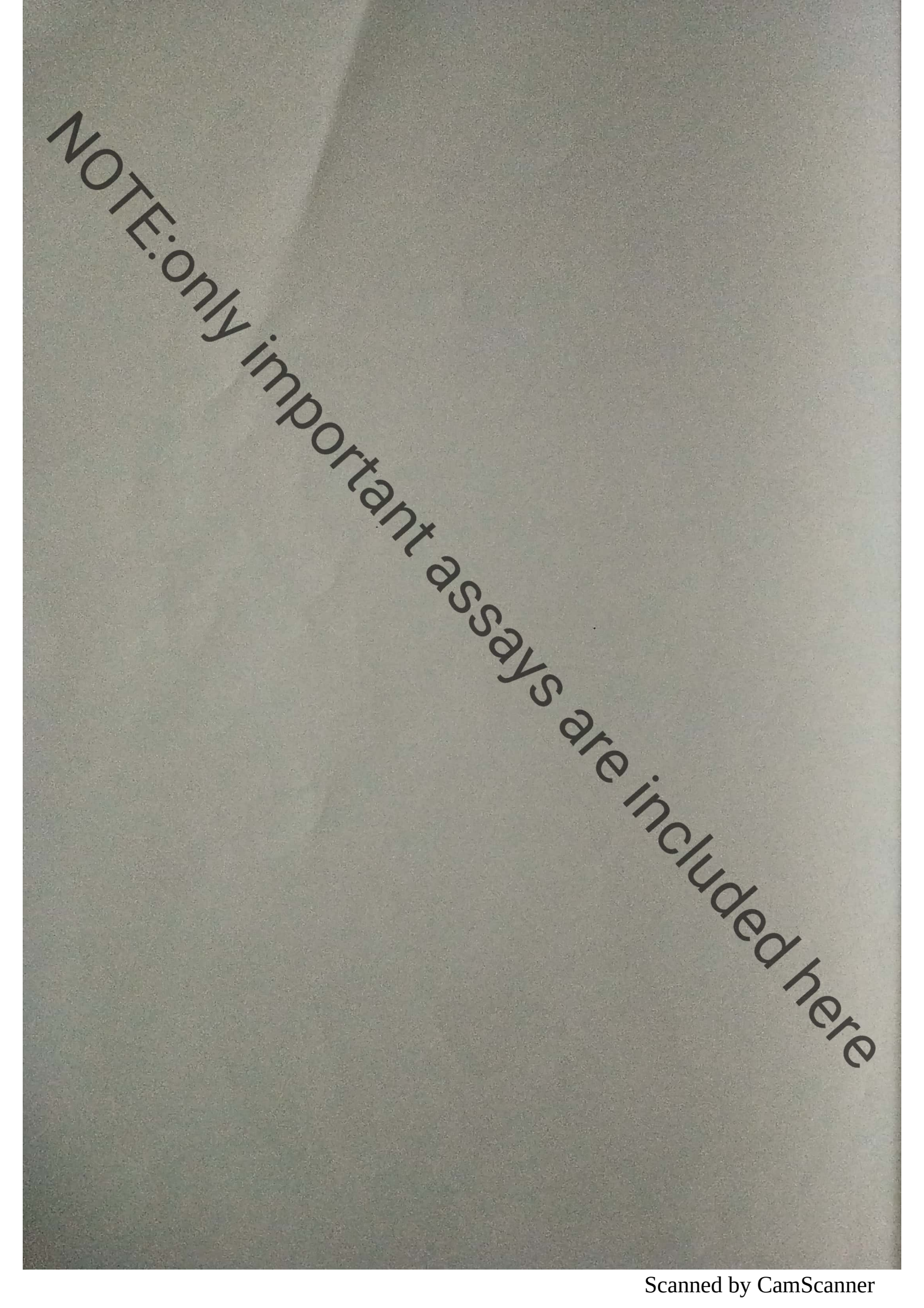


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NOTE: only important assays are included here

10 mark important concepts

IMPURITIES IN PHARMACEUTICAL SUBSTANCES

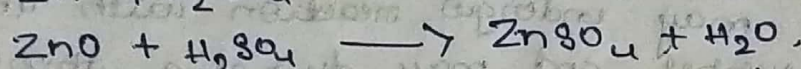
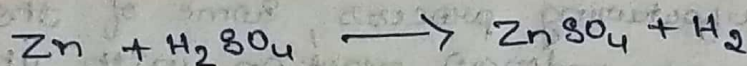
① Describe the various source of impurities present in pharmaceutical substances.

① Raw materials employed in manufacture.

Impurities known to be associated with these chemicals may be carried through the manufacturing process and contaminate the final compound.

For ex: Rock salt contains small amount of calcium sulphate and magnesium chloride, so that NaCl prepared from this source will almost certainly contain traces of calcium and magnesium compounds.

Ex ①. Zinc sulphate may be prepared by the action of H_2SO_4 on zinc metal or zinc oxide.

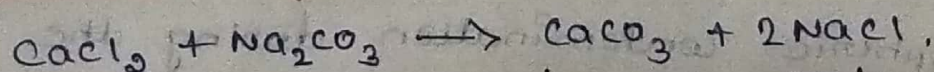


Both zinc and zinc oxide are known to have aluminium, copper, magnesium etc. as impurities. If these impurities are present in appreciable amounts in raw materials, these impurities are likely to be carried to the final product.

②. Reagents used in the manufacturing process.

If reagents used in the manufacturing process are not completely removed by washing, these may enter into final products.

Ex ①: precipitated calcium carbonate may be prepared by the interaction of calcium chloride and sodium carbonate.



precipitated $CaCO_3$ is associated with sodium carbonate and soluble chlorides. This precipitate is washed with H_2O to remove excess of sodium carbonate and soluble chlorides. If it is not washed, it may present as impurity.

③ Decomposition of product during storage

① Some substances decompose on keeping. The decomposition becomes greater in the presence of light and oxygen. The result of decomposition brings about contamination of final product.

② Substance which contains H_2O on crystallisation loses its moisture.

while deliquescent substance absorbs water from the atmosphere and gets liquified.

④ Chemical processes used in the manufacture

① For synthesis of drugs, many chemical reactions such as nitration, halogenation, oxidation, are involved.

② In these chemical processes, different chemicals are used.

③ Tap water used in the process contains chloride, calcium and magnesium.

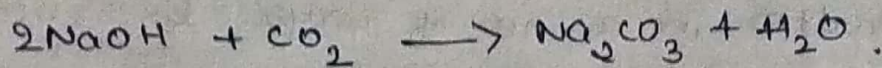
④ Nitrogenous organic matter in the manufacturing potassium iodide.

⑤ Atmospheric contamination during the manufacturing process

In industrial areas, atmosphere is contaminated with dust particles. During manufacture of pharmaceutical products, the impurities enter the final products as impurities.

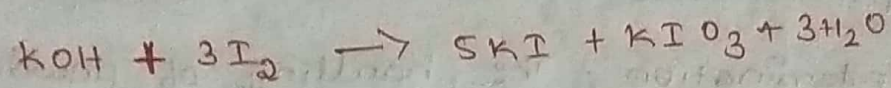
There are many pharmaceutical products during manufacture. They are contaminated with CO_2 & water vapour.

Sodium hydroxide absorbs atmospheric CO_2 .



So NaOH should not be exposed to the atmosphere for a long time during its manufacture.

⑥ Intermediate products in the manufacturing process. There are some intermediates which are produced during the manufacturing process. It may be carried through to the final product.



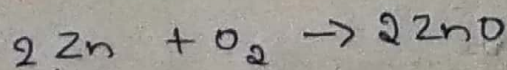
Potassium Iodide is prepared by reacting Iodine with potassium Hydroxide.

In this process, intermediate product KIO_3 is not completely converted into KI , it may be carried through final product.

⑦ Defects in the manufacturing process.

In many manufacturing processes, there are defects like imperfect mixing, non-adherence to proper temperature, pressure, pH etc. which may yield chemical compounds with impurities in them.

Ex ① Zn is converted to zinc oxide by heating the metal in presence of air.



Zinc metal is not completely converted into zinc oxide. The final product, ZnO , may still contain metallic zinc as impurity.

① deliberate adulteration of useless materials.
There are many pharmaceutical chemicals which are adulterated with cheaper substances.

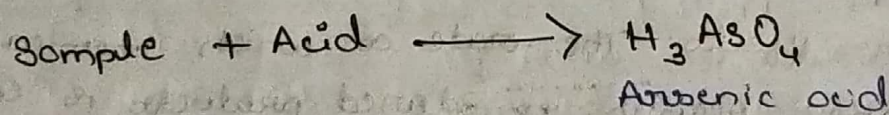
The expensive potassium bromide may be adulterated with cheaper sodium bromide. In order to avoid the chances of adulteration of potassium bromide IP has prescribed the test for sodium in them.

② write principle, reaction and procedure involved in limit test for Arsenic?

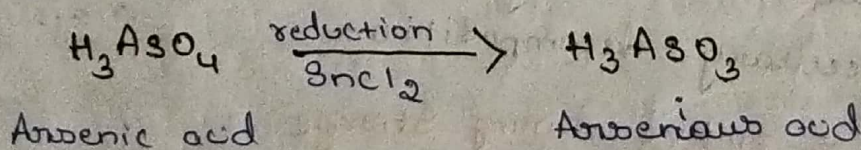
principle:- Arsenic is an undesirable & cumulative toxic impurity in medicinal impurities and all pharmacopoeia prescribed limit test for it.

The pharmacopoeial method is based on Gutzeit but which is designed for determination of small quantities of Arsenic. This involves reduction of arsenic compound to arsine^{gas} by nascent hydrogen. The reduction can be done either electrolytically or by the use of Zn & HCl.

① The sample is dissolved in acid thus converting the Arsenic compound to Arsenic acid



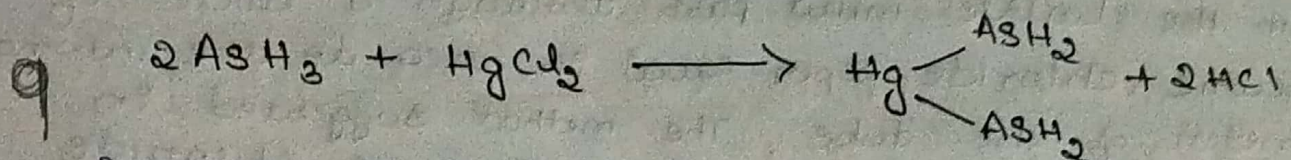
② The arsenic acid is reduced to arsenious acid by treatment with Stannous chloride.



③ The nascent hydrogen reduces Arsenious acid to arsine.

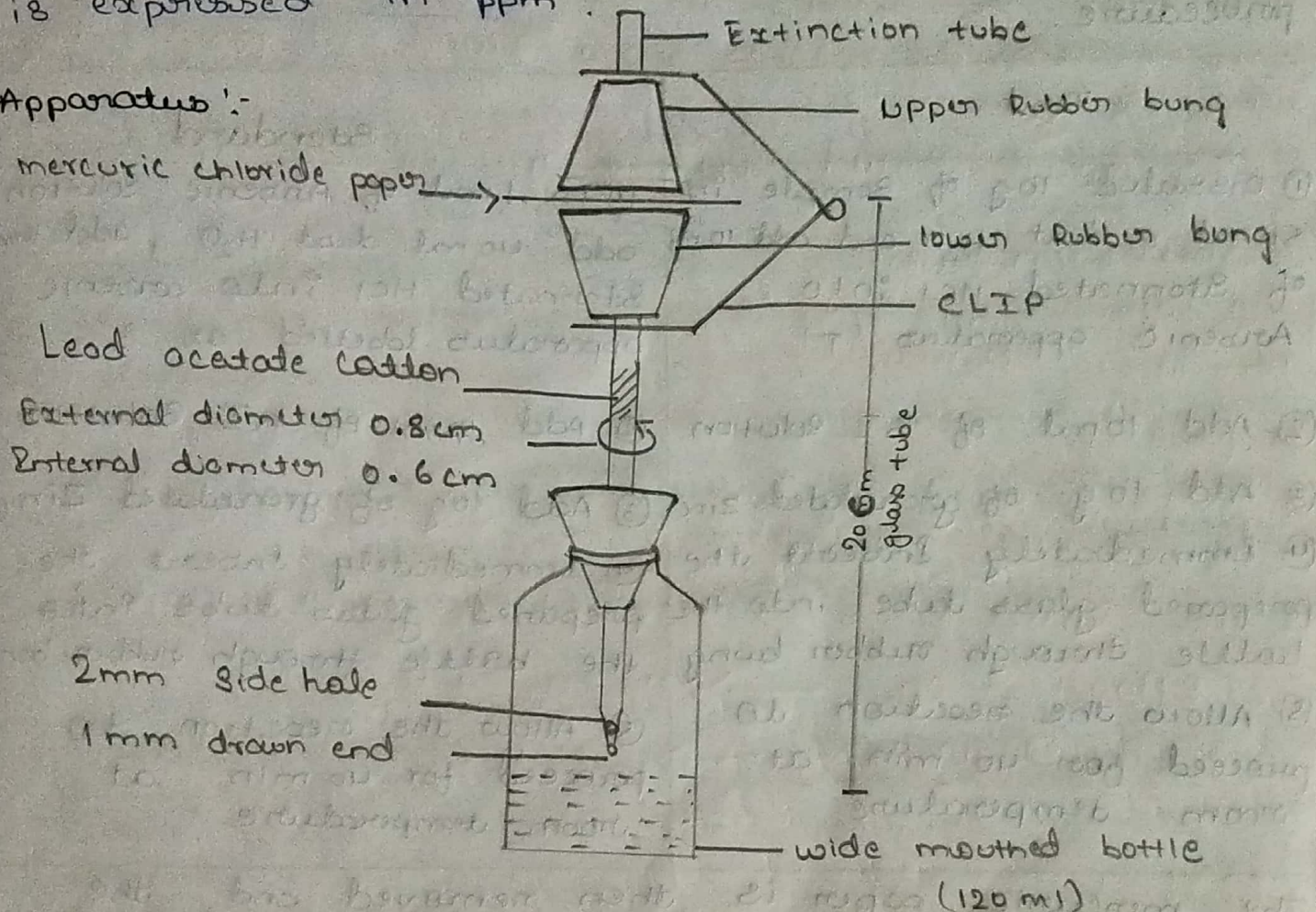


(4) Arsenine reacts with mercuric chloride paper & produces yellow stain of mercuric arsenide



The intensity of test stain is compared with standard stain which containing known amount of arsenic impurities. The limit test for arsenic is expressed in ppm.

Apparatus:-



The apparatus consists of wide mouthed bottle of 120 ml capacity. with rubber bulb through which passes a glass tube (20 cm, 0.8 cm external diameter and 0.65 cm Internal diameter)

The upper end of tube is rounded off while the lower end of test tube is drawn out to a diameter of about 1 mm & a hole not less than 2 mm in diameter. The 2 mm serves as exit for condensed water vapour, otherwise glass tube gets blocked. The tube is tightly packed with cotton wool, which has been moistened with lead acetate solution & dried.

The mercuric chloride paper is fixed over the top of the tube in such a way that gas evolved from the bottle must pass through a circle of mercuric chloride paper equal in area to the internal diameter of the tube. The method suggested in pharmacopoeia for fixing the mercuric chloride paper is to sandwich two perforated rubber bungs, which are held together by a spring clip.

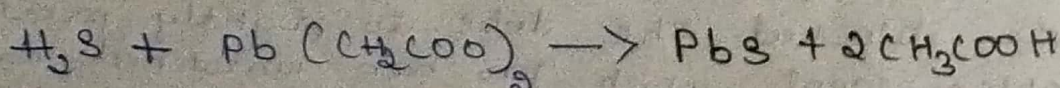
procedure.

Test	Standard
① Dissolve 10g of sample in 50ml of dist H_2O and add 10ml of standardized HCl into Arsenic apparatus 'T'	① To 1ml of Arsenic solution add 40ml dist H_2O , add 10ml standardized HCl into arsenic apparatus labelled as 'S'
② Add 10ml of KI solution	② Add 10ml of KI solution
③ Add 10g of granulated zinc	③ Add 10g of granulated Zinc
④ Immediately insert the prepared glass tube into the bottle through rubber bung	④ Immediately insert the prepared glass tube into the bottle through rubber bung
⑤ Allow the reaction to proceed for 40 min at room temperature	⑤ Allow the reaction to proceed for 40 min at room temperature.

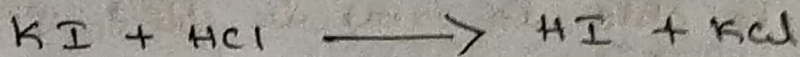
The mercuric paper is then removed and the stain of test is compared with standard solution.

Role of Reagents

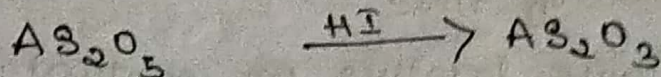
① Lead acetate cotton: when Zn is heated with HCl and some of the H_2S gas is evolved along with Arsenic gas, lead acetate cotton is employed to trap H_2S which otherwise interfere with test by staining mercuric chloride paper.



⑥ potassium iodide: It liberates HI acid by reacting with HCl. The HI helps in reduction of pentavalent arsenic to trivalent.



||



⑦ Stannous chloride: It is essential for complete reduction of arsenous acid to arsine. The reaction b/w pure Zn and pure HCl is very slow, presence of small amount of stannous chloride ensure a steady stream of hydrogen gas. Stannous chloride form Zn-stannous couple

⑧ what are Antacids? Give the ideal properties of antacids. Discuss the preparation and assay and uses of sodium bicarbonate (baking soda).

Ans: ① These Antacids are usually alkaline substances and used for neutralising excess acid in stomach of patients suffering from hyperacidity.

Systemic antacids
(Readily absorbable and produce systemic electrolytic alteration)

Non-Systemic antacids
(not absorbed in significant extent)

Eg: Sodium bicarbonate

→ ④ Aluminium containing Antacids

Eg: ① Aluminium hydroxide gel
② Aluminium phosphate

→ ⑤ Calcium containing Antacids

Eg: ① Calcium carbonate
② Calcium phosphate

→ ⑥ Magnesium containing Antacids

Eg: ① Magnesium hydroxide
② Magnesium carbonate

→ ⑦ Combination antacid preparation

Eg: ① Magnesium hydroxide & Aluminium hydroxide gel

Ideal requirements

- ① It should be insoluble in water ✓
- ② It should not be absorbable
- ③ It should be able to exert its effect gradually and over a long period of time ✓
- ④ It should not cause laxative or constipation
- ⑤ It should not cause any side effects
- ⑥ It should be stable and readily available ✓
- ⑦ The reaction b/w antacids & HCl should not produce large volume of gas
- ⑧ The antacid should buffer in the pH range 4 to 6 ✓

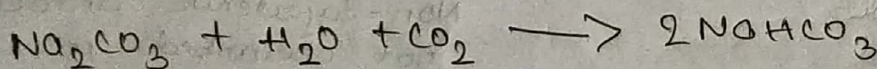
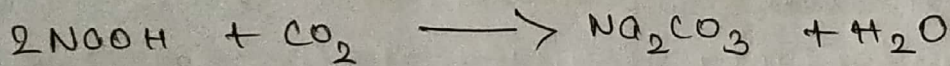
SODIUM BICARBONATE

Synonym: Baking soda

Formulae: NaHCO_3

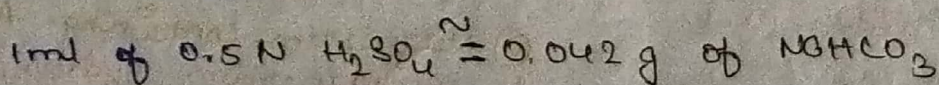
Preparation

- ① It is prepared by passing CO_2 gas through a solution of NaOH .
- ② The solution is concentrated to get the product.



Assay

- ① It is assayed by acid metric titration method.
- ② 1 g of substance is weighed accurately, it is dissolved in 20 ml of water
- ③ It is titrated with 0.5 N sulphuric acid using methyl orange as an indicator.



uses

- ① used as Electrolyte replenisher.
- ② As an Antacid
- ③ used in preparing buffer solution
- ④ used as constituent of effervescent mixture

④, what are GIT agents? Add a note on antacid combination therapy and assay of sodium bicarbonate?

Ans: GIT agents are drugs used to control gastric acidity, gastrointestinal mobility, water flow & improve digestion.

- ① No Antacid available in the market which satisfies the requirements of an ideal antacid. Many preparations which are having combination of antacids are being marketed.
- ② The idea behind such combination is to counteract the constipative action of calcium & aluminium containing antacids with laxative effect of magnesium containing antacid.
- ③ Sometimes combination contains one with rapid reaction with a longer duration of action.
- ④ Sometimes combination contains antacids which are antiprurulent in nature.

Combination

- ① Calcium carbonate containing Antacids: Calcium carbonate with Aluminium hydroxide gel yield products which have a rapid onset with prolonged action.

② Sodium Bicarbonate, Alginate Acid - Antacids - Alginate Acid precipitated in the form of light, viscous gel which floats on top of the stomach contents

1

③ Aluminium hydroxide, magnesium ^{carbonate} hydroxide Antacid
It is a co-precipitate of aluminium hydroxide & magnesium carbonate, carefully dried ~~and~~ as antacids, dried to contain a critical proportion of water for antacid activity.

④ Algicon Tablets: These tablets are chewable - prepared by aluminium hydroxide & magnesium carbonate co-dried gel

⑤ Simcoe Tablets: It contains aluminium hydroxide & magnesium carbonate co-dried gel

⑥ Aluminium Hydroxide gel - Magnesium Trisilicate combination - This is one of the common combination. It has laxative, constipative & protective effect

⑦ What are antimicrobials? Give their mode of action? Enumerate official antimicrobials

Ans: Antimicrobials are chemicals and their preparation which helps in preventing infection due to microbes

Mechanism of action.

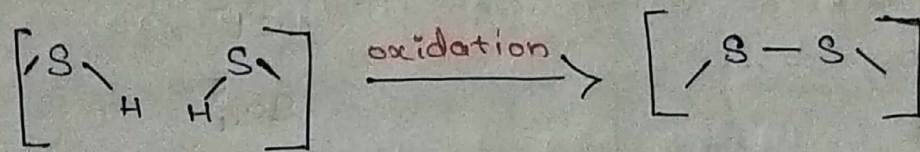
① Oxidation [H_2O_2 , $KMnO_4$]

① Compounds acting by this mechanism belongs to class of peroxides.

② These compounds bring about oxidation of active functional group present in (enzyme), which is responsible for growth & survival of micro-organisms

③ This causes change in conformation of protein and thereby alter its function.

Ex: A free Sulphydryl group has been essential for functioning of variety of proteins, Sulphydryl group gets destroyed by oxidation resulting into a formation of disulphide bond.

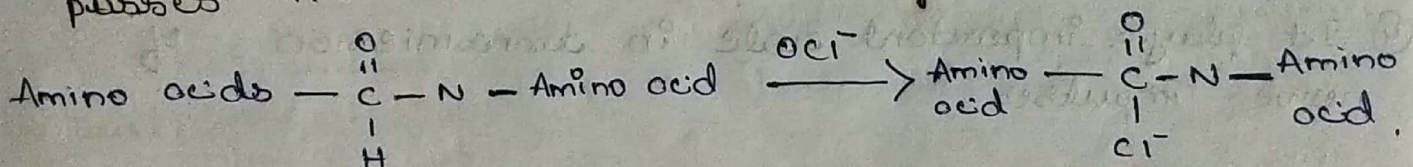


- ② Halogenation mechanism [chlorinated lime, Iodine]
- ① Compounds which are able to liberate chlorine act by this mechanism.
 - ② Compounds act on peptide linkage and alter its property.

③ This alteration of protein causes death of micro-organisms

Ex: ① protein molecule is composed of variety of amino acids connected through a peptide linkage

② Hypo-chlorites chlorinates peptide linkage & passes its antimicrobial activity

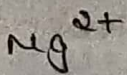
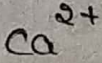
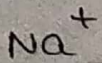


③ protein ppt. [AgNO₃, selenium sulphate]

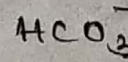
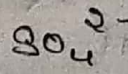
- ① It is based on chemical interaction b/w compound and microbial protein
- ② This interaction results in death of microbes
- ③ This action is generally non-specific: protein precipitants are not able to distinguish the protein of microbes and the host
- ④ In high concentration it will affect both microbes & host proteins

⑥ Name the major physiological ions and write their role in the body?

① Cations



② Anions



phosphates

① Sodium (Na^+)

- ① Sodium in association with chloride and bicarbonate regulates acid-base equilibrium.
- ② It helps in maintaining osmotic pressure of various body fluids.
- ③ It helps in preserving normal irritability of muscle and permeability of cell.
- ④ It plays important role in transmission of nerve impulses.

② Potassium (K^+)

- ① It plays vital role in contraction of muscle.
- ② Maintaining electrolyte composition of various body fluids.
- ③ It helps to regulate pH.
- ④ It plays important role in transmission of nerve impulses.

③ calcium (Ca^{2+})

- ① It plays vital role in functioning of nerves and muscle.

④ magnesium (Mg^{2+})

- ① It activates enzyme which are involved in carbohydrates and protein metabolism.
- ② It plays important role in transmission of nerve impulse.

⑤ chloride (Cl^-)

- ① chloride ion in association with sodium regulates acid-base equilibrium.
- ② It helps in maintaining osmotic pressure of various body fluids.
- ③ chloride ions is able to maintain the charge balance b/w the body fluids.

⑥ sulphate (SO_4^{2-})

- ① It plays vital role in detoxication mechanism.

⑦ Bicarbonate (HCO_3^-)

- ① It helps in the maintenance of acid-base balance.

⑧ phosphates

- ① It play vital role in buffering system of the body.
- ② It also involved in erythrocyte-glucose metabolism.

⑦ Explain the mechanism of maintenance of physiological acid-base balance? Explain preparation and uses of dextrose-sodium chloride injection.

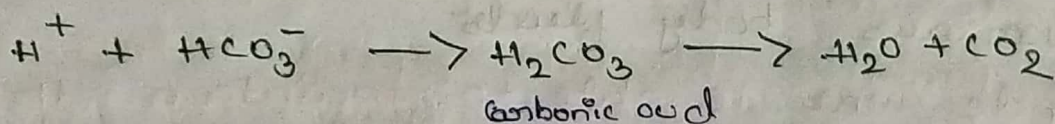
① Buffer Systems

Buffer system of the body does not allow rapid and drastic change in the pH of a body fluid by converting strong acids and bases into weak acids and bases.

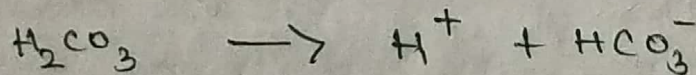
(i) bicarbonate buffer system

① It occurs in kidney. It is important regulator of blood pH.

②. In case of excess H^+ , the bicarbonate ion acts as a weak base and accepts H^+ to form carbonic acid, later dissociates to yield CO_2 & H_2O



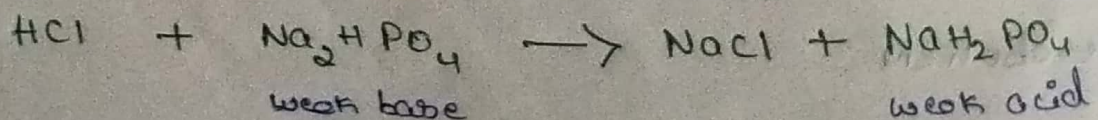
③. In case of storage of H^+ , the carbonic acid ionises to release more H^+ ions



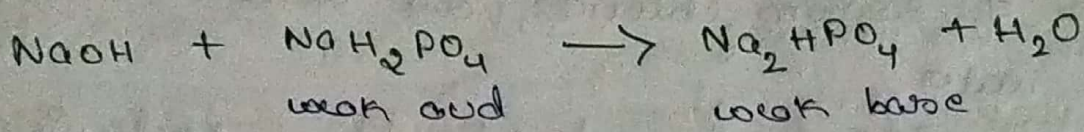
(ii) phosphate buffer system

① It occurs in cells and kidney. It is important regulator of blood pH in cytosol.

② In case of excess H^+ , the monohydrogen phosphate ion acts as weak base by accepting the proton



③ while the dihydrogen phosphate can act as the weak acid by donating the proton & neutralise the alkaline condition

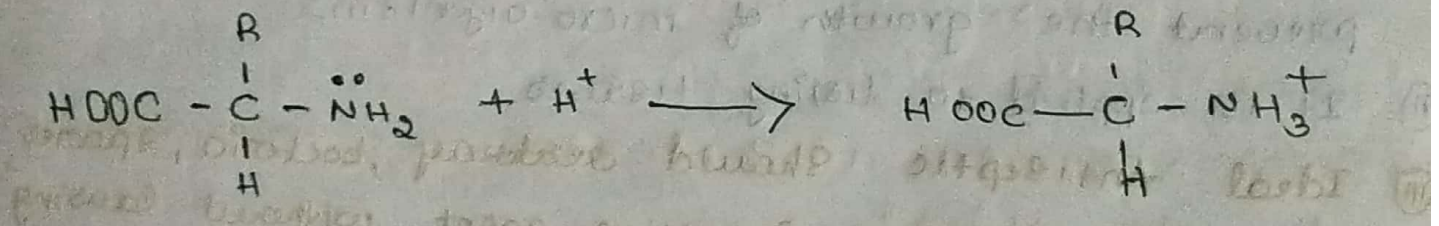


③ protein buffer system

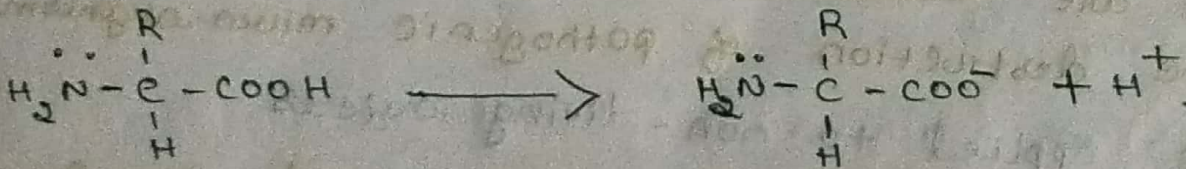
① It occurs in body cells and plasma

② proteins are composed of amino acids that are having atleast one carboxyl group and atleast one amino group

③ In excess of hydrogen ions, the aminogroup acts as a base and accepts the proton



④ In case of shortage of H^+ , carboxyl group can liberate protons to neutralise an alkaline condition



② Sodium chloride and Dextrose Injection

7

Preparation.

- ① It is prepared by dissolving the calculated quantities of sodium chloride and dextrose in purified water.
- ② It is sterilised immediately by autoclaving or by filtration.

uses

- ① It is used as fluid, nutrient and electrolyte replenisher.

⑤ mode of action of Antimicrobial Agents

① Antiseptics.

- ① These are substances which are able to kill or prevent the growth of micro-organisms.
- ② It is applied to living tissues.
- ③ Ideal Antiseptic should destroy bacteria, spores, viruses or any other infective agent without causing any harm to the tissue of the host.

② Disinfectants

- ① These are substance that prevent infection by the destruction of pathogenic micro-organisms.
- ② It is applied to non-living objects.
- ③ It is widely used for home and hospital sanitation.

③ Germicides.

① These are substances which kill micro-organisms.

② It includes

Bactericide → against bacteria

Fungicide → against fungi

Virucide → against viruses

④ Bacteriostatics.

① These are substances which inhibit the growth of bacteria.

② These agents do not kill but arrest the growth of bacteria.

⑤ Sanitizers

① Substance which are used to maintain general public health standards, are termed as sanitizers.

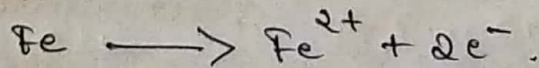
② It is mainly concerned with cleaning organic matter.

Q8) What is Redox titration? Take suitable Example & Explain Iodo and Iodimetry.

Ans. A titration which deals with the Reaction involving oxidation and Reduction of certain chemical species.

① oxidation

It is a process where an atom loses one or more e^-



oxidizing agent

It is a species which accepts one or more e^- and gets reduced.

② Reduction

It is a process where an atom accepts one or more e^-



Reducing agent

It is a species which donates one or more e^- and gets oxidized.

process of oxidation and reduction occurs simultaneously in a chemical reaction. Such reactions are called Redox reaction.

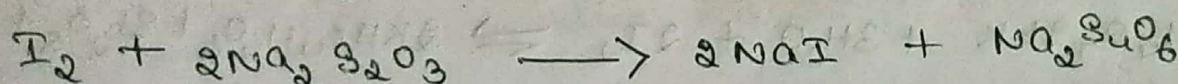
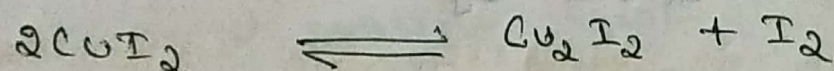
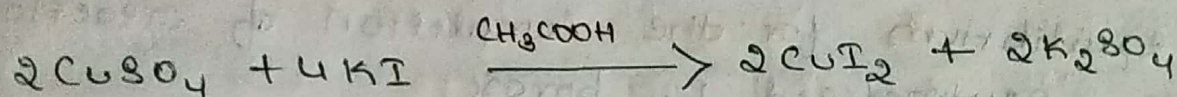
Iodometry

Iodometry deals with the titration of Iodine liberated in chemical reaction.

④ Assay of Copper Sulphate

Principle.

- ① The Assay of CuSO_4 is based on Iodometric titration
- ② Copper Sulphate is reduced by potassium Iodide to yield unstable cupric Iodide.
- ③ Cupric Iodide then converted into cuprous Iodide and Iodine.
- ④ liberated Iodine is then determined against Sodium thiosulphate by using Starch as an Indicator.



Sodium thiosulphate

Sodium tetrathionate

Estimation of CuSO_4 .

30 ml KI

IF $\rightarrow$ 10 ml CuSO_4 + 30 ml water + 3g KI +
5ml acetic acid + 2g potassiumthiocyanate
+ starch mucilage.

Burette $\rightarrow$ 0.1 N Sodiumthiosulphate

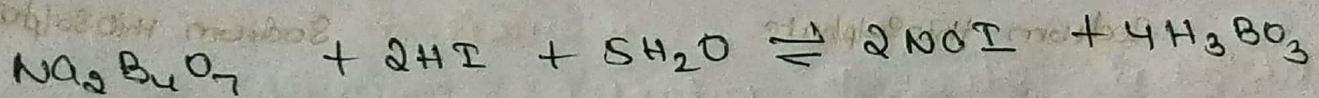
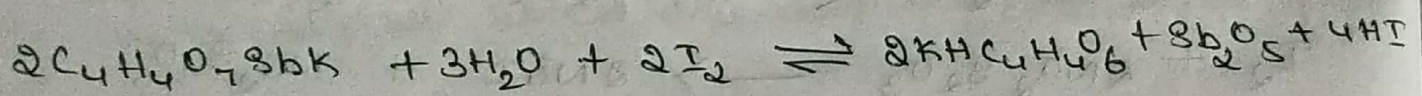
End point $\rightarrow$ Blue to colourless

0.02

Iodimetry -

Iodimetry deals with the titrations directly with the Iodine solution.

- ① Assay of Antimony potassium tartarate.
- ① The Assay of Antimony potassium tartarate is based on Iodimetric titration
- ② Iodine acts as oxidizing agent which oxidises Antimonous to Antimonic state
- ③ During the titration there is a liberation of Hydroiodic acid, which tends to disturb the equilibrium for the completion of reaction. It is neutralised by borax.



Estimation of Antimony potassium tartarate

IF $\rightarrow$ 0.5 g of Antimony potassium tartarate + 50 ml water
5g Sodium potassium tartarate + 2g borax
+ starch mucilage

Burette $\rightarrow$ 0.1 N Iodine

End point $\rightarrow$ pale pink to permanent blue

0.01

Q) What are non-aqueous titrations? Explain in detail the type of solvents used in NAT write a note on application in pharmacy.

Ans: ① Non-Aqueous titrations are titration which are carried out in non-aqueous solvents i.e. solvents other than water.

② NAT are preferred when reactants are insoluble in water.

Types of Solvents.

① Aprotic Solvents

① These solvents are chemically inert or doesn't donate or accept protons therefore they don't have any acidic or basic nature.

② These solvents have less dielectric constant.

Ex: Chloroform, benzene.

② protogenic solvent.

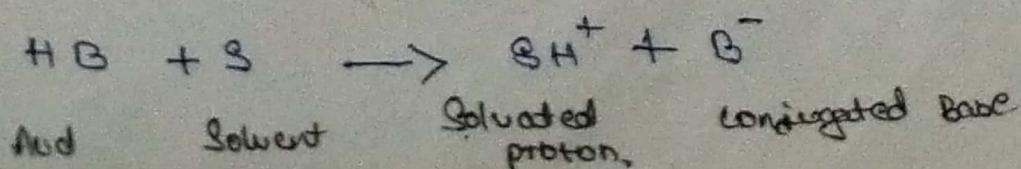
① These are the solvents which readily donate protons and are acidic in nature.

Ex: HCl , H_2SO_4 .

③ protophilic solvent.

① These are solvents which have high affinity for protons and are basic in nature.

② they produce solvated proton by abstracting proton from A^+D .



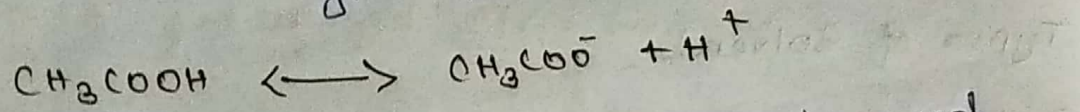
Ex: Amines, Ketones

Amphiprotic Solvent

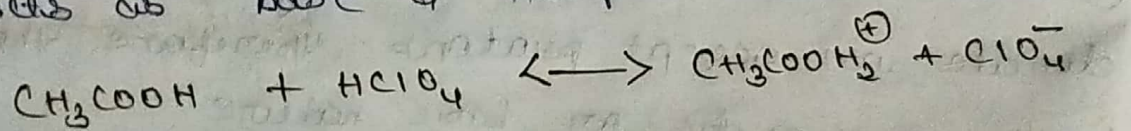
① These are the solvents which are able to donate as well as accept protons, i.e. they possess both protophilic and protogenic properties

Ex: Alcohol, water, Acetic acid

Ex: ① Acetic acid act as an acid by dissociation to give protons



② In presence of strong acid like perchloric acid + It acts as base & accepts protons



Application in pharmacy

① NAT is used in Titration of water Insoluble drugs -

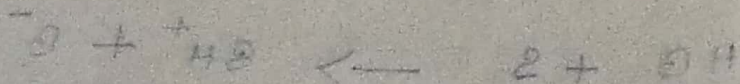
② used in titration of weakly acidic and basic drugs

③ Titration of water sensitive drugs
Ex: Aspirin.

④ used in titration of 2 or more weakly acidic and basic drugs.

⑤ NAT are simple and accurate

Ex: Ephedrine preparation



(10) what are complexometric titration? list out different complexometric titration with example or EDTA.

(1) complexometric titration is a titration which involves reaction b/w metal ions and complexing agent.

(2) In complexometric titration formation of colored complex is used to indicate the end point of a titration.

Different types of complexometric titration.

(1) Direct Titration.

Ex: MgCO_3 , CaCl_2 can be estimated.

(2) Back Titration

Ex: aluminium hydroxide gel, calcium phosphate can be estimated.

(3) Replacement Titration

Ex: Lead, mercury can be estimated.

(4) Alkalimetric titration, of metals

Ex: phosphates can be estimated

11) Define and classify precipitation titration? Explain Volhard's, modified Volhard's, Mohr's & Fajans method

Ans: ① precipitation titration are the titrations that involves the formation of precipitate

② silver nitrate is the most important and mainly used precipitating agent and titrations which use silver nitrate as a precipitating agent is called argentometric titration.

Types

① Direct titration

② Indirect titration

~~Class~~
Different methods

① modified Volhard's method

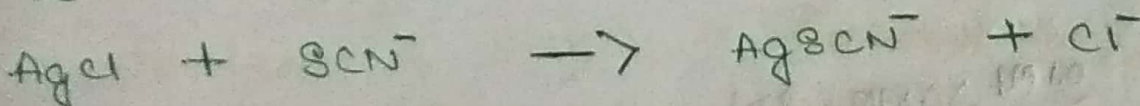
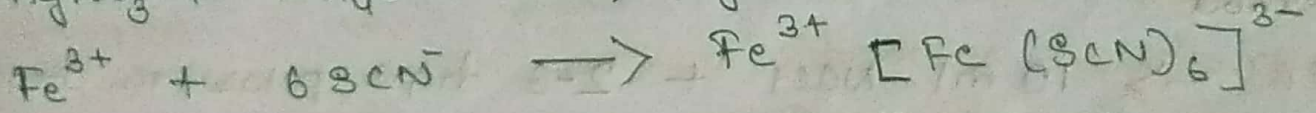
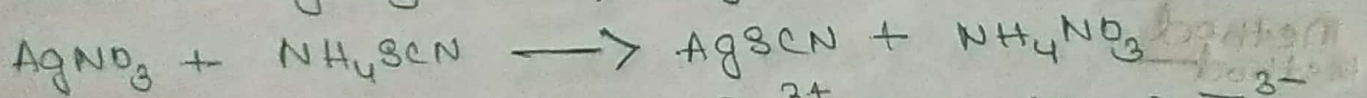
② Volhard's method

③ Mohr's method

④ Fajans's method

① Assay of Sodium chloride

- ① The Assay of Sodium chloride is based on modified Volhard's method.
- ② Known quantity of AgNO_3 reacts with NaCl to yield AgCl .
- ③ Excess AgNO_3 is titrated back with 2nd soln of Ammonium thiocyanate.
- ④ At the endpoint excess thiocyanate reacts with Ferric ion of ferric ammonium sulphate to yield red colour due to formation of ferroferric thiocyanate.
- ⑤ The unwanted reaction b/w AgCl and thiocyanate can be prevented by adding nitrobenzene before titration with thiocyanate.



Method :-

CF $\rightarrow$ 10ml NaCl + 50ml AgNO_3 + 3ml conc HNO_3
+ shake well + 5ml Nitrobenzene + Ferric alum

Burette $\rightarrow$ 0.1 N Ammonium thiocyanate

End point $\rightarrow$ untill Reddish brown appears

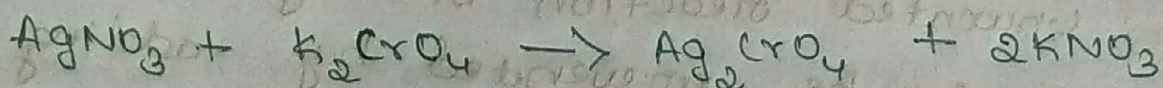
0.005

② Mohr's method.

① The Assay of Sodium chloride is based on Mohr's method.

② known quantity of AgNO_3 reacts with NaCl to yield AgCl

③. when all the chloride of sodium chloride is consumed, AgNO_3 reacts with potassium chromate to yield reddish brown colour due to formation of silver chromate.



potassium
chromate

silver
chromate

potassium
nitrate

Method.

CF $\rightarrow$ 10 ml NaCl + 2-3 drops potassium chromate

Burette $\rightarrow$ 0.1M AgNO_3 sol

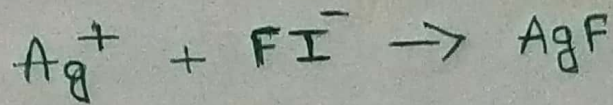
End point $\rightarrow$ until reddish brown appears.

IP = 0.005 ml

itself is the standardization of AgNO_3

③ FAJAN'S METHOD

- ① Fajen's method is based on the use of Adsorption Indicators.
- ② Fluorescein are adsorbed to the surface of colloidal AgCl.
- ③ After all chloride is used, the first drop of Ag^+ will react with Fluorescein forming reddish brown colour.



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method

CF $\rightarrow$ 10 ml NaCl + 1g dextrin + 2-3 drops Dichloro fluorescein

Burette $\rightarrow$ 0.1 M AgNO_3 soln

End point $\rightarrow$ until reddish brown colour appears.

⑫ mechanism of action of Indicator (cont.)

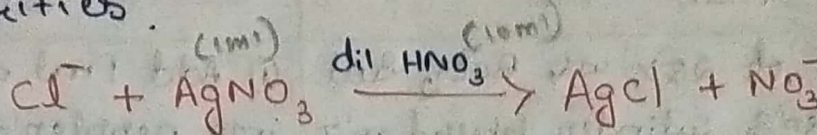
Theory of adsorption Indicators.

- ① Fajen's method is based on the use of Adsorption Indicators.
- ② Fluorescein are adsorbed to the surface of colloidal AgCl.
- ③ The adsorption process causes change in colour of Indicator.
- ④ Fajen adsorption Indicators are weakly acidic organic compounds in alkaline condition will exist as conjugate base. It is the form of the Indicator which interacts with the ppt.

5 mark important concepts

① Limit test for chlorides

principle:- Limit test for chloride is based on reaction between AgNO_3 and soluble chloride in presence of dil HNO_3 , to give AgCl precipitate. The AgNO_3Cl produced make the solution opalescent. The extent of opalescence depends upon amount of chloride impurities present in pharmaceutical compound. The opalescence produced by given pharmaceutical compound is compared with std containing known amount of chloride impurities.



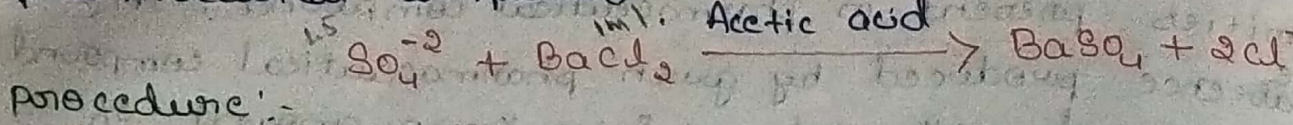
Test	Standard
① Dissolve given pharmaceutical compound in neosler cylinder labelled as 'T' in minimum quantity of water	① Add 1ml of standard chloride solution in neosler cylinder labelled as 'S'
② Add 10ml of dil HNO_3	② Add 10ml of dil HNO_3
③ make up to 50ml with distilled water	③ make up to 50ml with distilled water
④ Add 1ml of 1M AgNO_3 solution	④ Add 1ml of 1M AgNO_3 solution

Storn well set aside for 5 minutes compare Test opalence with that of standard
Role of Reagents.

- ① Standard chloride solution:- It provides maximum amount of chloride impurities within a pharmacopial limit to produce standard opalescent.
- ② Dilute HNO_3 :- It destroys unwanted interfering radicals like carbonates and phosphates. It provides acidic medium. It increases the sensitivity of reaction
- ③ AgNO_3 :- Acts as precipitating agent and converts all soluble chlorides into insoluble silver chloride.

② Limit test for Sulphates

Principle: Limit test for sulphate is based on reaction between BaCl_2 and Soluble Sulphates to form insoluble BaSO_4 in presence of acetic acid. BaSO_4 produced make the solution opalescence. Extent of opalescence depends upon Soluble Impurities present in pharmaceutical compound.



procedure:-

Test	Standard
① Add 1 ml of 25% w/v BaCl_2 Sol into neubler's cylinder labelled as 'T'	① Add 1 ml of 25% w/v BaCl_2 Sol into neubler's cylinder labelled as 'T'.
② Add 1.5 ml of Standard ethanolic Sulphate Solution	② Add 1.5 ml of Standard ethanolic Sulphate Solution.
③ mix and Allow it for 1 min	③ mix and Allow it for 1 min
④ Add 15 ml of Sample solution prepared	④ Add 15 ml of Std Sulphate Solution
⑤ Add 3 drops of 5M acetic acid	⑤ Add 3 drops of 5M acetic acid
⑥ make up to 50 ml with distilled H_2O	⑥ make up to 50 ml with distilled water

Stir well. Set aside for 5 minutes compare Test opalescence with that of standard.

- ① Standard Sulphate Solution: provides maximum amount of Sulphate Impurities within the pharmacopial limit to produce standard opalescence.
- ② Acetic acid: It destroys unwanted Interfering radicals like carbonates and phosphates. It provides Acidic medium. It increases Sensitivity of reaction.
- ③ BaCl_2 : precipitating agent, converts all Soluble Sulphate Impurities into insoluble BaSO_4 .
- ④ Standard ethanolic Sulphate Solution: It increases Sensitivity of reaction. If the amount of BaSO_4 formed is very less then it is not clearly visible because some small amount of BaSO_4 is Soluble in such case. Ethanolic Sulphate Solution reacts with BaCl_2 and forms BaSO_4 .

So that all the Sulphate ions which are present as an impurity, can be precipitated and ethaned prevents Super Saturation.

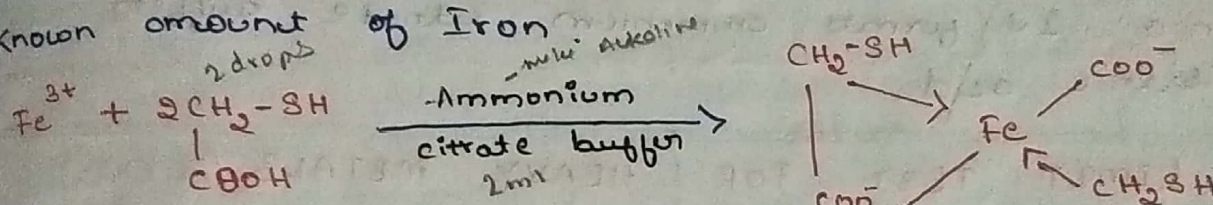
② LIMIT TEST FOR IRON

principle: It is based on the formation of pale pink to reddish purple colour complex by reaction b/w Fe^{2+} ion thioglycolic acid in presence of ammonium citrate buffer.

The pale pink to reddish purple colour is due to formation of co-ordination of compound ferrous thioglycollate.

If Iron is present in Fe^{3+} form then it is reduced to Fe^{2+} by thioglycolic acid.

The colour produced by given compound is compared with colour produced by standard containing known amount of Iron.



Ferrous thioglycollate compound.

Procedure:

Test	Standard
① Dissolve given compound in a nessler cylinder as 'T' in 40 ml of distilled H_2O	① Add 2 ml of standard Iron solution in a nessler cylinder labelled as 'S'
② Add 2 ml of 20% $\frac{w}{v}$ Iron free citric acid	② Add 2 ml of 20% Iron free citric acid
③ Add 2 drops of Iron free thioglycolic acid	③ Add 2 drops of Iron free thioglycolic acid
④ make alkaline with Iron free ammonia solution	④ make alkaline with Iron free ammonia solution
⑤ Make upto 50 ml with distilled H_2O	⑤ Make upto 50 ml with distilled H_2O .

Role of reagents

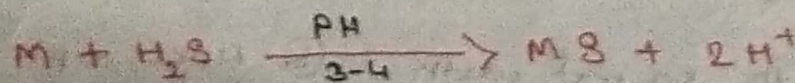
- ① Standard Iron Solution: It provides maximum amount of Iron Impurities within pharmacopoeal limit to produce Standard Colour.
- ② 20% $\frac{w}{v}$ Iron free citric acid: It eliminates Interfering metal cations. It forms ammonium citrate buffer with ammonia. It prevents precipitation of Iron by ammonia, by forming a soluble non-Interfering Iron complex.
- ③ Thioglycolic acid: It reduces Fe^{3+} to Fe^{2+} . It increases sensitivity of reaction and it forms a coloured complex ferrous thioglycolate with ferrous form of Iron.
- ④ Ammonia: It forms ammonium citrate buffer with citric acid.

④ LIMIT TEST FOR HEAVY METALS (LEAD)

Principle: Limit test for heavy metal is based on reaction b/w Sulphide and heavy metals. In this reaction heavy metals reacts with hydrogen sulphide in pH range of 3-4.

The reaction product ^{are} sulphides of respective metals. The sulphide formed are distributed in colloidal state and make the solution brownish to black in colour.

The Intensity of colour depends on quantity of heavy metals present. The colour produced by given pharmaceutical compound is compared with colour produced by standard containing known amount of heavy metals in the form of lead.



Test	Standard
① Dissolve the specified quantity of given compound in 25 ml distilled H_2O in neoblen cylinder labelled as 'T'	① Add 2 ml of Standard lead solution into neoblen cylinder labelled as 'S' in 25 ml of dist H_2O .
② Adjust PH blue 3-4 by adding dilute Acetic acid (or) dil Ammonia soln by using PH paper	② Adjust PH blue 3-4 by adding dil CH_3COOH (or) dil Ammonia solution. PH paper.
③ Add 10 ml of freshly prepared H_2S	③ Add 10 ml of freshly prepared H_2S .
④ mix thoroughly make upto 50 ml with dist H_2O	④ mix thoroughly make upto 50 ml with dist H_2O .

Stir well and keep aside for 5 minutes. Compare test colour with Standard colour

Role of reagents

① **Standard lead solution**: It provides maximum amount of heavy metals impurities in the form of lead with in a pharmacopoeial limit to produce standard colour

② **Dil Acetic acid**: They are used to adjust the PH between 3-4. Since Sulphides of various heavy metals are stable at that PH.

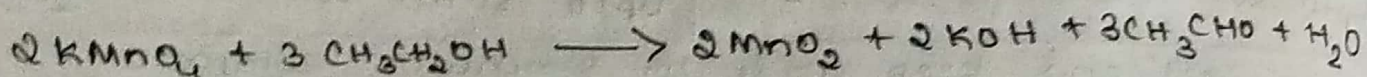
⑤ Discuss the Importance of limit test.

- ① To find out the harmful amount of impurities
- ② To find out avoidable / unavoidable amount of impurities.

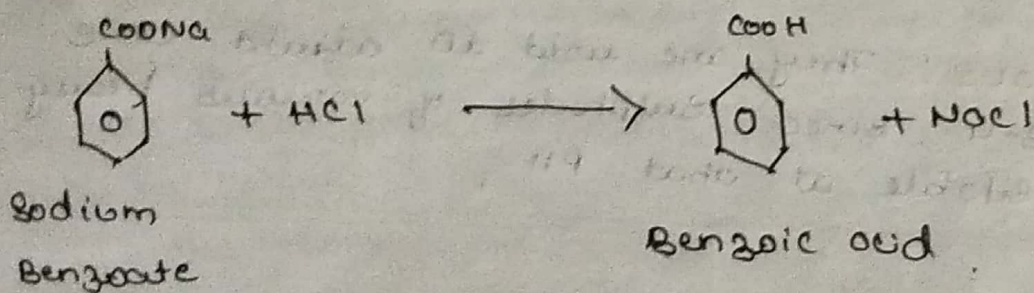
⑤ Modification in limit test.

principle: Limit test cannot be carried out directly for the substance which are insoluble in H_2O highly coloured, oxidizing and reducing agents having alkaline in nature. They require suitable modification.

$KMnO_4$: It is a coloured substance which interferes with opalescence and hence it is decolourised by reduction with ethyl alcohol. The precipitate MnO_2 is separated by filtration and filtrate containing soluble Cl^- and SO_4^{2-} impurities are used for limit test. Excess of Ethyl alcohol is oxidised to acetaldehyde.



Sodium Benzoate:- It is a salt of organic acid. They liberate water insoluble benzoic acid upon acidification. The insoluble organic acid is separated by filtration and filtrate containing soluble chloride and Sulphate impurities are applied for limit test.

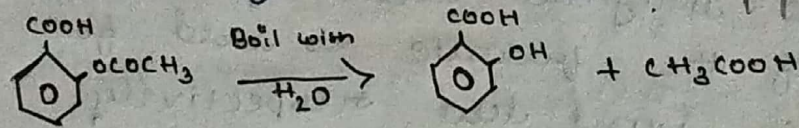


Sodium bicarbonate: It is an alkaline substance. It is to be dissolved in excess of acid then prescribed. Since some amount of acid is utilized by $NaHCO_3$ for neutralization.



Aspirin :- It is a water Insoluble organic substance hence soluble Cl^- and SO_4^{2-} impurities are extracted with H_2O and then filter to separate aspirin. The filtrate containing Cl^- and SO_4^{2-} impurities is used for limit test.

procedure :-



① KMnO_4 :-

Dissolve 1g of KMnO_4 in 50ml of distilled H_2O heat on waterbath till it dissolve completely and add gradually 4ml of alcohol until the mixture is colourless, filter the solution. Each 20ml of filtrate used for the chloride and sulphate limit test respectively.

② Sodium benzoate.

① Dissolve 1g of Sodium benzoate in 40ml of distilled H_2O and add 1ml of nitric acid and filter then chloride limit test is carried out by employing general procedure.

② Dissolve 1g of Sodium benzoate in 40ml distilled H_2O & add 1ml of HCl and filter then sulphate limit test is carried out by general procedure.

③ Sodium bicarbonate.

① Dissolve 1g of NaHCO_3 with addition of 2ml HNO_3 then chloride limit test is carried out by employing general procedure.

② Dissolve 1g of NaHCO_3 in 10ml of distilled H_2O with addition of 2ml HCl then sulphate limit test is carried out by employing general procedure.

④ Aspirin.

Calibrate the beaker for 75 ml, boil 2.5g of Aspirin with 75ml of distilled H_2O for 5 min. Cool and add sufficient distilled H_2O to restore the original volume of 75ml and filter. Each 25ml of the filtrate is used for chloride and sulphate limit test respectively.

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⑥ (i) Define cathartics?

(ii) what are GIT agents? classify them with ex? write a note on acidifiers.

① Ans: Cathartics are drugs which are able to bring about defecation.

Ex: $MgSO_4$.

(ii) GIT agents are drugs used to control gastric acidity, gastrointestinal mobility, water flow and improve digestion.

① Acidifiers

Ex: ① Dil HCl

② NH_4Cl

② Antacids

Ex: ① Aluminium hydroxide gel

② Calcium carbonate

③ Cathartics

Ex: ① $MgSO_4$

② $Mg(OH)_2$

④ protective & Absorbents

Ex: ① Milk of Bismuth

② Bismuth Subcarbonate

Acidifiers

These are the drugs which are able to increase the acidity, in GIT, it is used to increase gastric HCl.

① Gastric acidifier: These are drugs used to increase acidity temporarily. 19

② Urinary acidifier: These are drugs which are used to provide acidic urine to enable treatment of some type of urinary tract disorder.

③ Systemic acidifier: These are the drugs which are able to neutralize the alkaline body fluids.

④ Acids: These are used as pharmaceutical aids in preparation, laboratory quality control etc.

⑦ What are Saline cathartics? What is their mechanism of action?

Ans: Saline cathartics are GIT agents which stimulate peristalsis.

① These act by increasing the osmotic load of Intestine by absorbing large quantity of water and thereby stimulate peristalsis.

② Saline cathartics are water soluble inorganic chemicals and they are taken with plenty of water. This is helpful in moderating excessive loss of body fluid and reduces Nausea & vomiting.

③ The saline cathartics are relatively free from side-effects when taken for brief periods.

④ They may be administered by oral route and rectal route.

⑤ The saline cathartics are generally used for their mild purgative action.

⑥ These are taken in the form of Suspension, Tablets or any other suitable formulation.

Ex: $MgSO_4$, $Mg(OH)_2$.

⑧ Write composition & uses of Talc & Kaolin & Magnesium Trisilicate

① TALC

Composition: It is composed of Hydrated Magnesium Silicate
 $[H_2Mg_3(SiO_3)_4]$

- uses: ① In pharmaceuticals
② In cosmetics
③ To manufacture paper

② KAOLIN

Composition: It is composed of Hydrated Alumino Silicate

- uses: ① In cosmetics
② To manufacture paper

③ MAGNESIUM TRISILICATE

Composition: It is composed of Magnesium oxide
Silicon dioxide

- uses: ① To treat ulcers
② As Antacid

⑨ what are dental products? Discuss role of fluorides in dental caries

Ans: Inorganic compounds and their formulations which are used in maintaining the oral and dental hygiene are known as dental products.

① The deposition of fluorides on the surface of the teeth prevents the action of acids in cavities.

② Fluorides hardens the enamel and makes it more acid resistant.

③ Fluorides possesses some antibacterial activity and helps in remineralization of enamel.

④ A trace amount of fluorides in drinking water is enough to prevent dental caries.

⑩ what are Dentifrices? classify them with Ex.

Ans: Dentifrices is a material which is used for cleaning teeth surface and providing polishing effect on the cleaned teeth.

Two types.

① Abrasive dentifrices

used to remove extrinsic staining occurs on tooth

Ex: Calcium carbonate

Calcium phosphate

② Therapeutic dentifrices.

used to reduce mouth disease such as dental caries, tooth sensitivity etc

Ex: Sodium metaphosphate

Strontium chloride

peroxide.

⑪ what is electrolyte combination therapy? Explain ORS

① When a patient undergoes a surgery, he is unable to take normal diet. So he is given infusions containing saline and glucose. This is sufficient for short-term therapy 20

② But when the patient is deficient or in severe illness, he also needs additional electrolytes which are intended for fluid maintenance of the body

③ usually the combination of electrolytes are prepared and given to the patient according to his requirement. This type of treatment is called electrolyte combination therapy.

④ Electrolyte combination products are in two categories

① Fluid maintenance

② Electrolyte replacement.

⑤ Important products of combination therapy are

① Compound Sodium lactate Injection

② Compound Sodium chloride Injection

③ ORS.

⑥ ORS - Oral Rehydration Salts.

① The preparation of ORS consists of glucose, sodium chloride, potassium chloride, sodium bicarbonate

② These preparations are mixed in specific amount of water and used for oral rehydration therapy

③ These preparation also contains flavouring agent & preservatives etc.

Rx

sodium chloride	1.0 g
potassium chloride	1.5 g
sodium bicarbonate	1.5 g
glucose	40.0 g

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Q12. write a note on electrolyte replacement therapy.

- ① Various conditions such as prolonged fever, vomiting, diarrhoea, causes heavy loss of water and electrolytes.
- ② In order to compensate this, administration of lost electrolyte is essential.
- ③ Two types of solution in electrolyte replacement therapy.
 - (i) solution for rapid initial treatment
 - (ii) solution for subsequent replacement
- Q13. Important products of electrolyte replacement therapy.
 - ① Sodium chloride solution.
 - ① It is prepared by dissolving NaCl in purified water and it is clarified by filtration.
 - ② Then it undergoes test for sterility.
 - ② Sodium chloride eye lotions.
 - ① It is prepared by dissolving NaCl in purified water, then it is filtered.
 - ② It is sterilised by heating in an autoclave.

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③ Sodium chloride Injection

Rx

Sodium chloride 9g

water for Injection 1000 ml,
to produce

It is prepared by dissolving sodium chloride in water for injection, filtered, & sterilised by heating in an Autoclave.

④ Sodium chloride and dextrose injection

① It is prepared by dissolving the calculated quantity of Sodium chloride and dextrose in purified water, then it is filtered.

② Finally it is sterilised by heating in an Autoclave.

uses: It is used as fluid, nutrient, electrolyte replenisher.

uses of
NaCl Injection

① Electrolyte Replenisher

② It is a constituent of Ringer's Solution

⑬ Define, ① Accuracy ② precision ③ Significant figures ④ Quality control

① Accuracy

① The term Accuracy refers to the agreement of experimental result with the true value. It is usually expressed in terms of error.

② It is usually a mean calculated from the results of several experiments.

② precision
① It may be defined as degree of agreement b/w various results of the same quantity.

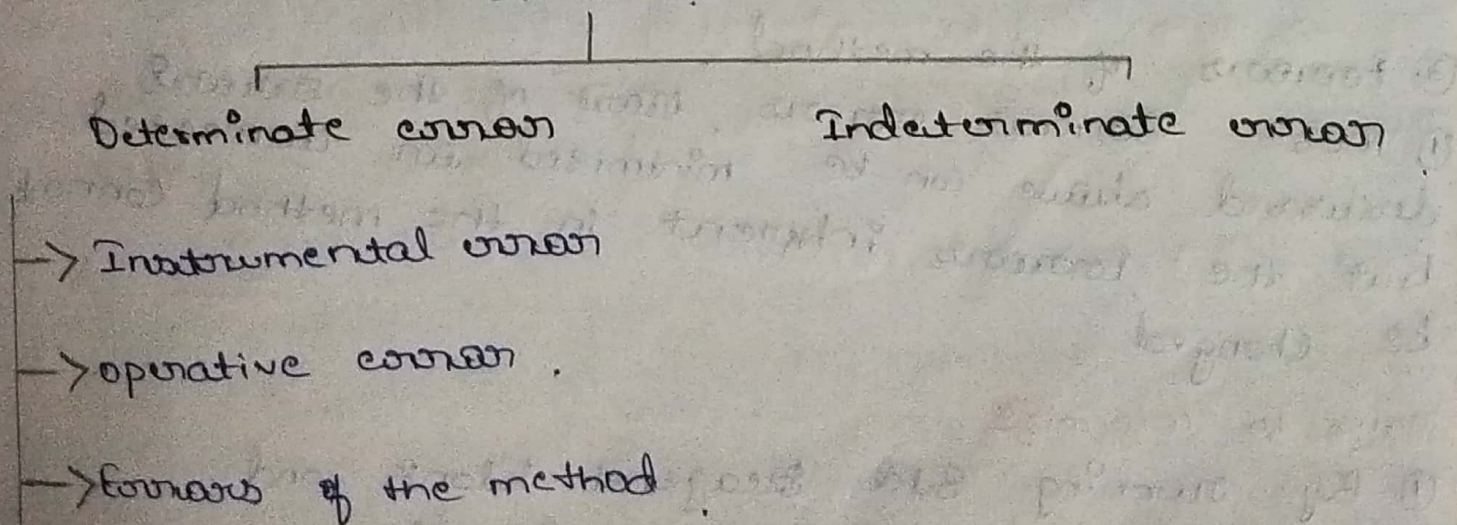
③ Significant figures
① The no of significant figures is the no of digits which are necessary to express results

② Sample weight 15.6g in rough balance and 15.5988 in analytical balance
First value has 3 significant figures and second value six significant figures

④ Quality control
① It is a set of procedure employed to ensure that a manufactured product adheres to a defined set of quality criteria or meets the requirement of the client or customer.

⑤ Explain different source of errors in volumetric analysis and ways to minimize them.

ERRORS



Determinate Errors

As the name implies, these errors are determinable
It can be avoided or corrected

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① Instrumental Errors

① These errors are common to all instruments which has limited accuracy

ways to minimize

① In case of volumetric analysis, the glass apparatus like burette, pipette are calibrated

② operative errors

① It includes personal error and can be reduced by experience.

② These errors occur during transfer of solutions incompletely, drying, bumping out of sample etc

③ other personal errors include mathematical errors in calculation, incorrect judgement of colour

ways to minimize

① It can be reduced by experience

③ Errors of the method

① Most serious errors. Most of the errors discussed above can be minimised or corrected but the errors inherent in the method cannot be changed.

ways to minimize

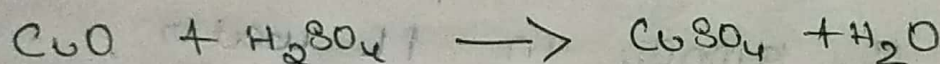
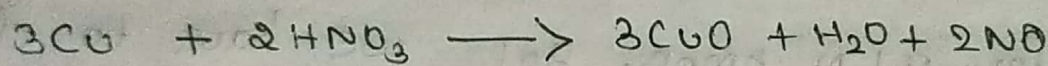
① By running Std Reagent blank and subtracting results from sample

Indeterminate errors

- ① These errors are cannot be predicted or determined.
- ② They are revealed by small differences in successive measurements made by same analyst

15 Explain the preparation & uses of copper Sulphate?

- ① on treating copper with HNO_3 cupric oxide is formed.
- ② cupric oxide on reacting with H_2SO_4 yields copper Sulphate.



uses

- ① As an emetic
- ② As an chemical Antidote, & fungicide
- ③ As astringent
- ④ Ingredient of Benedict's reagent and Fehling's reagent.

16) Write the preparation and standardization of 0.1 N potassium permanganate

① 0.1 N potassium permanganate

$$\text{Equivalent wt of } \text{KMnO}_4 \text{ in Acidic medium} = \frac{\text{Molecular wt}}{\text{no of } e^-}$$

$$= \frac{158}{5} = 31.6$$

$$31.6 \text{ g} \rightarrow 1 \text{ L} \rightarrow 1 \text{ N}$$

$$3.16 \text{ g} \rightarrow 1 \text{ L} \rightarrow 0.1 \text{ N}$$

So for 0.1 N KMnO_4 sol, we have to dissolve 3.16 g of KMnO_4 in 1 L water

② Standardization of 0.1 N KMnO_4

CF $\rightarrow$ 10 ml 0.1 N oxalic acid + 20 ml 1M H_2SO_4 + warm

Burette $\rightarrow$ 0.1 N KMnO_4

End point $\rightarrow$ colourless to pale pink

0.001

17) What is permanganometry titration? Explain with one example

Ans: It is

① It is a redox titration in which the use of permanganates and is used to measure the amount of analyte present in unknown chemical samples.

② Explain Assay of H_2O_2

(18) Explain different types of redox titrations with Examples.

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① Permanganometry.

① The titration which employs potassium permanganate as an oxidising agent is called permanganometry.

② Potassium permanganate is a powerful oxidizing agent and it is used as a self indicator due to its intense colour.

③ KMnO_4 is used in redox titrations by standardizing it with primary standard like oxalic acid. Therefore it is not a primary standard.

Ex: It is used for the assay of H_2O_2 .

② Dichrometry.

① The titration which employs potassium dichromate as oxidising agent is called Dichrometry.

② It is available in pure form and is less expensive.

Ex: It is used for determination of Iron in Iron ore.

It is used for determination of Chromium in Chromium salt.

③ Cerimetry.

① The Titration which employs ceric ammonium sulphate as an oxidizing agent is known as Cerimetry.

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Ex: It is used for assay of Ferrous fumarate.

④ Iodimetric titration

Iodometric titration

① Direct titration of Iodine

① Indirect titration of Iodine

② Iodine is used as titrant

② Iodine is not used as titrant.

③ It is carried out in alkaline solution

③ It is carried out in acidic condition

④ End point pink to blue

④ Endpoint blue to colourless

Eg: used in Assay of Antimony potassium tetraborate

Eg: used in Assay of Copper sulphate.

⑤ Bromometry

① The titration which employs potassium bromate as an oxidizing agent is known as Bromometry.

② It can be done by direct and indirect methods.

Ex: It is used for determination of phenols.

⑥ Titration with potassium Iodate

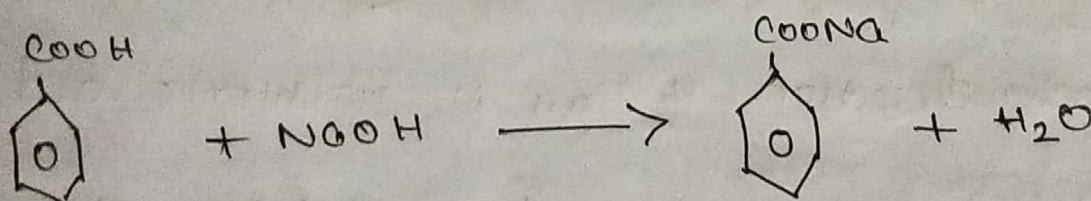
⑦ potassium Iodate is a powerful oxidizing agent and is used for various redox titration

Ex: It is used in determination of arsenic in arsenic compound.

⑩ Explain preparation, standardization and Assay principle of sodium benzoate & its method.

⑪ preparation of sodium benzoate.

⑫ Benzoic acid is treated with sodium hydroxide to give water soluble salt as sodium benzoate.



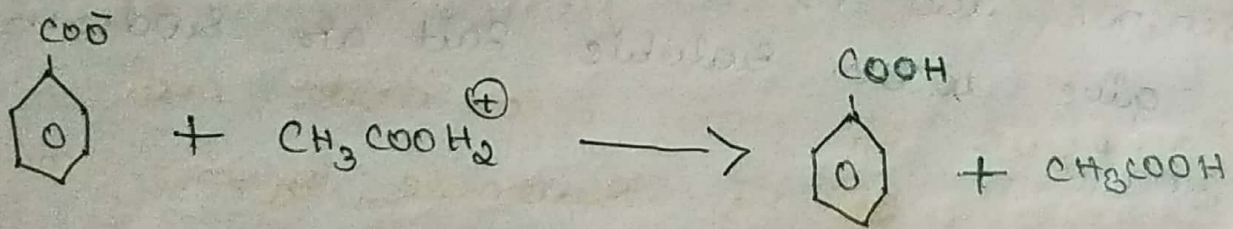
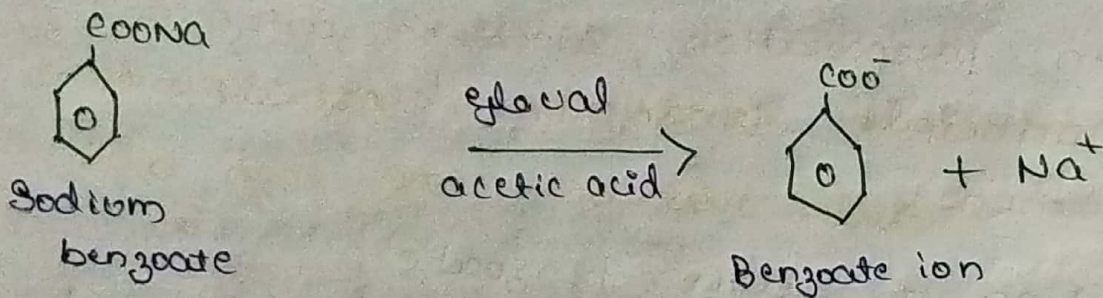
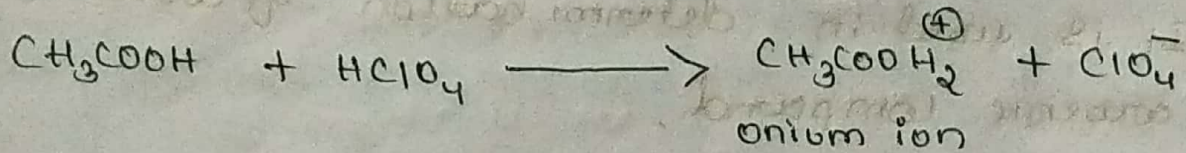
⑬ Assay principle.

⑭ The Assay of sodium benzoate is based on non-aqueous titration.

⑮ In presence of much stronger acids like perchloric Acid, Acetic acid behaves as a base and accepts a proton from perchloric acid to form onium ion.

③ Sodium benzoate ionizes in glacial acetic acid to yield benzoate ion and Sodium Ion

④ Benzoate ion accepts proton from onium ion to form benzoic acid and acetic acid.



⑤ Standardization of 0.1 N perchloric acid

CF $\rightarrow$ 0.35 g of potassiumhydrogenphthalate +
25 ml glacial acetic acid + crystal violet

Burette $\rightarrow$ 0.1 N perchloric acid

End point $\rightarrow$ violet to green.

0.02

④ Assay of Sodium benzoate

CF $\rightarrow$ 0.25 g sodium benzoate +
20 ml glacial acetic acid + crystal violet.

urette $\rightarrow$ 0.1 N perchloric acid

End point $\rightarrow$ Violet to green

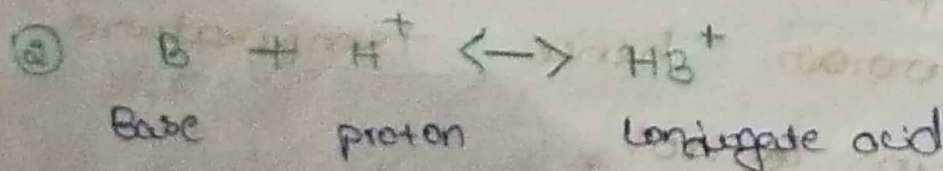
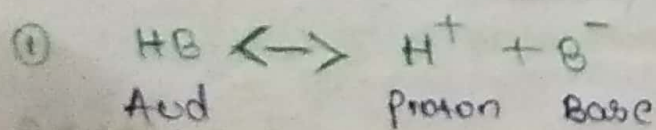
0.01

② Important conditions of Non-Aqueous titration

- ① The moisture content in non-aqueous titrations should not be more than 0.05%.
- ② Moisture and carbon dioxide are to be avoided in non-aqueous titration.
- ③ Titration of very weak acids and weak bases ~~can~~ is suitable by this technique.
- ④ Use of perchloric acid in anhydrous acetic acid is suitable for this procedure.
- ⑤ Small temperature difference can cause significant error hence temperature should be in control.

② Explain principle of NAT.

- ① Non aqueous titrations are the titrations which are carried out in non aqueous solvents, i.e. solvents other than water.
- ② It is most common titrimetric procedure used in pharmacopoeial assay.
- ③ It is suitable for titration of very weak acids and very weak base.
- ④ The most commonly used procedure is the titration of organic bases with perchloric acid in anhydrous acetic acid.
- ⑤ NAT are mainly based on Brønsted lowry theory which suggest that acid is a substance which donate proton and base is a substance which accepts proton.

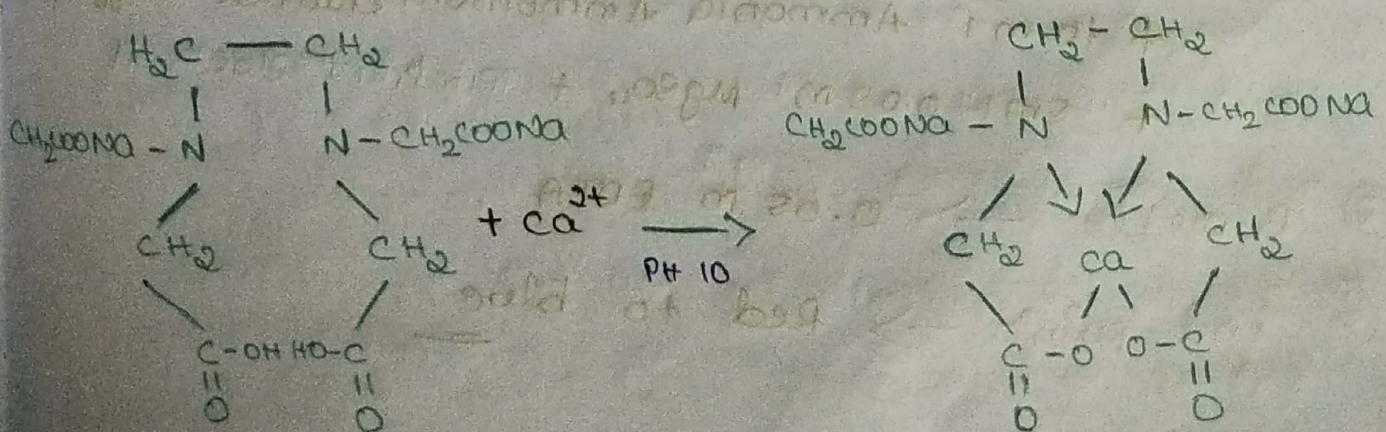


(22) write principle & Estimation of calcium gluconate & preparation & standardization of 0.05 M Disodium EDTA?

29

① principle of calcium gluconate.

- ① The Assay of calcium gluconate is based on complexometric titration
- ② Calcium Ions forms stable complex with EDTA and with Indicator mordant black II at PH 10
- ③ To maintain required PH ammonia ammonium chloride buffer is used.
- ④ The metal EDTA complex is more stable than metal Indicator complex.
- ⑤ At the equivalence
- ⑥ All calcium ions forms complex with EDTA
- ⑦ Dissociation of less stable metal Indicator complex is the end point of titration.



② preparation of 0.05M EDTA

molecular mass of EDTA = 372g

372g $\rightarrow$ 1L $\rightarrow$ 1M EDTA

18g $\rightarrow$ 1L $\rightarrow$ 0.05M EDTA

18g of EDTA is dissolved in 1L of water
to get 0.05M EDTA

③ standardization of 0.05M EDTA

① CF $\rightarrow$ 10ml 0.05M $MgSO_4$ + 20ml distilled water
+ 18ml ammonia ammonium chloride buffer
+ pinch of mordant, Block II

② Burette $\rightarrow$ 0.05M EDTA

③ End point $\rightarrow$ Red to blue

④ Estimation of calcium gluconate

① CF $\rightarrow$ 0.5g calcium gluconate + 40ml water
+ 10ml Ammonia Ammonium chloride buffer
+ 5ml 0.05M $MgSO_4$ + mordant, Block II

② Burette $\rightarrow$ 0.05M EDTA

③ End point $\rightarrow$ Red to blue

0.02

23) General principle involved in complexometric titration

31

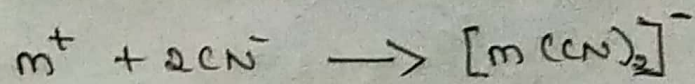
- ① complexometric titration is a titration which involves reaction b/w metal ions and complexing agent.
- ② metal ions form stable complex with ligand and with indicator.
- ③ To maintain required pH buffer is used.
- ④ The metal ligand complex is more stable than metal indicator complex.
- ⑤ At the equivalence.
- ⑥ All metal ions forms complex with ligand.
- ⑦ Dissociation of less stable metal indicator complex is the end point of titration.

24) Add a note on masking and demasking agent

- ① masking agent.
- ② It is the reagent which prevent interfering of ion in a reaction without physical separation.
- ③ A masking agent can be used to carry out determination of metal ion in the presence of another metal ion.

⑧ During the titration of metal ion using EDTA, EDTA may form complex with some of the impurities. These impurities can be masked using masking agent. 32

Ex: KCN is used as masking agent for Ag^+



⑨ Demasking Agents

① It is a reagent which makes masked substance reverts back to its ability to take part in the reaction.

Ex: - The masking of CN^- can be removed by mixture of formaldehyde & acetic acid.

⑩ write in detail theory of complexometric titration with ex & what is ligand?

Explain type of ligand with ex

① complexometric titration is a titration which involves reaction b/w metal ions and complexing agent.

② It is particularly useful for determination of mixture of different metal ions in solution.

③ Indicator capable of producing distinct colour change is used to detect the end point of titration. 33

④ In complexometric titration formation of colored complex is used to indicate the endpoint of titration.

Ex: Estimation of calcium gluconate.

Ligand.

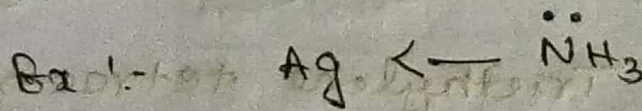
① ligand are the molecule bound to central metal atom by coordinate bonding to form co-ordination complex.

Classification.

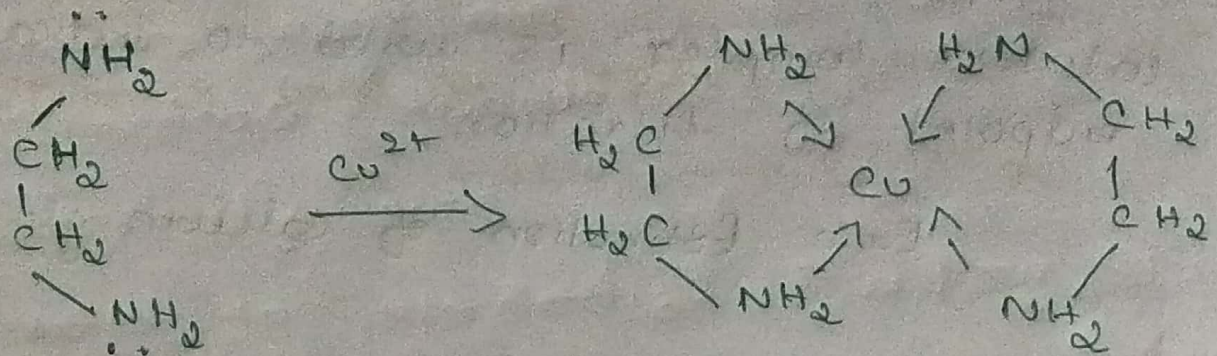
Depending on the no of donor atoms present in the ligand, ligand can be classified as.

monodentate ligand.

ligand which attach to central metal ion ~~via~~ through only one donor atom.

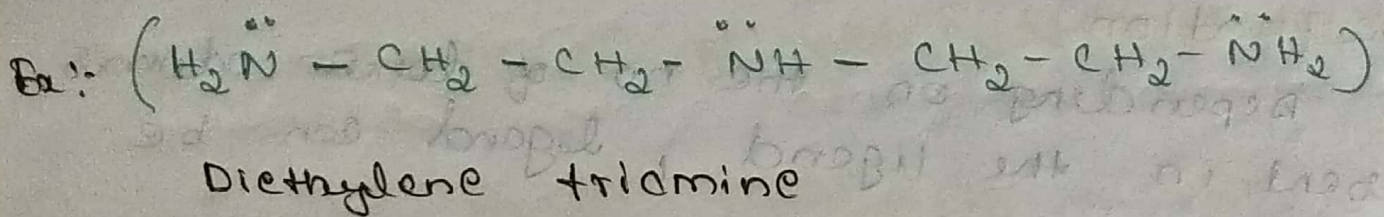


Bidentate ligand,
 ligand which attach to central metal
 ion through two donor atoms



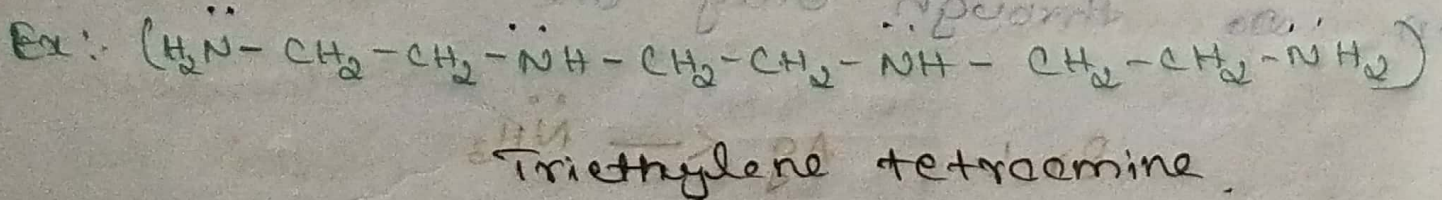
Ethylenediamine

Tridentate ligand
 through three donor atoms



Tetradentate ligand

Through four donor atoms

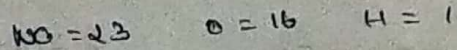


Hexadentate ligand

Through six donor atoms

Eg: EDTA

How do you prepare and standardize
0.1 N sodium hydroxide solution



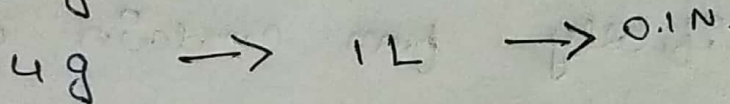
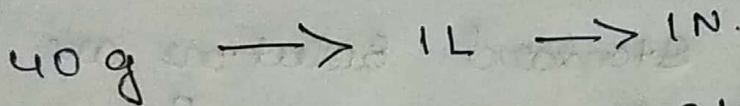
Sol.

① 0.1 N NaOH.

Equivalent
wt
of
NaOH

$$= \frac{\text{Mol wt}}{\text{no of e}^-}$$

$$= \frac{40}{1} = 40$$



So for 0.1 N NaOH sol, we have to
dissolve 4 g of NaOH in 1 L water

standardize

CF $\rightarrow$ 10 ml 0.1 N HCl + 50 ml H_2O + Methyl Red.

Burette $\rightarrow$ 0.1 N NaOH,

End point $\rightarrow$ Red to colourless

② what are primary & secondary standard substances.

① primary standard solutions are solutions made out of primary standard substance

② Extremely pure

③ used to standardize secondary standards

Ex:- potassium dichromate, potassium iodate
potassium hydrogen iodate

① Secondary standard solutions are solutions made specifically from certain analysis

② Not very pure

③ used for specific analytical experiments

Ex: potassium permanganate, perchloric acid

③ 0.1 N oxalic acid sol (126)

Equivalent wt
of
oxalic acid

$$= \frac{\text{Mol wt}}{\text{no of e}^-}$$

$$= \frac{126}{2} = 63g$$

$$62 \text{ g} \rightarrow 1 \text{ L} \rightarrow 1 \text{ N}$$

$$6.2 \text{ g} \rightarrow 1 \text{ L} \rightarrow 0.1 \text{ N}$$

So for 0.1 N oxalic acid, we have
to dissolve 6.2 g of oxalic acid in
1 L of solution

2 mark important concepts

① what are Inhalants.

Ans ① Inhalants are drugs which is in vapour form administered through respiratory system.

② It is intended for patient for diagnosis, therapy and to produce anaesthesia.

Ex: oxygen, carbon dioxide, Nitrous oxide

① oxygen (O_2) preparation.

By electrolysis of H_2O .

① Direct current is passed through a cell with the Iron electrodes which is immersed in aqueous sol of NaOH.

② oxygen liberated at anode & Hydrogen at cathode.

③ liberated oxygen is filled under high pressure in metallic cylinders.

20 Storage

oxygen is stored and supplied in metallic cylinders under high pressure.

labelling

- ①. cylinder is of grey body with black & white shoulder.
- ② Name and Symbol of oxygen are printed using paint on shoulder of cylinder

uses.

- ①. used as Inhalant in anaesthesia & in post operative condition
- ② 10 During gaseous poisoning and Artificial Respiration
- ③ Mixture of O_2 & He is used for patient with Severe lung damage

② 15 CO_2

preparation

Compounds have carbon like coal, coke & are burned with excess of oxygen to yield carbon dioxide

20



Storage

CO_2 is stored and supplied in metallic cylinders under High pressure

25

labelling

- ① cylinder is of grey colour.
- ② name and symbol of oxygen O_2 are printed using paint on shoulder of cylinder

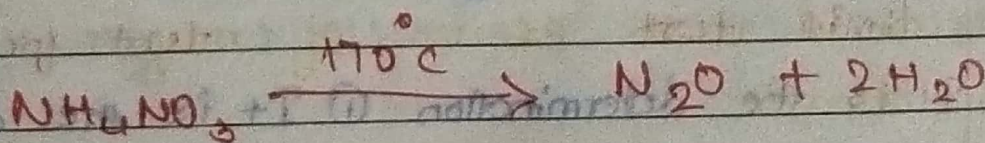
uses

- ① used as Respiratory Stimulator.
- ② used in monoxide poisoning.
- ③ Detoxification of Heroin addicts

③ Nitrous oxide (N_2O)

preparation

- ① It is obtained by thermal decomposition of Ammonium nitrate. The gas may be purified by washing with NaOH , water.
- ② Liberated N_2O is filled under high pressure in metallic cylinders.



Storage

N_2O is stored and supplied in metallic cylinders under high pressure

Absorbents: Distribution of one substance through out the another substance, by diffusion is called Absorbents

Ex: Soda lime

Page No.:



Date:

Labelling

- ① Cylinder is of blue colour
- ② Name and Symbol of N_2O are printed using paint on shoulder of cylinder

uses

- ① used in dental practice
- ② To induce anaesthesia
- ③ Calming excited psychiatric patient

Define limit test?

Ans Limit tests are quantitative test designed to identify and control small quantity of impurity which are likely to be present in a substance.

Limit test

test for purity

- ① It is the determination of small quantities of impurities present in the sample.
- ① It is the determination of impurities in the sample.

Adsorbents: These are chemical substances used to treat disturbance of GIT because of their ability to adsorb gases, toxins, bacteria

Ex: charcoal

Ex: kaolin & bentonite

Page No.: 5

Date:

⑥ Define protectives ? give ex

Ans ① protectives are substances which form protective coat on mucous membrane and provides mechanical protection.

Ex: kaolin, bentonite

⑦ what is achlorhydria ?

Ans ① It occurs when there is an absence of HCl acids in the stomach.

② It impairs digestive process

③ It leads to damage of gastrointestinal system.

⑧ Define Emetic ?

Ans ① It is a medicinal substance which causes vomiting.

② They may act directly on the gastrointestinal tract.

③ They act indirectly on chemoreceptor triggering zone near the medulla.

⑨ Accuracy

Ans It refers to the closeness of a measured value to a standard value.



(10) Antioxidants

- ① Antioxidants are substance that inhibit oxidation
- ② oxidation damages cell and can lead to the development of disease
Ex: Sodium Sulphate, Sodium bisulphite

(11) write different types of cathartics

- ① Stimulants
- ② Bulk purgatives
- ③ 10 Lubricants
- ④ Saline Cathartics

(12) Non-Systemic Antacids

Antacids which are not absorbed from the ¹⁵ gut and does not interrupt acid-base balance are called non-systemic antacid

Buffer antacid: They limit the rise in pH of gastric contents.

Non-Buffer antacid: They permit the rise in pH of gastric contents.

(13) why Sulphuric acid is added in the assay of H_2O_2

Ans H_2O_2 acts as an oxidizing agent, since it readily liberate oxygen, then it acts as a reducing agent, when it is titrated in an acidic medium against $KMnO_4$ to carry out oxidation-reduction reaction.

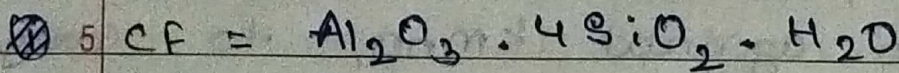
(14) use of glycerine in boric acid assay?

Ans Boric acid, being weak acid cannot be titrated accurately with strong alkali. When it dissolves in glycerine, it behaves like strong monobasic acid, then it can be titrated with alkali.

(15) Role of chloroform in the assay of potassium Iodide.

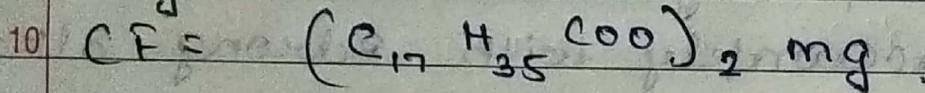
16. Give chemical formula and uses of Bentonite and magnesium Stearate, Sodium metabisulphate & Sodium Carboxy methyl cellulose

① Bentonite



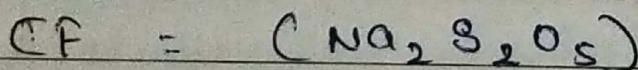
uses = (i) good pharmaceutical aid
(ii) used as protective

② Magnesium Stearate



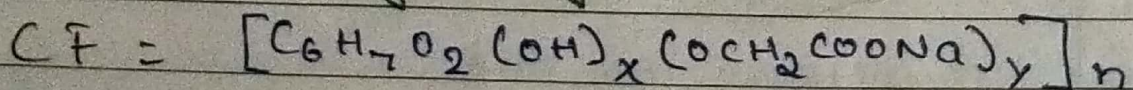
uses = (i) good pharmaceutical aid
(ii) used as dusting powder
(iii) used as lubricant in tableting

③ Sodium metabisulphate



uses = (i) good pharmaceutical aid
(ii) used as antioxidant & stabilizing agent

④ Sodium Carboxy methyl cellulose



uses = (i) good pharmaceutical aid
(ii) used as stabilizing & thickening agent

(5) Diff b/w H_2O for Injection & sterile H_2O for Injection

water for Injection

sterile water for Injection

(6) what are expectorants & give ex.

Ans. Expectorants are the drugs that help in removing sputum from the respiratory tract. Either by increasing the fluidity of sputum or increasing the volume of fluids.

Ex: Ammonium chloride & potassium

Iodide.

(7) Desensitizing agents & give ex.

Ans: Desensitizing agents are drugs used to reduce sensitivity of teeth to heat and cold during tooth decay or toothache.

Ex: Strontium chloride, Zn chloride.

(20) What is dental caries? Name two anticaries agents.

Ans (1) Dental caries or tooth decay is a disease of the teeth caused by acids produced by the action of microorganisms on carbohydrates.

(2) It is characterized by decalcification of tooth and accompanied by foul mouth odour.

10

Ex: Ammoniated toothpaste

urea Ammonia containing toothpastes

(21) Write the composition and application of Zinc eugenol cement.

15

(1) Composition: Zinc oxide + eugenol

(2) Application

(i) used for temporary cement filling

(ii) used for its antiseptic property.

(iii) reduce inflammation in mouth.

(22) Sclerosing agent

Ans Sclerosing agents are used in sclerotherapy of varicose veins, where the irritant solution is injected into the blood vessels.

This agents are used to treat varicose veins.
Ex: Asclera, Ethamolin.

(23) Sedatives

Ans Sedatives are drugs which brings about mild depression of the Central nervous system

Ex: potassium Bromide

(24) Define antidotes and its mechanism

Ans Antidotes are substances which inhibit the action of poison by various mechanism in the body.

(1) physiological antidotes

They counteract the effect of poison physiologically.

Ex: NaNO_2 (Sodium nitrate)

(2) Chemical antidotes

They combine with poison & changes its nature

Ex: $\text{Na}_2\text{S}_2\text{O}_3$ (Sodium thiosulphate)

(3) Mechanical antidotes

They act by adsorbing the poison in the body

Ex: Activated charcoal



(25) Respiratory Stimulants

Ans Respiratory Stimulants are the drugs used to increase the activity of respiratory system.

Ex: NH_4CO_3 (Ammonium carbonate)

(26) uses of Ammonium carbonate

(1) good pharmaceutical aid

(11.10) Respiratory Stimulant

(27) Role of Ammonia compounds as Respiratory Stimulants

Ans (1) Ammonia gas stimulates the Respiratory centre

(2) It accelerate function of heart & brings about vasodilation

(28) what is meant by 'Radioactivity'?

Ans 20 The spontaneous emission of electromagnetic rays in nuclear decay.

(29) Nuclide

Ans An Atomic nucleus with a specific number of neutrons and protons

Isotopes

Nuclides having the same number of protons but different number of neutrons are termed as Isotopes.

Q. Define the following terms

(1) observed activity

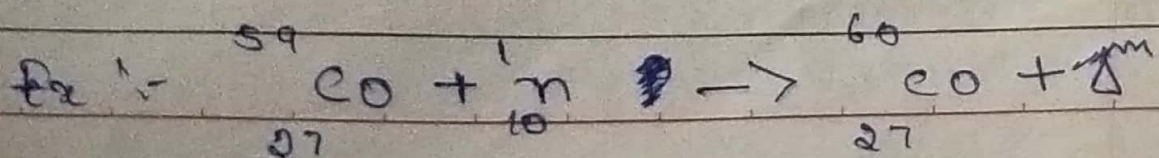
(2) Absolute activity

(3) Define radioactive half life

Ans It is the time required for the radioactive atom to become half of its initial value

(4) Define radioisotopes with example

Ans It is an element with unstable nucleus which emits radiation during its decay



(33)

Radiopharmaceuticals

Radiopharmaceuticals are group of pharmaceutical drugs which have Radioactivity. that can be used either for diagnostic or therapeutic purpose

(34)

write any four clinical application of Radiopharmaceuticals

10

(1)

Treatment of Cancer and Tumours
Gold 198 used as antineoplastic

(2)

Treatment of Thyroid Disease with Iodine
131

15

(3)

Treatment of Arthritis

Erbium - 169 is used to relieve joint pain

(4)

20

Treatment of Bone Metastasis

Samarium - 153 is used to treat

35 List official zinc compound Along with formula & use

- ① Zinc chloride. use: ① As desensitizer
($ZnCl_2$) ② As mouthwash
- ② Zinc Sulphate use: ① As emetic
($ZnSO_4 \cdot 7H_2O$) ② In ophthalmic preparation
- ③ Zinc peroxide use: ① protective
(ZnO_2) ② Astringent
③ Antiseptic

10 (36) Define gravimetric Analysis? write importance of it

Ans It is the quantitative isolation of a substance by precipitation

- 15 ① A variety of organic substances can be easily determined
- ② Inorganic anions & cations can also be determined

37 principle of Gravimetry with ex

① principle of thermogravimetry is based on simple fact that the sample is weighed continuously as it being heated and change in mass of the sample are studied

Eg:- In determination of Magnesium it is precipitated in the form of ammonium magnesium phosphate, but then it is converted into magnesium pyrophosphate by igniting in crucible at $1000^{\circ} - 1100^{\circ}\text{C}$.

15

38 Steps in gravimetric analysis

- ① Drying of sample
- ② preparation of solution
- ③ precipitation.
- ④ Digestion
- ⑤ Filtration
- ⑥ washing
- ⑦ Drying
- ⑧ weighing
- ⑨ Calculating

38 limitation

- (1) method is not very sensitive
- (2) occurrence of Interferents

39 co-precipitate

During precipitation process, Soluble Impurities also get included in the precipitate, It leads to increase in the mass of ppt

40 post precipitation

During ppt'ion process, less soluble Impurity get deposited on the precipitate

41 Digestion

allowing the precipitate to stand in presence of liquid from which it's originally precipitated, large crystals form by small ones. This process is called Digestion

Q12 Define acidimetric & alkalimetric titration.

acidimetric

acidimetry refers to determination of strength of acidic substances by titrating them with a standard base solution.

10 Alkalimetry

alkalimetry refers to the determination of strength of basic substance by titrating them with standard acid solution.

15

Q13 milliequivalent

Defined as no. of grams of equivalent weight of drug contained in 1ml of normal solution.

20

Q14 Indicators used in acid-base titration

- ① Methyl Red
- ② Methyl orange
- ③ Methyl Violet
- ④ Thymol blue

48 Molarity

No of moles of Solute per litre of solution

5 Normality

No of mole equivalents per litre of solution.

10 molality

No of moles of Solute per kg of solvent

15 Mole fraction

Moles of 1 component divided by total moles in solution

$$X = \frac{n_1}{n_2}$$

20

pH

phenolphthalein

and

methyl orange

phenolphthalein $\rightarrow$ 8-10

25

Methyl orange

$\rightarrow$ 3.2 - 4.4

④ Back titration

A back titration is a titration method used to determine the concentration of an unknown using an excess amount of compound with a known concentration.

② Two chemical reaction occur.

⑥ Universal Indicators

It is a mixture of dyes that changes colour gradually over a range of pH and is used in testing for acids and alkalis.