



Subject Code: 0806

SUMMER-16 EXAMINATION
Model Answer

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Important Instructions to examiners:

- 1) The answers should be examined by key words and not as word-to-word as given in the Model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try To assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the Figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgment on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.



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Q. 1- Attempt any EIGHT of the following. (8 x 2)

16 M

a) Define acid and base as per Lewis theory with examples.

(Definition -01 Mark & example 01 Mark)

Ans: - Acid- An acid is the molecule or ion that can accept a lone pair of electrons.

e.g- H^+ , NH_4^+ , Na^+ , K^+ , Cu^{++} , Al^{+++} etc

Base- Base is the molecule or ion which donates a lone pair of electrons.

e.g- NH_3 , H_2O , OH^- , Cl^- , CN^- , S^{--} etc

b) Discuss the uses of Aluminium hydroxide gel and Magnesium sulphate.

(01 Mark for uses of each compound)

Ans: - Uses of Aluminium hydroxide gel

- It is non systemic or non absorbable antacid.
- Externally it is used as mild Astringent & Demulcent.
- Used in the treatment of Diarrhoea & Cholera.

Uses of Magnesium sulphate

- Magnesium sulphate is used as a saline cathartic. It is not absorbed in intestinal tract, so it increases the hydrostatic pressure on intestine and increases the peristaltic activity.
- It is also used as an Antidote in Heavy metal poisoning.
- Wet dressings of a 25% solution of magnesium sulphate are sometimes used in the treatment of carbuncles & boils.
- It should be used with care as a laxative in patients with impaired renal functions.



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c) Define the following terms:

(i) Achlorhydria

(ii) Gastrointestinal Agents.

(01 Mark for each definition)

Ans- i) Achlorhydria - If due to some reasons, there is no secretion or decreased secretion of hydrochloric acid in gastric secretion/juices, the condition is called as achlorhydria or hypochlorhydria.

ii) Gastrointestinal Agents – These are the drugs or agents which are used to treat gastrointestinal disorders. E.g. Acidifying agents, Antacids, Protectives & Adsorbents, Laxatives etc.

d) Give the synonym of-

i) Sodium potassium tartarate.

ii) Zinc Sulphate.

(01 Mark for each synonym)

Ans- i) Sodium potassium tartarate- Rochelle's salt , Seignette salt.

ii) Zinc Sulphate- White Vitrol.

e) Write the properties and uses of silicone polymers.

(01 Mark for properties and 01 Mark for Uses)

Ans- Properties-

- It is clear, odourless, colourless viscous oil.
- It is immiscible with water and alcohol; it is miscible with ether and chloroform.
- It is an inert silicone, oily in nature; it is stable and has low surface tension.
- The oily nature of these compounds makes it useful as water repellent and protective to skin from contact irritants.



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Uses-

- It is used as protective against chemical irritation.
- Used as ointment and cream.
- Also used as antispasmodic or antifatulent.
- It is used in combination with antacid preparation.
- It is used in Digestant preparation.
- It is effective water repellent.

f) What are Dentifrices? Write the storage condition of Sodium fluoride.

(01 Mark for definition, 01 Mark for storage condition)

Ans- Definition-

These are the substances which are used to clean and polish the accessible surfaces of teeth. They are generally available as paste, powder, gel or liquid form.

Storage-

It should be kept in well closed container in a cool, dry place.

g) Give the incompatibilities of-

i) Iodine

ii) Silver nitrate.

(01 Mark for each compound)

Ans-

- **Iodine-** It is incompatible with hypophosphite, sulphites, some metals and reducing agents.
- **Silver nitrate-** It is incompatible with halogen containing compounds, reducing agents, tartarate, sugars and tannins.



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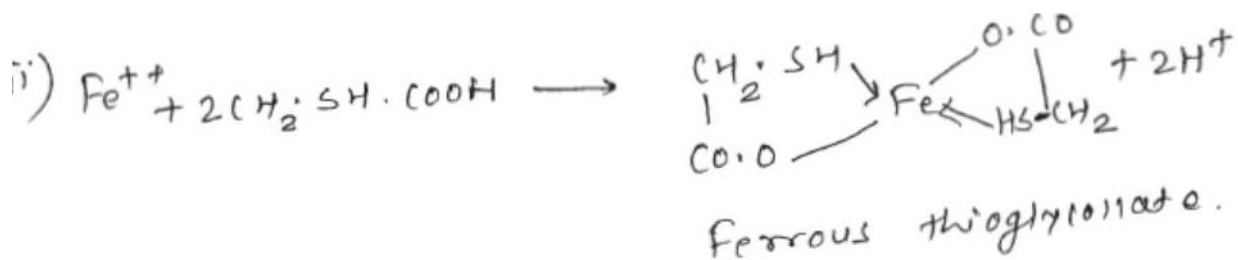
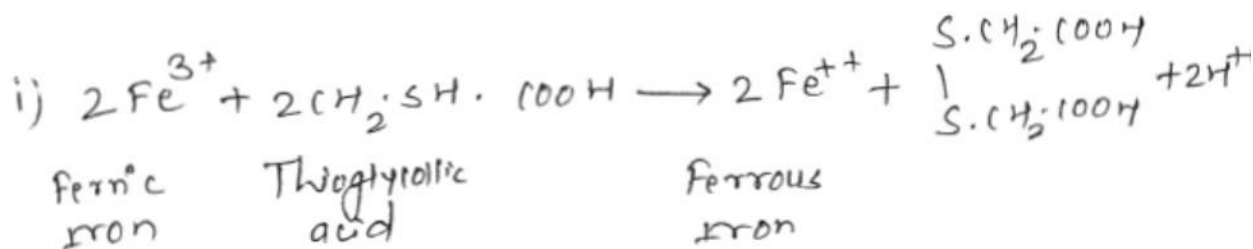
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h) Write the reaction involved in limit test for iron. What is the role of thioglycolic acid in iron limit test?

(01 Mark for reaction, 01 Mark for Role)

Ans-

i) Chemical reaction involved in limit test for Iron-



ii) Role of Thioglycolic acid in Iron limit test-

Thioglycolic acid reacts with Iron to form deep reddish purple complex of ferrous thioglycollate in alkaline medium. Thioglycolic acid reduces Ferric ion to ferrous ion. The ferrous thioglycollate formed is stable in the absence of air.



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i) Give the molecular formula of the following-

- i) Borax**
 - ii) Yellow Mercuric Oxide.**
- (01 Mark for each formula)**

Ans-

- i. Borax- $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$.
- ii. Yellow Mercuric Oxide- HgO .

j) Name major intra and extra cellular electrolytes.

(01 Mark for intra, 01 Mark for Extra)

Ans-

Major Intra cellular electrolytes-

- Potassium
- Phosphate
- Magnesium
- Sulphate

Major Extra cellular electrolytes-

- Chloride
- Sodium
- Calcium
- Bicarbonate.

k) Define buffers. Enlist various buffers used in pharmacy.

(01 mark definition, enlisting 01 mark)

Ans- Definition-

The solution that resists the changes in pH value upon addition of small quantities of acids & bases are called buffer solutions.



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Name of Buffers-

- HCl buffer.
- Acid Phthalate buffer.
- Neutralised Phthalate buffer.
- Phosphate buffer.
- Alkaline borate buffer.

1) Explain handling and storage of radioactive material.

(02 Marks for any 04 points)

Ans-

Great care must be taken in handling and storage of radioactive materials. This is to protect people and personnel who handle it from harmful radiations which the radioactive material emits. Certain precautions to be taken while working with materials, detectors, in experiments, in radio assays and in handling are as follows:

- Radioactive materials should never be touched with hands but handle with help of forceps.
- Smoking, eating and drinking activities should not be carried out in laboratory where radioactive materials are stored.
- Sufficient protective clothing must be used while handling the radioactive material.
- Radioactive materials should be stored in suitable labelled container shielded by lead bricks and preferably in remote area.
- Areas where radioactive materials are stored should be monitored regularly.
- There should be a proper disposal of radioactive material.



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Q.2 Attempt any FOUR of the following. (4x3) (12M)

a) Give the properties and uses of Calcium hydroxide.

(Properties 1 ½ Marks, Uses 1 ½ Marks)

Ans- Properties-

- Calcium hydroxide occurs as white crystals or soft powder.
- It is an odorless powder.
- Calcium hydroxide is a powder with slightly bitter taste.
- It is very slightly soluble in water, soluble in aqueous solution of glycerol and sugars.
- Solubility of Calcium hydroxide diminishes with increasing temperature.
- It readily absorbs water from air forming calcium carbonate.

Uses-

- Calcium hydroxide is used internally as an Antacid.
- It is used as lime water in infantile diarrhea and vomiting.
- It is used in skin lotion and oily preparations to form calcium soaps of fatty acid which produce water in oil emulsion.
- Calcium hydroxide paste is used in dentistry.
- Calcium hydroxide is a source of calcium.
- It is used as fluid and electrolyte replenisher and a topical astringent.



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b) Define Antioxidant. Write the factors for selection of suitable antioxidant.

(Definition 01 Mark, Factors 02 Marks)

Ans- Definition-

These are the agents which inhibit oxidation and are commonly used to prevent rancidity of oils and fats or deterioration of other materials like drugs through oxidative processes.

Factors for selection of suitable antioxidant-

- It should be non-toxic.
- It should be palatable.
- It should be compatible with pharmaceutical product.
- It should be soluble in normal aqueous solvents.
- It should give no colour or odour to product.
- It should be physiologically and chemically compatible.
- It should be chemically inert.
- It should not create any solubility problem in its oxidised and reduced form.



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c) Write properties, uses and incompatibilities of Sodium thiosulphate.

(01 Mark for each)

Ans -Properties-

- It occurs as transparent, colourless monoclinic prism or as a crystalline powder.
- It has cooling and bitter taste.
- It effloresces in dry air and deliquesces in moist air.
- It is soluble in water but insoluble in alcohol.

Uses-

- It is considered useful in parasitic skin diseases.
- It is used as an antioxidant.
- It is used in controlling the infection of athlete's foot.
- It is effective in cyanide poisoning as an antidote.
- Sodium thiosulphate when used in large doses causes cathartic action.
- It is used extensively in photographic industry.

Incompatibilities-

- Sodium thiosulphate is incompatible with strong oxidizing agents and acids.
- Sodium thiosulphate can react violently with sodium nitrite.
- Sodium thiosulphate is also incompatible with mercury and iodide.
- Only alkali metal thiosulphate salts are soluble.
- Mixing it with solutions containing other metal cations is a source of incompatibility due to the precipitation of the metal thiosulphate.
- In acidic media, these precipitates may darken due to the formation of the respective sulphides.



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d) Define and classify Antacids with suitable examples.

(Definition 01 Mark, classification 02 Marks)

Ans- Definition-

Antacids are the drugs or preparations which neutralize the excess hydrochloric acid secreted in the G.I.T. These drugs give relief of pain caused due to hyperchlorhydria.

Classification-

They are mainly classified into two types-

I) Systemic Antacids-

These are also called as absorbable antacids. They are water soluble and get readily absorbed and produce systemic electrolyte alterations and finally systemic alkalosis. It causes retention of Na and electrolyte disturbances. Due to this acid base balance of the body gets disturbed.e.g.- Sodium bicarbonate.

II) Non Systemic Antacids- These are also called as Non absorbable antacids. These compounds are generally water insoluble & so do not get absorbed to a significant concentration in the system.

These are further classified as follows-

• **Aluminium containing antacids-**

e.g- Aluminium hydroxide, aluminium phosphate.

• **Calcium containing antacid-**

e.g- Calcium carbonate, Calcium hydroxide, Tribasic Calcium phosphate.

• **Magnesium containing antacid-**

e.g- Magnesium carbonate, Magnesium trisilicate, Magnesium oxide.

• **Combination antacid preparation-**

Combination of Aluminium hydroxide gel and Magnesium hydroxide

Combination of Aluminium hydroxide gel and Magnesium trisilicate

Combination of Aluminium hydroxide gel and Calcium carbonate

Combination of Aluminium hydroxide gel, Calcium carbonate and Magnesium hydroxide.



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e) Give the molecular formula of :

i) Talc

ii) Calamine

iii) Chlorinated lime.

(01 Mark for each formula)

Ans-

i) Talc - $3\text{MgO} \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$

ii) Calamine - $\text{Fe}_2\text{O}_3 \cdot \text{ZnO}$ (Calamine generally does not have a defined molecular formula because it is a mixture of zinc oxide & ferric oxide in varying proportions)

iii) Chlorinated lime- $\text{Ca}(\text{OCl})\text{Cl} \cdot \text{H}_2\text{O}$



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f) Discuss the term ORS with example.

Ans- ORS is an example of electrolyte combination therapy.

- When there is a heavy loss of water and electrolytes e.g. in excessive vomiting, diarrhea, or prolonged fever, electrolyte combinations are used as electrolyte replacement therapy. Various electrolyte combinations in varying concentrations are commercially available as dry powders to be dissolved in specified amount of water or in the form of prepared solutions as “oral electrolyte solutions” or “oral rehydration salts”.
- If equimolar solution of glucose & sodium is given orally, it is gets absorbed in GIT & restores Na^+ , Cl^- or other ions in the body. ORS with concentration of 90 mEq/lit. of Na^+ is used in all types of dehydration in all ages. Once hydration has been achieved, low concentration of ORS is sufficient to maintain fluid & electrolyte balance.
- ORS solution is administered in small sips with teaspoon to prevent dehydration due to vomiting, diarrhea. It should be freshly prepared to avoid contamination. But severe dehydration should be treated under medical supervision.
- A large number of formulations of oral rehydration preparations are available in the market, which contains anhydrous glucose, sodium chloride, potassium chloride, and either sodium bicarbonate or sodium citrate.
- These dry powder preparations are to be mixed in specific amount of water and are used for oral rehydration therapy.
- These preparations may contain a flavouring agent & a suitable agent for free flow of the powder.



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Example-

The formula recommended by UNICEF and WHO are the examples of ORS. The composition is-

Ingredients	Formula II Quantity	Formula III Quantity
Sodium Chloride	3.5 gm	3.5 gm
Potassium Chloride	1.5 gm	1.5 gm
Sodium Bicarbonate	2.5 gm	---
Sodium citrate	---	2.9 gm
Anhydrous glucose	20 gm	20 gm
Safe drinking water	1 liter	1 liter



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Q. 3 Attempt any FOUR of the following. (4x3)

12 M

a) Write molecular formula, properties and uses of calcium carbonate.

(01 mark each for molecular formula, properties and uses)

Ans: Molecular Formula: CaCO_3

Properties of Calcium Carbonate:

1. It occurs as fine white, microcrystalline powder.
2. It is odorless, tasteless and stable in air.
3. It is insoluble in water and alcohol but its solubility in water is increased by the presence of CO_2 and also by ammonium salts.
4. It dissolves with effervescence in most common dilute acids like acetic acid, dilute HCl.
5. Calcium carbonate neutralizes acid. e. g. $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$

Uses of Calcium Carbonate:

1. It acts as non-systemic antacid and produces rapid onset of action.
2. It has tendency to cause constipation and hence it is usually administered along with magnesium salts.
3. Widely used medicinally as an inexpensive dietary calcium supplement.
4. It acts as a good cleaning & polishing agent & thus forms a common ingredient of tooth powder and toothpaste.



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b) State molecular formula, synonym and uses of sodium metabisulphite.

(01 mark each for molecular formula, synonym and uses of sodium metabisulphite)

Ans: Molecular Formula of sodium metabisulphite ($\text{Na}_2\text{S}_2\text{O}_5$)

Synonym: Disodium Pyrosulphite, sodium pyrosulphite

Uses:

1. It is used as an antioxidant.
2. It is used as stabilizer in injections in 0.1 % concentration.
3. Used in the solution of drugs that contains phenol, catechol to prevent oxidation of these compounds.
4. Used as reducing agent in ascorbic acid injection.
5. Used to prepare water soluble derivatives of normally insoluble drugs.

c) Define and classify topical agents with examples.

(01 mark for definition and 02 marks for classification with examples.)

Ans: Definition: These are the agents which are applied on body surfaces including application within body cavities that open to the outside (e.g. Oral, vaginal, colonic cavities) as opposite to systemic agents which are absorbed into the circulatory system.

Classification:

- 1) Protectives and adsorbents: e.g Talc, Calamine, Zinc Oxide, Titanium Dioxide, silicone polymers.
- 2) Anti-microbial agent: They are further classified based on their mechanism of action:-
 - a) Acting by oxidation e.g. Hydrogen peroxide solution, potassium permanganate.
 - b) Acting by halogenation e.g. Iodine and iodine preparation, chlorinated lime.
 - c) Acting by protein precipitation e.g. Boric acid, Silver and Silver compounds, Mercury compounds.
- 3) Astringent: e.g. Alum, Aluminum chloride, Zinc Sulphate, Zinc chloride
- 4) Miscellaneous agent: e.g. Sulphur and sulphur compounds, Selenium Sulphide.



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d) Name the inorganic pharmaceuticals used in the treatment of constipation. Write properties and uses of bismuth sub carbonate.

(01 mark for Name of the inorganic pharmaceuticals and 01 mark each for properties and uses of bismuth subcarbonate.)

Ans: The Inorganic pharmaceuticals used in the treatment of constipation are:

1. Saline cathartics e.g. Magnesium sulphate, Dried sodium phosphate, etc.
2. Stimulant: Drugs like senna, rhubarb, cascara, podophyllum, castor oil, aloe, bisacodyl etc. belong to this class.
3. Bulk purgatives: Methylcellulose, sodium CMC, gum, isapagol etc. are bulk purgatives.
4. Lubricants: Substances like liquid paraffin, glycerin; mineral oils etc. act as lubricants and bring smooth clearance of the fecal material.

Properties of bismuth sub carbonate:

1. It is available as white or yellowish white tasteless powder.
2. It is insoluble in alcohol and water.
3. It is soluble in HCl or HNO₃.
4. It is stable in air but affected by light.
5. When ignited, it decomposes into yellow bismuth trioxide.

Uses of bismuth sub carbonate:

1. Protective and adsorbent.
2. Antidiarrheal, in treatment of dysentery, colitis etc.
3. Uses as antiseptic.
4. Can be used as mild antacid, protective and astringent.



e) Define the term anticaries agent and desensitizing agent with example. What is dental fluorosis?

(01 mark each for anticaries agent, desensitizing agent and for dental fluorosis)

Ans: Anticaries agent: The agents which are used in the treatment of dental caries are called as Anticaries agent. E.g. Sodium Fluoride , Stannous fluoride, etc.

Desensitizing agent: The agents which reduce sensitivity of teeth for heat and cold are called as desensitizing agents. These agents reduce sensitivity of teeth towards hot & cold substances. E.g. Stontium Chloride, Zinc Chloride.

Dental Fluorosis:

When a fluoride containing solution is taken internally, it gets readily absorbed, transported and deposited in the bone or developing teeth and remaining is excreted by the kidneys. The deposited fluoride on the surface of teeth prevents the action of acids or enzymes in producing lesions. A small quantity of fluoride (4 ppm) is thus necessary to prevent caries. When more quantity of fluoride is ingested it is carried in bone and teeth and produce mottled enamel known as **dental fluorosis**.



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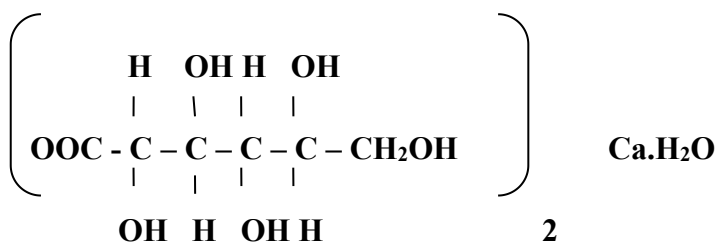
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f) State molecular formula, properties and uses of calcium Gluconate.

(01 mark each for molecular formula, properties and uses)

Molecular formula: $C_{12}H_{22}CaO_{14}.H_2O$



Properties:

1. It is available as white crystalline or granular powder.
2. It is odourless and tasteless.
3. Stable in air.
4. It is sparingly soluble in water, freely soluble in boiling water and insoluble in alcohol.
5. If the aqueous solution is treated with Hydrochloric acid or other acid, gluconic acid is formed which is said to be converted to D-gluconolactone.
6. It is incompatible with oxidizing agents.

Uses:

1. It is used as source of calcium in calcium deficiency.
2. It is a drug of choice for severe hypocalcemic tetany.
3. Calcium gluconate tablets are administered orally which do not cause irritation of GIT.



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Q. 4 Attempt any FOUR of the following (4x3)

12 M

a) Mention molecular formula and uses of stannous fluoride and strontium chloride.

(1.5 marks each for molecular formula and uses of stannous fluoride and strontium chloride).

Molecular formula of stannous fluoride: (SnF₂)

Uses: 1.It is used in fluoride treatment of teeth.

2. Used as anticaries agent.

Strontium Chloride (SrCl₂.6H₂O)

Uses: Used as desensitizing agent in dentifrices.

b) What is metabolic acidosis and metabolic alkalosis? Name two compounds used to treat metabolic acidosis.

(02 marks for both definition and 01 mark for example of compounds)

The pH of blood of healthy person remains constant around 7.35. If the pH of blood is low (high hydrogen ion concentration) acidosis results and when pH is high (low hydrogen ion concentration) alkalosis results.

Metabolic acidosis can result from

1. Failure to excrete metabolic acids by kidney.
2. Formation of excessive quantities of metabolic acids (e.g. carbonic acid)
3. Loss of base from body fluids under certain conditions like diarrhea, vomiting

Metabolic alkalosis does not normally occur. However it may result under certain conditions like administration of diuretics or due to loss of chloride ions.



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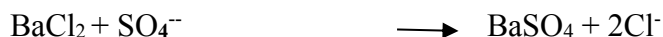
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Compounds used to treat acidosis: Generally potassium or sodium compounds like bicarbonates, lactate, acetate are used to treat metabolic acidosis.

E.g. Potassium acetate, Potassium citrate, Sodium Acetate, Sodium Bicarbonate, Sodium Citrate.

**c) Write the principle and procedure involved in the limit test for sulphate as per I.P. 1996.
(01 mark for principal, 01 mark for reaction and 01 mark for procedure)**

Ans: Limit test for sulphate is based upon the interaction of sulphate with barium chloride in presence of hydrochloric acid. This results in precipitation of sulphate as barium sulphate. Hydrochloric acid is added to prevent precipitation of other acid radicals. Alcohol prevents super saturation and potassium sulphate increases sensitivity of test when small quantity of sulphate ions is present. Barium sulphate appears as opalescence/turbidity. This is compared with standard opalescence/turbidity. If opalescence/ turbidity produced in test sample is less than standard it means sample complies the limit test.





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Procedure for Limit test for sulphate IP-

Sr. No.	Standard Solution	Test Solution
1	Take 1 ml of 25% w/v of barium chloride in Nessler's Cylinder.	Take 1 ml of 25% w/v of barium chloride in Nessler's Cylinder.
2	Add 1.5 ml of ethanolic sulphate standard solution(10 ppm SO_4^-) mix and allow to stand for 1 min.	Weigh one gram of sample (Sodium Bicarbonate) and add to labeled Nessler's cylinder.
3	Add 0.15 ml of 5 M acetic acid in Nessler's cylinder	Add 1.5 ml of ethanolic sulphate standard solution(10 ppm SO_4^-) mix and allow to stand for 1 min.
4	Dilute up to 50 ml with water and stir with glass rod	Add 10ml distilled water and neutralize with hydrochloric acid and add 15 ml of distilled water.
5	Allow to stand for 5 min	Add 0.15 ml of 5 M acetic acid in Nessler's cylinder
6	.	Dilute up to 50 ml with water and stir with glass rod and allow to stand for 5 min.

d) Give the properties, molecular formula and uses of ammonium chloride.

(01 mark each for properties, molecular formula and uses of ammonium chloride)

Ans: Molecular formula: NH_4Cl

Properties:

1. It occurs as white colorless, crystalline or a coarse powder.
2. It is odorless.
3. It has cooling saline taste.
4. It is slightly hygroscopic in nature.



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5. It is very soluble in water, sparingly soluble in alcohol and freely soluble in glycerin.
6. Freshly prepared aqueous solutions are neutral to litmus but become quickly acidic on standing due to hydrolysis.

Uses:

1. It maintains acid-base equilibrium of body fluids.
2. It exhibits diuretic effect due to utilization of ammonium cation in conversion into urea and in the process H^+ and Cl^- ions are produced.
3. It acts as mild expectorant and diaphoretic when administered in small doses. It does so because of local irritation which produces increased secretion of respiratory tract and makes the mucus less viscous. Therefore used in cough preparation.

e) What are protectives and adsorbents? Give classification and ideal properties of the same. (01 mark each for definition, classification and ideal properties)

Ans: Protective and adsorbents:

Protective are the agents that cover skin or mucous membrane from possible irritants and adsorbents are chemically inert substances that adsorb dissolved or suspended particles or gases, toxins etc. and are mainly used internally/externally to prevent the irritation and unwanted action on mucous membrane or skin.

Classification: There are two types of protective and adsorbents.

1. **External /Topical protective and adsorbents:** Topical protective and adsorbents are generally applied to the irritated areas of the skin. The irritation and inflammation is due to moisture, friction of allergy.
2. **Internal protective and adsorbents:** Protectives intended for use in the gastrointestinal tract are internal protectives. Adsorbent protective adsorb bacteria, toxins and viruses in addition to forming protective covering over the intestinal mucosa. Internal protective and adsorbents are used in the treatment of diarrhea.



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Ideal properties of the protective and adsorbents:

1. It should be biologically inactive: Compounds which are chemically inert are necessary in order to prevent interactions between the protective substance and tissue.
2. It should have good adsorbent action which is useful for adsorbing moisture from skin or toxins & other harmful substances in the G.I.T.
3. It should have fine particle size since adsorbent action is maximized with decreasing particle size. Small particles offer a larger surface area.
4. It should be water insoluble.

f) Discuss the properties and uses of Potassium Permanganate.

(1.5 marks each for properties and uses)

Ans: Properties of potassium permanganate:

1. It occurs in the form of dark purple coloured monoclinic prism.
2. It is opaque with a blue metallic luster.
3. It is odourless.
4. It has sweet astringent taste in aqueous solution.
5. It is water soluble and more soluble in boiling water.
6. It is powerful oxidizing agent.
7. When heated, it decrepitates.
8. Potassium permanganate oxidizes alcohol to aldehyde, sulphide to free sulphur, ferrous salt to ferric state, nitrites to nitrates and iodide to free iodine under acidic conditions.

Uses:

1. Its solutions are used for antiseptic and antibacterial action.
2. It is anti-infective due to its oxidizing properties.
3. It acts as antidote in barbiturates, chloral hydrate and alkaloidal poisoning.
4. It is also used in veterinary as antiseptic and in alkaloidal poisoning.



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Q.5) Attempt any Four of the following :(4 x 3)

12 M

a) Discuss uses and storage condition of-

i) Oxygen ii) Nitrous oxide

Answer: (1.5 marks for each)

i) Oxygen: Storage and labeling: Store under compression in metal cylinder. Valve should not be lubricated with oil or grease. Cylinder should be stored in a special room which should be cool and free from inflammable materials. The shoulder of the metal cylinder is painted WHITE and the remainder is painted BLACK. The name of the gas or symbol “O₂” is stenciled in paint on the shoulder.

Uses: Oxygen is essential for normal respiration and some metabolic functions.

Oxygen is used during anesthesia, post-operative pulmonary complications, in the treatment of hypoxia, anoxia, asphyxia, asthma, shock, poisoning, serious wounds and burns, edema, congestive heart failure.

ii) Nitrous oxide: Storage condition: Store under compression in metal cylinder & at a temperature not exceeding 37°C.

The cylinder is painted blue & carries a label stating the name of gas & symbol N₂O stenciled in paint on the shoulder.

Uses : It is the only inorganic gas used as an anaesthesia.

It is used by inhalation for operation of short duration like dental extraction, minor operation of boils & abscesses.



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b) State the uses of :(1.5 marks for each)

i) Sodium acetate

ii) Potassium citrate

Ans. i) Uses of sodium acetate:

1. It is an ingredient of peritoneal dialysis fluid.
2. It is used as a systemic alkaliser in metabolic acidosis.
3. Uremic acidosis has been corrected by infusion of sodium acetate.

ii) Uses of potassium citrate:

1. Systemic alkaliser used for treatment of systemic acidosis.
2. To make urine alkaline.
3. Treatment of urinary tract infection.
4. Mild diuretic.
5. To prevent urea crystal formation in urinary bladder.
6. Expectorant, Mild laxative, Buffering agent etc.



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c) Give the molecular formula, uses and storage condition of ammonium carbonate.

(01 mark for each)

Ans. Formula- $(\text{NH}_4)_2 \text{CO}_3$

Uses: 1. It acts as respiratory stimulant and expectorant.

2. The ammonia gas when inhaled stimulates respiratory center and acts as respiratory stimulant.

3. Ammonium carbonate causes irritation on the epithelial cell of trachea, bronchia and bronchioles which get stimulated and leads to respiratory stimulation.

Storage Condition: On exposure to air, it loses ammonia and carbon dioxide and is converted to porous opaque, easily friable porous lumps. It should be stored in air tight, well closed containers.

d) Define mEq. Calculate the mEq of NaCl in one litre of 1.6% w/v of solution.

(01 mark for definition of mEq, 01 mark for conversion, 01 mark for calculation)

Ans. Definition: It is an unit used to express concentration of electrolytes in the body fluids.

mEq/L = mg of substance present in one litre / Equivalent Weight.

Weight of electrolyte in NaCl Solution = 1.6gm /100ml i.e.16/1000ml

In 1000 ml = 16000 mg of NaCl

mEq/L = mg of substance present in one litre/ Equivalent Weight.

Equivalent weight = Molecular weight /Valency = 58.5/1

Equivalent weight of NaCl is 58.5

Therefore mEq/L= 16000/ 58.5

= 273.5mEq / L of NaCl

Result: 1.6 % NaCl solution contains 273.5 mEq/L of Na^+ and Cl^-



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e) What are radiopharmaceuticals? Give the characteristics of alpha particles.

(01 mark for definition and 02 marks for characteristics)

Ans. Radiopharmaceuticals- The compounds or substances which exhibit radioactivity and which are used in medicine for various purposes are called as radiopharmaceuticals.

Characteristics of alpha particles.

1. It emits alpha particles (Helium nucleus) having two positive charges.
2. They are helium ions He with a relative +2 charge, containing two protons and two neutrons and have 4 units mass and atomic number 2.
3. It is heaviest and slowest of all radioactive emissions.
4. The velocity is about 1/10th that of light
5. Penetrating power is less as compared to other emitted species.
6. It has no biological applications because of its low velocity & low penetrating power.
7. It is affected by strong magnetic field.
8. As these particles have 4 +ve charge their ionization power is very high.



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f) Name two official compounds of iron. Discuss the properties and uses of ferrous sulphate.

(01 mark for each)

Ans. Official compounds of iron:

1. Ferrous sulphate
2. Dried Ferrous Sulphate
3. Ferrous Gluconate
4. Ferrous Fumarate
5. Ferrous Succinate
6. Ferric Chloride
7. Iron Phosphate

Properties of ferrous sulphate:

1. It is odorless, bluish-green crystalline powder.
2. It has astringent or metallic taste.
3. It efflorescence in dry air.
4. On exposure to air ferrous sulphate oxidized to brown color ferric sulphate.
5. It is soluble in water and insoluble in ethanol.

Uses of ferrous sulphate:

1. It is used as Haematinic (treatment of anemia caused by iron deficiency).
2. It is used to dye fabrics & cloths.
3. Manufacturing of ink.
4. It has also applications in photography.

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Q.6) Attempt any FOUR of the following: (4x4)

16M

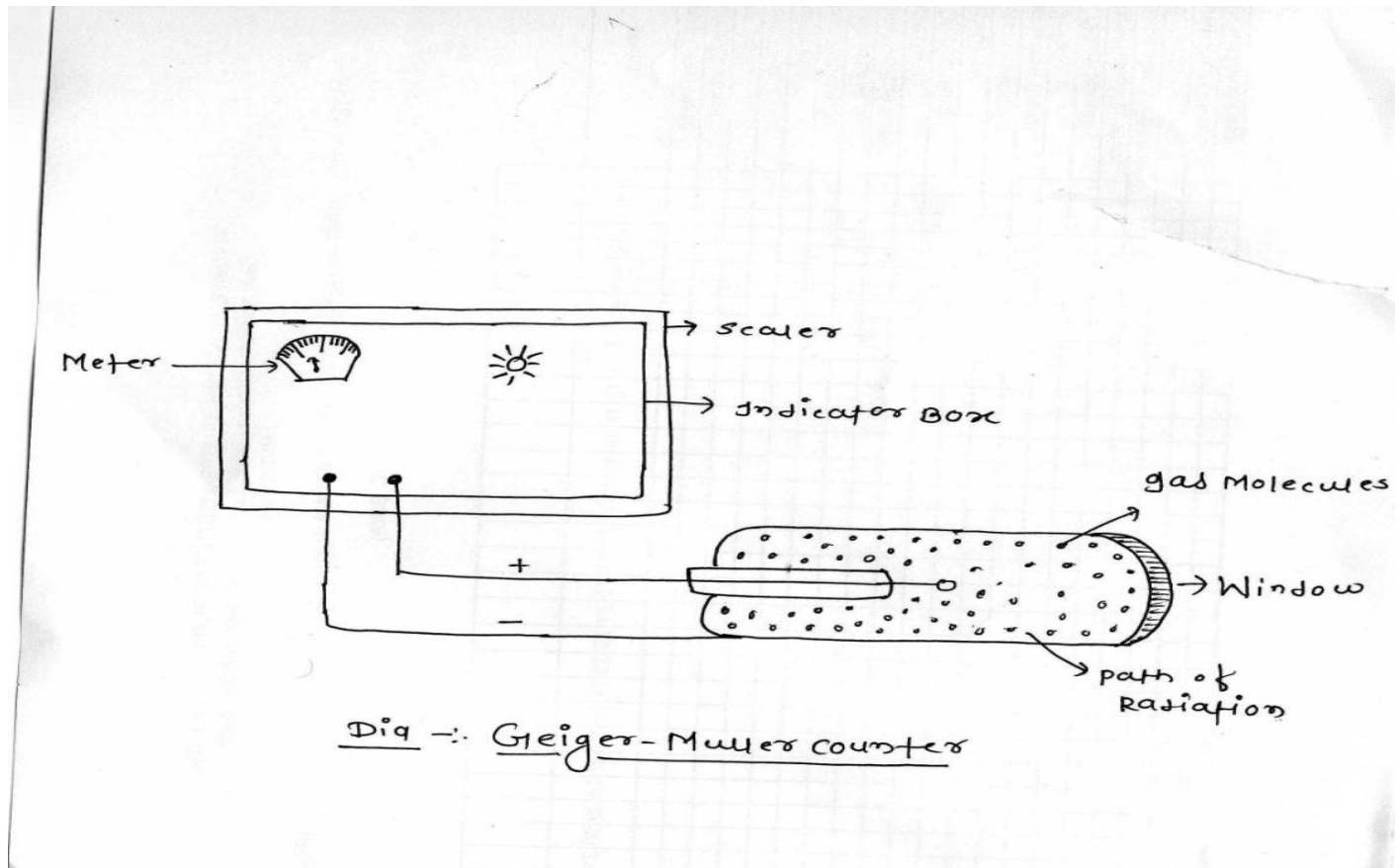
a) Define the term Curie and Microcurie. Draw well labeled diagram of G.M.counter.

(02 marks for definition and 02 marks for diagram)

Ans. Definition Curie- It is defined as the quantity of any radioactive substance undergoing the same number of disintegrations in unit time as of 1 gram of pure radium. one curie is equal to 3.7×10^{10}

Microcurie- Microcurie is the sub-unit of curie .It represent as one microcurie is equal to 1×10^{-6}

Of curie is equal to 3.7×10^{10} disintegration per second.



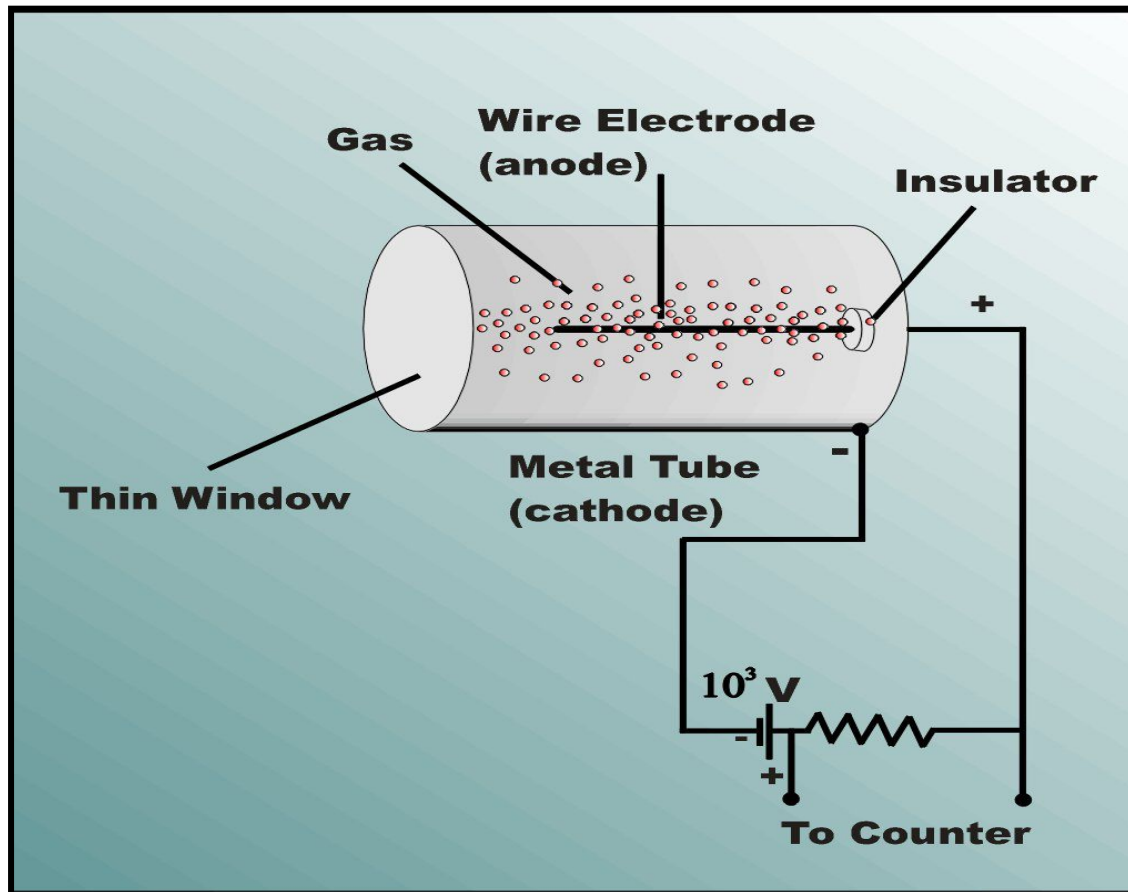


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b) Enlist different allotropic forms of sulphur. Explain properties and uses of precipitated sulphur.

(02 marks for allotropic forms and 01 mark each for properties and uses)

Ans: Allotropic forms of sulfur

1. Rhombic sulfur (α sulfur, sublimed sulfur, precipitated sulfur)
2. Monoclinic sulfur (β sulfur)
3. Liquid sulfur (λ sulfur)
4. Plastic sulfur
5. Amorphous sulfur

Properties of Precipitated sulphur

1. It is a greenish yellow or grayish yellow, soft, odorless, tasteless, amorphous powder.
2. Insoluble in water & alcohol, but soluble in carbon disulphide, alkali hydroxides like sodium hydroxide & calcium hydroxide.
3. When heated burns with blue flame.
4. Very reactive element, so reacts with iron copper, zinc mercury etc.

Uses of precipitated sulphur:

1. Antiseptic, parasiticide.
2. Scabicide (used in the formation of lotion, ointment, cream, paste).
3. Antifungal agent.
4. Keratolytic agent.
5. Treatment of acne, psoriasis, seborrhea, eczema.
6. It is used as a Fumigant.
7. Mild laxatives.
8. Used in homeopathic medicine.

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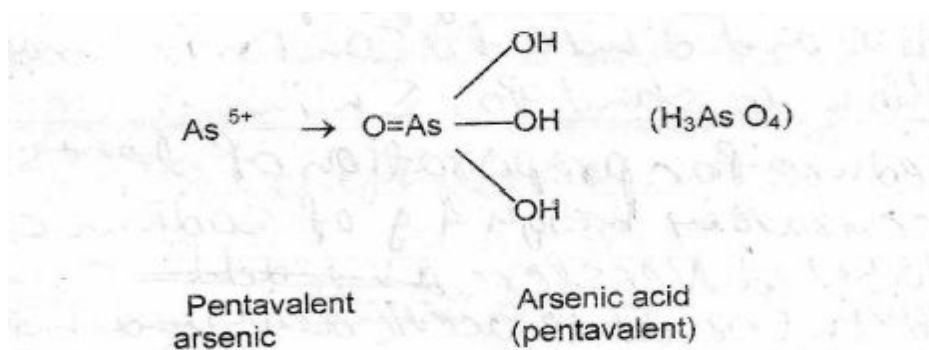
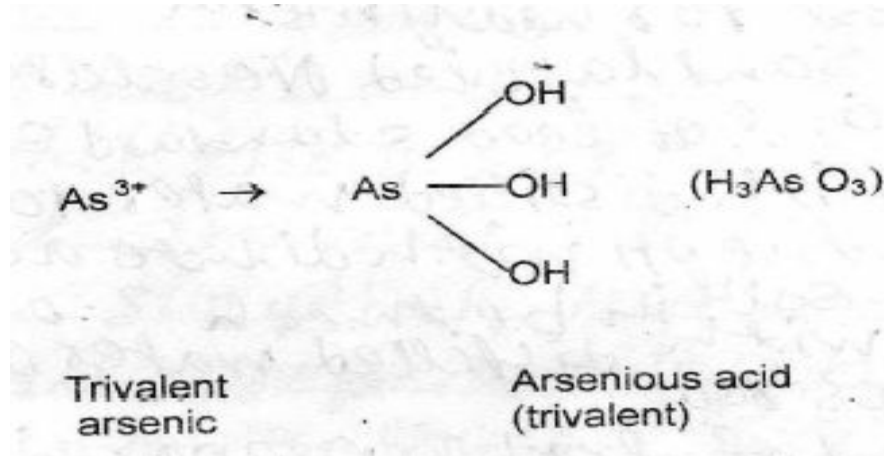
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c) Discuss the principle and reactions involved in the limit test for arsenic.

(02 marks for principle and 02 marks for reactions)

Principle and Reactions involved in limit test of Arsenic:-

1. Limit test for arsenic is based on semi quantitative determination of arsenic impurities in the test sample of drug. The sample is dissolved in stannated acid, which converts the arsenic impurities to arsenious acid or arsenic acid depending upon valence state of arsenic impurity present in the test sample.





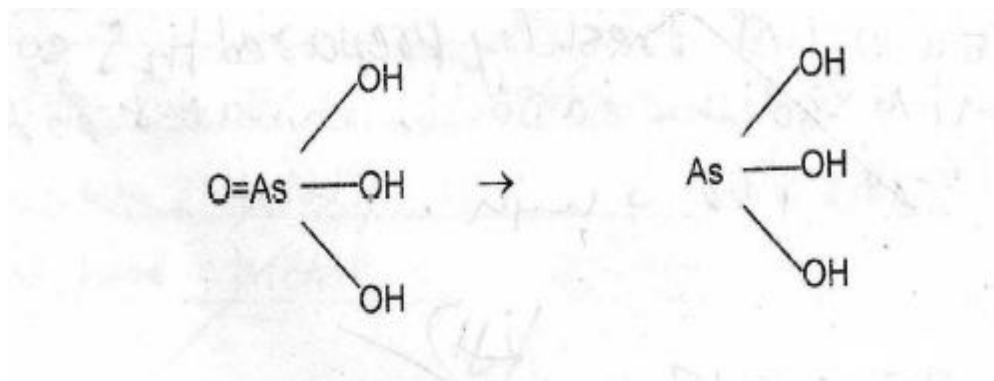
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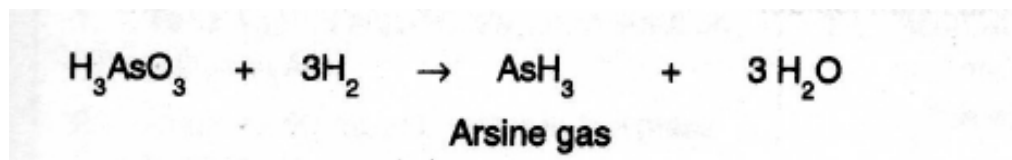
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2. When acidic solution of sample treated is with reducing agent(stannous chloride) converts pentavalent arsenic acid into the trivalent arsenious



3. The arsenious acid is then converted into gaseous arsenious hydride (arsine gas) with the help of nascent hydrogen (which is produced by zinc and hydrochloric acid).





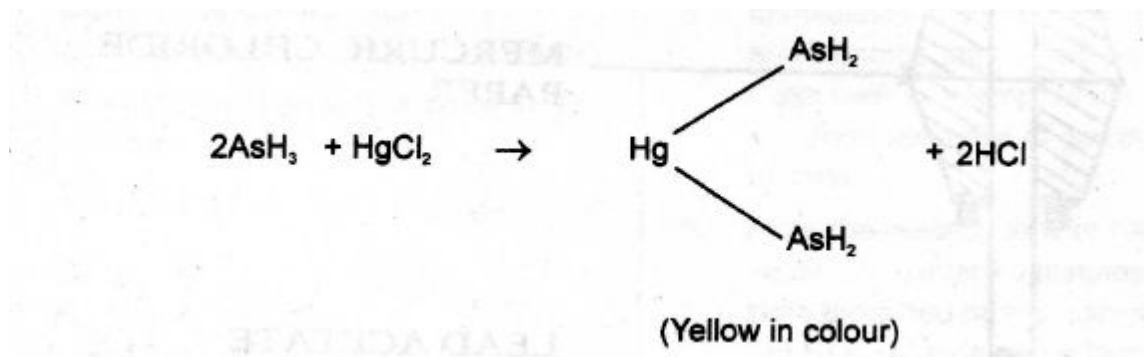
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4. Arsine gas is carried through the tube by the steam of hydrogen and out through the mercuric chloride paper. A reaction occurs between arsine and mercuric chloride, which produces yellow colour stain



5. The stain produced by test sample compared with that of standard arsenic solution. The limit of arsenic is expressed as part per millions.



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d) Give any two identification tests for the following. (Any Two)

i) Carbonate ii) Acetate iii) Calcium (02 Marks for each)

Ans. i) Carbonate:

1. Solution of carbonates produces a brownish red precipitate with solution of mercuric chloride.
2. Solution of carbonates gives white precipitates with solution of silver nitrate which is soluble in dilute nitric acid.
3. Treat a solution of the substance being examined with a solution of magnesium sulphate a white precipitate is formed.

ii) Acetate :

1. Heat the substance with oxalic acid. It gives the acid vapours with the characteristic odour of acetic acid.
2. Warm 1gm of substance with 1ml of sulphuric acid & 3ml of alcohol, ethyl acetate, recognizable by its odour, is evolved.
3. Dissolve about 30mg of the substance being examined in 3ml of water; add 0.25ml of lanthanum nitrate solution, 0.1ml of 0.1N iodine & 0.05ml of dilute ammonia solution. Heat carefully to boiling, within a few minutes a blue ppt is formed or dark blue colour produced.



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ii) Calcium :

1. Calcium salt dissolved in HCl neutralized with NaOH & treated with carbonate solution to give white ppt of calcium carbonate.
2. Concentrated solution of calcium salt treated with chromate gives yellow ppt of calcium chromate.
3. Dissolve 20 mg of the substance in 5 ml of acetic acid. Add 0.5 ml of potassium ferrocynaide solution, the solution remains clear. Add about 50 mg of ammonium chloride, a white crystalline precipitate is formed.



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e) Define the following terms:

- i) Expectorant ii) Respiratory stimulants**
iii) Antidote iv) Cathartics

(01 Mark for each definition)

Ans. i) Expectorants: The drugs or compounds that remove sputum from the respiratory tract are known as Expectorants. These drugs either increase fluidity of sputum or increase the volume of fluids that have to be expelled from respiratory tract.

ii) Respiratory stimulants- Respiratory stimulants increases pulmonary ventilation by their effect on depth and rate of respiration by stimulating respiratory center in the medulla.

OR

Respiratory stimulants: The substances which increase the rate & depth of respiration are called as Respiratory stimulant.

iii) Antidotes:

Antidote is any substance which counteracts the effect of poison.

OR

Antidote is any substance or compound which is used in treatment of poisoning.

iv) Cathartics: Cathartics are the agents used to promote defecation or to relieve constipation. Laxatives are mild cathartic and Purgatives are strong cathartics.



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f) Define the term impurity. Explain various sources of impurities present in pharmaceuticals.

(01 mark for definition and 03 marks for sources of impurities)

Ans.Impurity-It is the undesirable foreign material which may be toxic or may not be toxic, present in the pharmaceutical substances. Impurity is the substance or the matter which does not form part of the medicinal or pharmaceutical substances or drugs.

Sources of Impurities:

1. Raw material
2. Reagents used in manufacturing process
3. Intermediate products in manufacturing process
4. Defects in manufacturing process/ manufacturing hazards
5. Solvents
6. Action of solvent and reagents on reaction vessel
7. Atmospheric contamination during manufacturing process
8. Defective storage of final products
9. Adulteration

1. Raw Materials- When substances or chemicals are manufactured; the raw materials from which these are prepared contain impurities. These impurities get incorporated into final product. Example-arsenic, lead, heavy metal impurities.



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2. Reagents used in manufacturing process: In synthesis of drug many chemical reactions like nitration, halogenations, oxidation and hydrolysis are involved. In these chemical process different chemicals, solvents are used. When chemical reactions are carried out in reaction vessel, the material of these vessels (Iron, tin, copper, aluminium etc.) is reacted upon by the solvents & chemicals & reaction product are formed. These reaction products then occur as impurities in the final product. Thus impurities of iron, lead, and heavy metals, copper are due to the above mentioned reasons.

3. Defects in the manufacturing process: Defects such as imperfect mixing, incompleteness of reaction, non-adherence to proper temperature, pressure, PH or reaction condition etc. may result in the production of chemical compounds with impurities in them.

4. Storage condition- The chemical when prepared is stored in different types of container. Various types of materials are used for storage purpose. Reaction of substance with material of the storage vessel may take place & product formed. The reaction may take place directly or leaching out effect on the storage vessel.

5. Solvents: Water is the solvent easily available & cheap and is used in the manufacture of inorganic chemicals. This can give rise to trace impurities such as sodium, calcium, magnesium, carbonate & sulphate ions.

6. Decomposition- Decomposition is caused by light, air, oxygen & causes contamination of final product. A number of organic substances get spoiled, because of decomposition on exposure to the atmosphere. E.g. amines, phenol, potent drugs.

7. Atmospheric contaminants: Atmospheric contamination may take place through dust, sulphur dioxide, hydrogen sulphide & arsenic. Carbon dioxide & water vapour are possible contaminants of substances which are affected by their action.