



WINTER-15 EXAMINATION

Subject Code: 0806

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 judgement 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. No. 1 Attempt any FIVE of the following:

20 Marks

- a) **Define Respiratory Stimulant. Write brief account on Ammonium Carbonate as a respiratory stimulant.**

Answer: [One mark for Definition & Three marks for explanation]

Respiratory Stimulant Definition:

The drug which causes stimulation in respiratory tract of unconscious person & revive an unconscious person who may have fainted called as respiratory stimulant.

Explanation: Respiratory stimulants belong to the class known as Central Nervous System Stimulant. Number of drugs and chemicals stimulate respiratory function by different mechanisms. Ammonium carbonate acts as respiratory stimulant by reflex mechanism.

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

Ammonium carbonate occurs as a hard, white or transparent mass or powder with strong odour of ammonia and sharp ammoniacal taste. It is freely soluble in water and the solution is alkaline to litmus. On exposure to air, it loses ammonia and carbon dioxide and is converted to porous opaque, easily friable porous lumps.

Uses: It acts as respiratory stimulant and expectorant. The ammonia gas when inhaled stimulates respiratory centre and acts as respiratory stimulant.



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b) What are Anticaries agents? Give properties and uses of sodium fluoride.

Answer: [One and half marks for explanation, one mark and half for properties and one mark for uses]

Anticaries agents: Dental carries or tooth decay is one of the health problems. When enamel dissolves and dentine is exposed, carries can develop. It is believed that food particles lodged between the teeth undergo decay because of bacterial action and produce acid- lactic acid. The acid so produced dissolves enamel and dentine. The agent which is used to prevent tooth decay and dental carries are called anticaries agents. For example – Sodium Fluoride, Stannous fluoride.

Properties: It occurs as colorless and odorless crystals or more commonly as a white powder which is soluble in water and practically insoluble in alcohol. Aqueous solution of salt tends to corrode glass bottles and should be stored in Pyrex ware. Solution for dental use should be made with distilled water and stored in dark.

Uses: It is used as prophylaxis of dental caries in communities where the intake of fluoride from drinking water and food is low. It is used as anti-caries agent. It is ingredients of some insecticides and rodenticides.

c) Give the identification tests with chemical reactions for the following

Ions/radicals (any two)

- (i) Acetates**
- (ii) Calcium**
- iii) Bicarbonates**



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Answer: [One mark for the identification test and one mark for chemical reaction of each ion/radical Total 2 X 2 = 4 Marks]

(i) **Acetates :**

1. Heat the substance with equal quantity of oxalic acid, vapour is produced having odour of acetic acid.

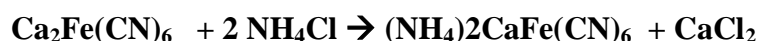
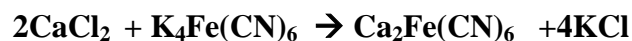


2. Warm 1 gm substance with 1 ml of sulphuric acid and 3 ml of alcohol, then ethyl acetate is produced.



(ii) **Calcium :**

1. 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.





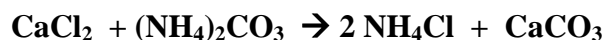
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2. Dissolve 20mg of the substance in the minimum quantity of dil. Hydrochloric acid and neutralize with dil. Sodium hydroxide solution then add 5 ml of ammonium carbonate solution, a white precipitate is formed.

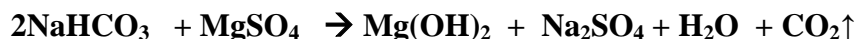


(iii) Bicarbonates :

1. Solution of bicarbonate when boiled liberates carbon dioxide.



2. Treat solution of the substance with a solution of magnesium sulphate; Boil, a white precipitate is formed.



d) Give the uses and storage and labeling of the following:

(i) Oxygen

(ii) Carbon dioxide

Answer : [One mark for uses and One mark for storage and labeling of

Total 2 X 2 = 4 Marks]

(i) Oxygen :

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.



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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.

(ii) Carbon dioxide :

Uses: When given orally it promotes absorption of liquids by the mucous membrane hence used in carbonating beverages. It is important for regulating the acid- base balance of the blood and tissue. It is a direct natural stimulant of respiratory centre. It is used in the treatment of carbon monoxide, morphine, hypnotics & other depressant poisoning. The dry ice is used for treating acne, eczema, moles, and warts.

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 GREY and carries a label stating the name of the gas. The name of the gas or symbol “CO₂” is stenciled in paint on the shoulder.



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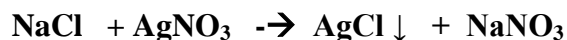
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e) Give the principle, reactions and procedure involved in Limit Test for Chloride (I. P.)

Answer: [One and half marks for Principle, One mark for reaction and One and half marks for Procedure]

Principle: - Limit test for chlorides depend upon the interaction of chlorides with silver nitrate in the presence of nitric acid. This results in the precipitation of Silver chloride. When only very small quantity of chloride ions are present, silver chloride appears as opalescence and not as precipitate. Silver chloride appears as opalescence which is compared with standard in Nessler cylinder. The standard turbidity is produced by the action of silver nitrate solution with 1 ml of 0.05845 % w/w of Sodium chloride (Chloride Standard Solution- 25 ppm Cl).

Nitric acid is added to prevent precipitation of other acid radicals such as phosphate, sulphate etc. with silver nitrate solution.





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Procedure:

Sr.No.	Test	Standard
1.	Dissolve 1 gm of sample in about 10 ml of distilled water and transfer it to a Nessler cylinder labeled as 'Test'.	Place 10ml of Chloride Standard solution (25 ppm Cl) in Nessler Cylinder labeled as ' Standard'.
2	Add 10 ml of dilute Nitric acid.	
3	Dilute to 50 ml mark with distilled water.	
4	Add 1 ml of 0.1M solution of Silver nitrate.	
5	Stir each solution with glass rod and allow to stand for 5 minutes & compare the opalescence transversely against a dark background.	



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f) Describe properties, uses, synonym and formula of calcium gluconate.

Answer: [One mark for Properties, one mark for uses, one mark for synonym and one mark for formula]

Properties of Calcium gluconate:

It occurs as a white crystalline powder or as white granules. It is odorless and almost tasteless. It is slowly soluble in cold water but is freely soluble in boiling water. It is insoluble in alcohol. It should be stored in well –closed container.

Uses: It is used as a Calcium replenisher. It is used in the treatment of hypocalcaemic tetany and calcium deficiency disorders such as dental carries, fractures, rickets, spasmophilia, pregnancy and lactation, hyperthyroidism, haemorrhage.

Synonym: Calcium Glucon OR Calcii Gluconas

Formula: $C_{12} H_{22} O_{14} Ca. H_2O$

g) Describe the assay principle and reactions of boric acid with glycerine.

Answer: [Two marks for Principle and Two mark for reaction]

Principle:

- This assay is based upon acid-base type of titration in which Boric acid is very weak acid and is titrated against strong alkali like Sodium hydroxide. Boric acid is a weak acid having a $pK_a = 9.19$ for the ionization of its first proton.
- Hence it must combine with a polyhydroxy compound, in this case glycerin, for a titration assay to be performed.



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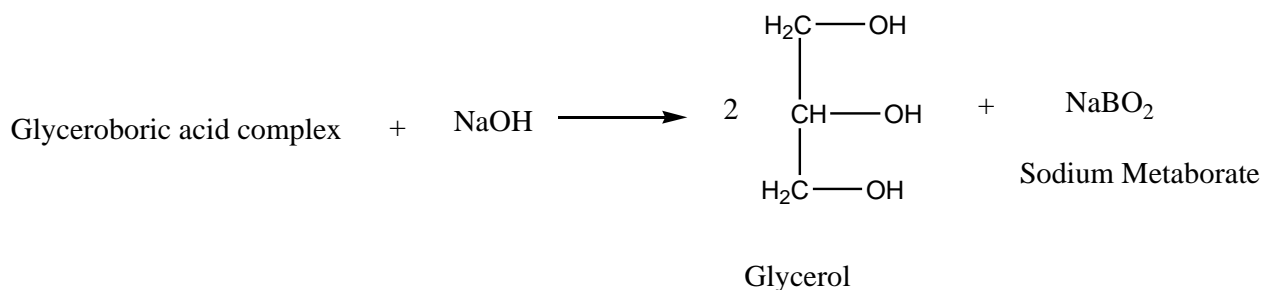
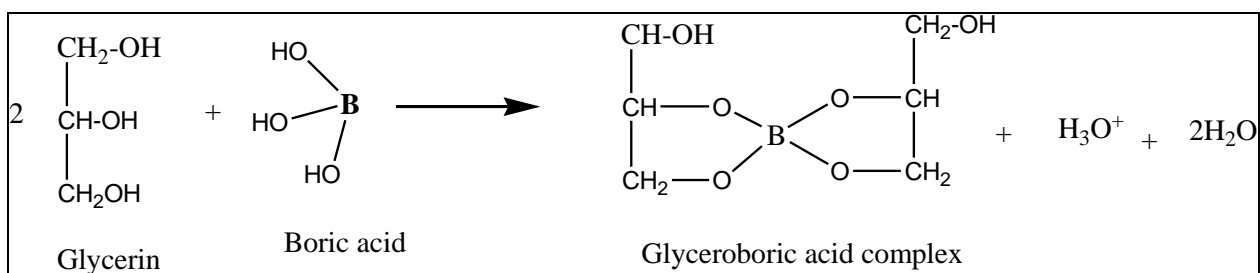
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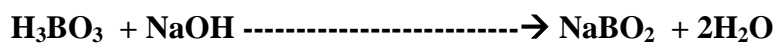
- Once combined, it can be titrated against a strong base like sodium hydroxide, which causes the indicator to change colour (from colourless to light pink).
- This is because the glycerin esterifies the boric acid to produce a complex glyceroboric acid that behaves like a strong monoprotic acid, which in turn allows the titration to be carried out.

Reaction :



Net reaction:

Glycerine



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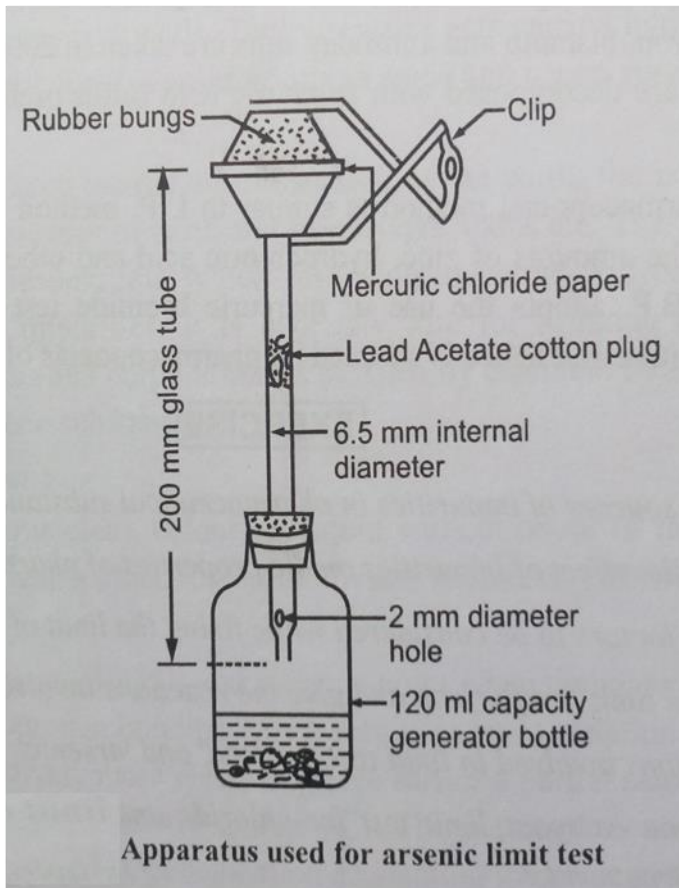
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Q. No. 2 Attempt any THREE of the following:

12 Marks

- a) Draw a well labeled diagram for Gutzeit Test Apparatus (I.P.) for Arsenic impurity in pharmaceuticals.

Answer :





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b) Give the deficiency, symptoms and properties of Iodine.

Answer: [One and half marks for deficiency, One mark for symptoms and One and half marks for properties]

Deficiency of Iodine: Deficiency of Iodine causes Hypothyroidism or myxedema which causes slowing down of all metabolic processes of body. It may cause bradycardia, decreased reflexes, anxiety, and nervousness. In infants mental and physical development may be impaired. Congenital thyroid deficiency results in cretinism which causes stunted growth and mental retardation. Iodine deficiency causes Goiter.

Symptoms : Decreased heart rate, decreased reflexes, weight gain, constipation, menstrual abnormalities, dry skin, puffiness of hands, feet and face, loss of hairs, lethargy, fatigue, slow speech, poor memory, nervousness . Sometimes Goiter development occurs.

Properties of Iodine: Iodine occurs as a heavy, bluish black, rhombic prism or plate or plates with metallic luster. It has a peculiar odor and volatilizes at ordinary temperature. It is practically insoluble in water but soluble in alcohol. It is freely soluble in chloroform and solvent ether & carbon disulfide. Iodine reacts with alkali to form an iodide and iodate when heated. Iodine in aqueous solution acts as oxidizing agent through formation of hypoiodous acid.



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c) Give the synonyms of :

(i) Precipitated sulphur

(ii) Stannous Fluoride

(iii) Borax

(iv) Zinc sulphate

Answer: [One mark each for one correct synonym. Total 1 X 4 = 4 marks]

(i) Precipitated sulphur: Milk of Sulphur, Precip. Sulph.

(ii) Stannous Fluoride : Tin Fluoride

(iii) Borax : Sodium borate, Sodium Tetraborate, Sodium Pyroborate

(iv) Zinc sulphate : White Vitriol

d) Write incompatibilities of the following:

(i) Iron Salts

(ii) Calcium gluconate

Answer: [Two marks for each compound]

(i) **Iron Salts** : It is incompatible with alkalis, soluble carbonates, gold and silver salts, lead acetate, potassium iodide, potassium and sodium tartrate, sodium borate, tannin, vegetable astringents, infusions and decoctions.



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ii) Calcium gluconate : It is incompatible with oxidizing agents, citrates and soluble carbonates, phosphates and sulphate.

e)Give chemical formula, properties and uses for (any two)

(i) Calcium carbonate

(ii) Sodium nitrite

(iii) Ferrous sulphate

Answer: [Half mark for formula, one and half mark for properties and uses of each compound respectively Total 2 X 2 = 4 marks]

(i) Calcium carbonate :

Formula: CaCO_3

Properties: It is a fine, white microcrystalline powder, odorless, tasteless, stable in air, practically insoluble in water, but its solubility is increased by the presence of carbon dioxide. The water solubility is decreased in presence of alkali hydroxide. It is insoluble in alcohol but dissolves with effervescence in most common acids.

Uses: Antacid



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ii) Sodium nitrite

Formula: NaNO_2

Properties: It occurs as yellow or white crystalline powder, odorless, deliquescent and has mild saline taste. It is freely soluble in water, but sparingly soluble in alcohol. All nitrates are easily decomposed by acidification with dilute Sulphuric acid. Reactions of sodium nitrite fall into two distinct types 1] acting as a reducing agent. 2] acting as an oxidizing agent.

Uses: Antidote in the treatment of cyanide poisoning.

iii) Ferrous sulphate

Formula: $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$

Properties: It occurs as transparent green crystal or as pale bluish green crystalline powder. It is odorless and has metallic & astringent taste. It is freely soluble in water, but insoluble in alcohol. It acts as strong reducing agent.

Uses: 1. It is used as a hematinic and used in the treatment anemia.

2. It is used to dye fabrics and in tanning leather, manufacturing of ink and in photography. It has disinfectant properties.



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Q.3) Attempt any THREE of the following :(3×4)

12Marks

a) Give the principle and reactions involved in the limit test of iron (I.P).
(2 marks for principle and 2 mark for reaction)

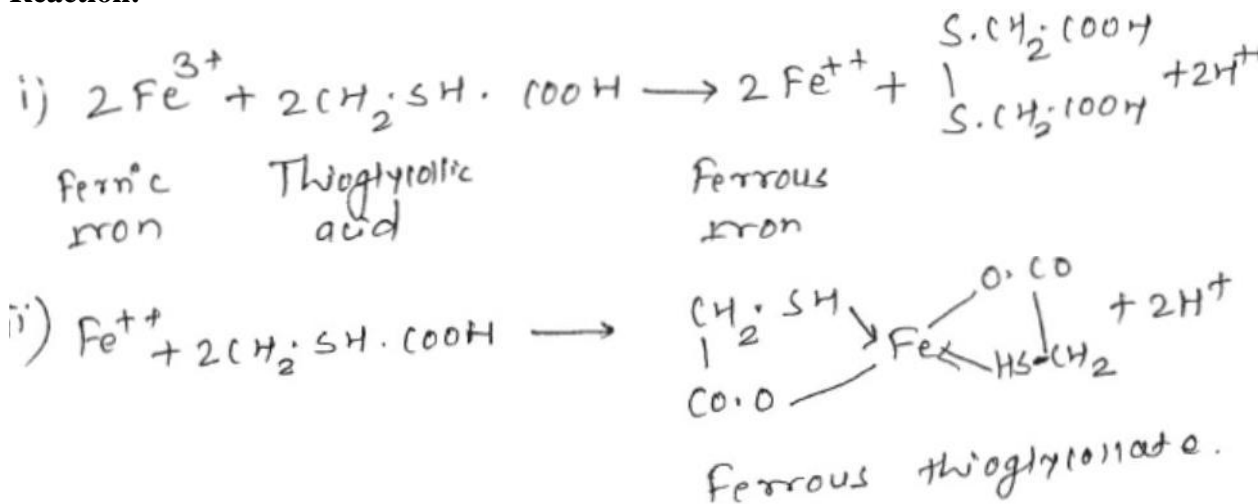
Ans. Principle:

Limit test for iron depends upon the interaction of thioglycolic acid with iron in the presence of citric acid and in ammonical alkaline medium.

This results in the formation of purple colored ferrous thioglycolate complex. The intensity of purple color produced in the test solution is compared with standard iron solution by viewing vertically downwards.

If the intensity of color is more in the 'test' sample than in the 'standard' it means that the sample contains more quantity of iron impurity than the permissible limit and hence sample is declared as not of standard quality.

Reaction:



Role of Thioglycolic acid-

1. Iron impurity may be present in trivalent ferric form or in the divalent ferrous form. If it is in ferric form, thioglycolic acid reduces ferric form of impurity into ferrous form.
2. Complexing agent to form complex with iron.

Role of Citric acid- It produces purple colored ferrous thioglycolate complex by acting as an acid. It prevents precipitation of iron (ferrous) with ammonia by forming ammonium citrate buffer.



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Role of Ammonia- To maintain alkaline condition.

b) Define Emetics. Give molecular formula, synonym, properties and uses of antimony potassium tartrate.

Ans. (one mark for definition and half marks for formula & synonym & one mark for properties & uses)

Emetics: A drug or substance given to induce vomiting is known as Emetic.

OR

The drugs or compounds which expel contents from the GIT are known as emetics.

Antimony Potassium Tartrate

Synonym-Tarter emetic

Formula- $C_4H_4KO_7.Sb.1/2H_2O$

Properties-

- Colorless, crystalline powder.
- Odorless & sweet in taste.
- Soluble in water & insoluble in alcohol.
- It effloresces on exposure to air.

Uses:-

- Emetic
- Expectorant (in low dose)
- Treatment of Kala Azar

c) What is quality control? Stress out the importance of quality control in pharmaceutical industry.

Ans. (one mark for definition and three marks for importance)

Defination of Quality control:-The term quality as applied to drugs and drug products includes all those factors which contribute directly or indirectly to the safety, effectiveness and reliability of the product.

Importance of Quality control in pharmaceutical industry:

The term Quality control is most important parameter in Pharmaceutical field. The good quality product should be available to the patient which must be –

i) Of a genuine quality and of nature



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ii) Physically and chemically pure

iii) Retains quality in terms of shelf life

The responsibility of Pharmaceutical industry and Pharmacist has increased considerably to maintain the Good Manufacturing Practices.

The term quality as applied to drugs and its products includes all those factors which contribute directly or indirectly to the safety, effectiveness and reliability of the product.

The quality control include all those aspects starting with the procurement of raw material to the finished products available at the drug store and till it consumed by the customer. The job of quality control is to test a drug for quality and quantity. Hence qualitative identification and quantitative determination should be done by following the standard given official books.

d) What are antidotes? Classify antidotes with examples.

Ans: (One mark definition and three marks classification)

Definition: Antidote is any substance which reverse, counteracts, stop the effect of poison.

Classification: Depending on their mechanism of antidotal action they are classified as:

1. Physiological antidote: It counteracts effect of poison by producing other physiological effect

Example- Sodium nitrite in cyanide poisoning

2. Chemical antidote: It changes chemical nature of poison.

Examples- Sodium Thiosulphate in cyanide poisoning

Chelating agents- Sodium & Calcium Edetate

3. Mechanical antidote: They prevent absorption of poison across the intestinal wall by adsorbing the toxins on to their surface.

E.g. Activated charcoal and kaolin.



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e) Give properties, uses, synonym and molecular formula of sodium hydroxide.

Ans.(one marks for each point)

Sodium Hydroxide:

Molecular formula: NaOH

Synonym: Caustic soda

Properties:

1. It is a dry, hard, brittle, white or nearly white sticks, in fused masses, in small pellets, in flakes and in other forms.
2. It is very deliquescent and rapidly absorbs moisture and carbon dioxide from the air, hence it should be stored in air tight container.
3. It is soluble in water, alcohol, ether, glycerin.

Uses:

1. Pharmaceutical aid.
2. Alkalizing agent.
3. Its 2.5% solution used in veterinary practice as disinfectant for animal houses.
4. It is used as powerful caustic so it has been used to remove warts.



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Q.4) Attempt any THREE of the following: (3x4)

12Marks

a) Enlist the various sources of impurities. Explain the source –“Raw materials” and “Storage condition.”

Ans. (2 mark to sources of impurities and 1 mark each for two explanations)

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.

2. Storage condition- The chemicals or substances, when prepared, are stored in different types of containers, depending upon the nature of the material, batch size and the quantity. Various types of materials are used for storage purpose. These may be plastic, polythene, iron, stainless steel, aluminum and copper vessels etc. Reaction of these substances with the material of the storage vessel may take place and the products formed, occur as impurities in the stored material. The reaction may take place directly or by the leaching out effect on the storage vessel. Alkalis stored in ordinary glass containers, extract lead from it, which occurs in the final product. Similarly, strong chemicals react with iron containers, and extract iron.



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b) Discuss the various uses of radioisotopes in pharmacy.

Ans. (one mark for each use.)

Uses of Radioisotopes:

Radioisotopes are widely used in medicines & surgery. There are various uses of radioisotopes in pharmacy

1] **Diagnostic applications:** By using radioisotopes, size & morphology of organ can be detected.

Radiations have sufficient energy to pass through tissue.

E.g. ^{32}P - used for diagnosis of eyes, brain & skin cancer,

^{51}Cr - used to determine volume of RBC.

^{57}Co , ^{58}Co - used for diagnosis of pernicious anemia.

2] **Radiotherapy:** Radioisotopes are helpful to destroy diseased tissue without affecting on normal cells.

Gamma radiation has high penetrating power hence it destroy deep seated tumor.

e.g. ^{60}Co - Treatment of cancer of cervix, vagina, bladder, mouth, uterus

^{131}I - Treatment of thyroid carcinoma, thyrotoxicosis,

^{32}P - Treatment of polycythemia (rise in RBCs)

3] **Sterilization:** Some radioisotopes are used for sterilization of heat labile drugs.

e.g. ^{60}Co –used for sterilization of hormones, vitamins, antibiotics, surgical dressing, disposable syringes etc.

4] **Research applications:** In biochemical research radioisotopes are used in the determination of reaction mechanism. E.g. ^{13}C - used to label organic compounds.

^{131}I used to determine effective renal plasma flow.

5] **Analytical chemistry:** Radioisotopes have applications in analytical chemistry mainly when dealing with very dilute solution.



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C) Give the molecular formula, method of preparation, properties and uses of Ammonium Chloride.

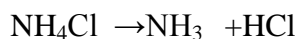
Answer- (One mark for each)

Ammonium Chloride:

Molecular Formula: NH_4Cl

Method of preparation:

Its aqueous solution is acidic. A 0.8% solution is iso-osmotic with serum. When heated, it vaporizes and the vapour is almost completely dissociated into ammonia and hydrogen chloride, reversibly.



It shows the reactions of ammonium (NH_4^+) and chloride (Cl^-) radicals.

Properties:

1. It is a white crystalline, slightly hygroscopic powder.
2. It is odorless but it has a cooling saline taste.
3. It is very soluble in water, sparingly soluble in alcohol but freely soluble in glycerine.
4. Store in air tight containers.

Uses:

1. Expectorant- Increases secretion of respiratory tract and makes the mucus less viscous.
2. Diuretic- Treatment of lead poisoning by increasing its excretion.
3. Replace chloride lost during vomiting.
4. Systemic acidifier (treatment of metabolic alkalosis)
5. Treatment of Urinary tract infection.



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d) Define Pharmacopoeia and Monograph. What are the contents of monograph?

(Half marks for each definition and three marks for content of monograph)

Ans: Definition of Pharmacopoeia: It is derived from the Greek words pharmakon (drug or medicine) Poieo (to make).

Pharmacopoeia is a document containing methods of standardization of drugs and their common formulations, published by a governmental authority.

Monograph:

The word “monograph” means the written study of a subject OR the monographs are somewhat stereotyped in style and are arranged in the alphabetical order of their names.

Content of Monograph (Any six)

- i) Main title
- ii) Synonyms or Subsidiary titles
- iii) Chemical formula and molecular weight of the substance
- iv) Category
- v) Doses
- vi) Description
- vii) Solubility
- viii) Storage
- ix) Standards
- x) Identification
- xi) Tests for Purity
- xii) Assay



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e) Define Antioxidants and state properties, chemical formula and uses of Sodium Metabisulphite.

Ans: (One mark for each)

Definition: Antioxidant is an agent which is added to any preparation to prevent oxidation of ingredients and subsequent deterioration of the product. Chemically they act as reducing agents.

Sodium metabisulphite:

Chemical formula: $\text{Na}_2\text{S}_2\text{O}_5$

Properties:

1. It is white to yellowish crystalline powder.
2. It has sulphur like odour and an acid saline taste.
3. It is soluble in water, alcohol and glycerol.
5. On exposure to air and moisture, it is slowly oxidized to sulphate with disintegration of the crystals. Hence it should be stored in an air tight container.

Uses:

1. It is used as antioxidants and preservatives in pharmaceutical preparations such as penicillin suspensions, ascorbic acid injection and preparation of steroids, P -amino benzoic acid derivatives.
2. It is also used to stabilize the solutions or injections of drugs that contain phenol or catechol nucleus such as adrenaline.
3. It is used in food industry for preservation of dried fruits and fruit juices because of their antimicrobial action.
4. It is used as a reducing agent in photography.



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Q. No 05- Answer any THREE (Each question will carry FOUR marks)

12 marks

a) Explain the mechanism of action of antimicrobial agents.

(03 marks for each mechanism, 01 marks for examples.)

Ans: - Mechanism of action of antimicrobial agents

Inorganic compounds generally exhibit antimicrobial action by any of the three mechanisms viz.

(i) Oxidation

(ii) Halogenation

(iii) Protein binding or precipitation.

1. Oxidation:

Compounds acting by this mechanism belong to class of peroxide, peroxyacids, oxygen liberating compounds like permanganate and certain Oxo-halogen anions.

Microorganisms require protein for their growth. Various reducing groups are present in proteins which are oxidized by oxidizing agents. They act on proteins containing sulfhydryl group and oxidizes free sulfhydryl to Disulphide Bridge and inactivate its function. Hence change in molecular shape of protein, leads to destruction of protein.

Examples: Hydrogen peroxide, Potassium permanganate, non-metals act by this mechanism.



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2. Halogenation:

Proteins are made up of different amino acids and it contains peptide linkage or peptide chain. Some antimicrobial agents like hypochlorites or compounds containing or liberating chlorine or iodine causes chlorination or iodination at peptide linkage of primary & secondary structures present in protein, leading to change in molecular shape of protein, and destruction of protein.

E.g. Iodine & iodine preparations, Chlorinated lime, Sodium Hypochlorite

3. Protein Precipitation:

Protein structure contains many polar groups & groups having lone pair of electrons. Some antimicrobial agents containing metal ions form complexes with polar groups or groups having lone pair of electrons.

e.g. Silver nitrate, Mild silver protein, Mercury & Mercury compounds like Yellow Mercuric oxide, Ammoniated mercury, Boric acid, Borax, IB, IIB group metals- Cu(II), Ag(I), Zn(II), Hg(II) etc.



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b) Give synonym, molecular formula, properties, preparation and uses of chlorinated lime.

(½ marks for synonym, ½ marks for molecular formula, 01 mark for properties, 01 mark for preparation, 01 mark for uses.)

Ans- Synonym - Bleaching powder

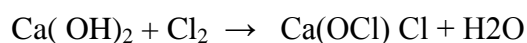
Molecular formula - Ca(OCl)Cl. H₂O or CaOCl₂

Properties-1) It is a dull white powder with characteristic odor.

2) On exposure to air it absorbs moisture & decomposes by liberating chlorine.

3) It is sparingly soluble in water & insoluble in alcohol.

Preparation-It is obtained by action of chlorine on calcium hydroxide. Calcium hydroxide is spread on the shelves in suitable container; chlorine gas is introduced at top of chamber & passed through the content of shelves. When absorption of chlorine is completed powdered lime is blown into the chamber to absorb excess chlorine.



Uses-

-It is used as disinfectant & bleaching agent.

-It shows bactericidal action. It is used to disinfect faeces, urine, sputum & other organic material.

-It is employed for disinfecting drainages.

-It is a powerful bleaching agent. Its powerful bleaching action must be considered while disinfecting colored materials.

- It is used as one to two grams per liter for sterilization of water. The treated water should be exposed to air & allowed to settle before use.

- Chlorinated lime is used in the preparation of surgical chlorinated soda solution, employed as a wound disinfectant.



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c) How the acid base of the body is maintained?

Ans- The acid base balance in the body is well regulated by intricate mechanism. Number of chemical reactions takes place in the cell and the activity of cell and the reactions occurring inside is greatly influenced by pH or hydrogen ion concentration. Acids are being constantly produced in process of metabolism. E.g. carbonic acid, lactic acid. Acids or alkalis produced in the body may cause change in pH. Most of metabolic reactions occur between pH 7.38-7.42. Increase in acidity of body fluid & tissues means (pH < 7.38) is called as acidosis and increase in alkali reserve in blood & body fluid (pH > 7.38) is called as alkalosis.

Required pH (7.38-7.42) of plasma is maintained by:

1) Buffering system: Three major system of buffering system occurring in the body are:

- a) $\text{HCO}_3^- / \text{H}_2\text{CO}_3$ / carbonic acid found in plasma & kidney.
- b) $\text{HPO}_4^{2-} / \text{H}_2\text{PO}_4^-$ present in cells & kidney
- c) Protein or buffer system

Proteins are composed of amino acids bound together by peptide linkage. However some amino acids like histidine have free acidic group which on dissociation from base and H^+ which participate in buffering of the body fluid.



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2. Respiratory mechanism

The other important pH control is through the control of respiratory centre. When this is stimulated it alters the rate of breathing. Through the rate, the removal of CO_2 from body fluid leads to the changes in pH of blood.

Retention of CO_2 in the body due to decrease in ventilation as a result of mechanical/muscular impairment, lung disease, pneumonia, CNS depression due to narcotic drugs, CHF etc. induces respiratory acidosis This can be overcome by renal mechanism by :

- i) Increase in acid excretion by $\text{Na}^+ - \text{H}^+$ exchange
- ii) Increase in ammonia (NH_3) formation
- iii) Increase in reabsorption of HCO_3^- (bicarbonate)

In respiratory alkalosis there is excess loss of CO_2 from body due to over breathing or hyperventilation as a result of emotional factor, fever, hypoxia, loss of appetite, salicylate poisoning etc. This can be overcome by renal mechanism by:

- i) Increase in bicarbonate (HCO_3^-) excretion
- ii) Decrease in ammonia (NH_3) formation
- iii) Decrease in reabsorption of HCO_3^- (bicarbonate)

3. Renal mechanism

The third mechanism is via elimination of some ions through urine by kidney. Absorption of certain ions and elimination of other control the acid-base balance of blood and thus of body fluids.



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d) What are desensitizing agent? Give properties & uses of Strontium chloride.

(01 Mark for definition, 1½ mark for properties, 1½ mark for uses)

Ans- Desensitizing agent-These are the agents which decrease hypersensitivity of teeth towards hot & cold things which may be due to infection of pulp cavity of tooth.

Properties-

1. It occurs as a colorless, odorless crystals or white granules.
2. It effloresces in dry air & deliquesces in moist air.
3. It is soluble in water & Alcohol.
4. The aqueous solution is neutral in nature.

Uses-

1. It is used as desensitizing agent in 10% concentration.

e) Enlist the various devices used in measurement of radioactivity. Draw a neat labeled diagram of “Geiger-Muller counter”.

(02 Marks for enlisting, 02 Marks for diagram.)

Ans- Various devices used in measurement of radiations

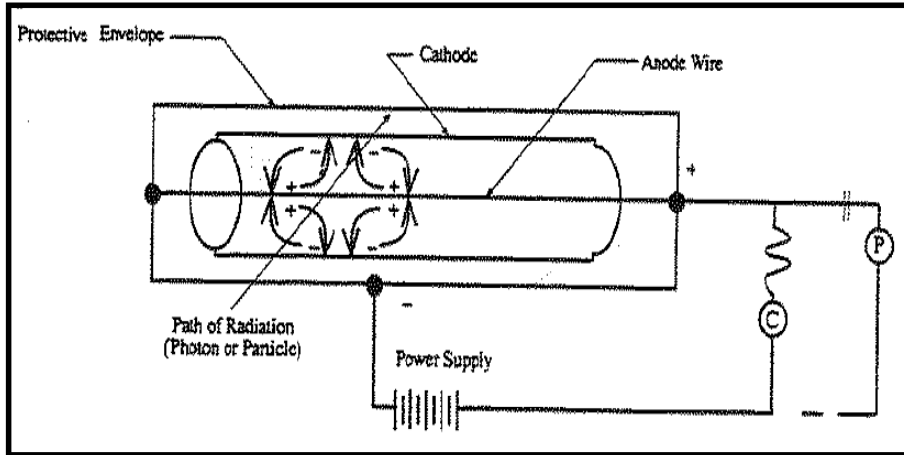
1. Ionization Chamber.
2. Proportional Counter.
3. Geiger-Muller Counter.
4. Scintillation Counter.
5. Autoradiography.
6. Solid state detectors.

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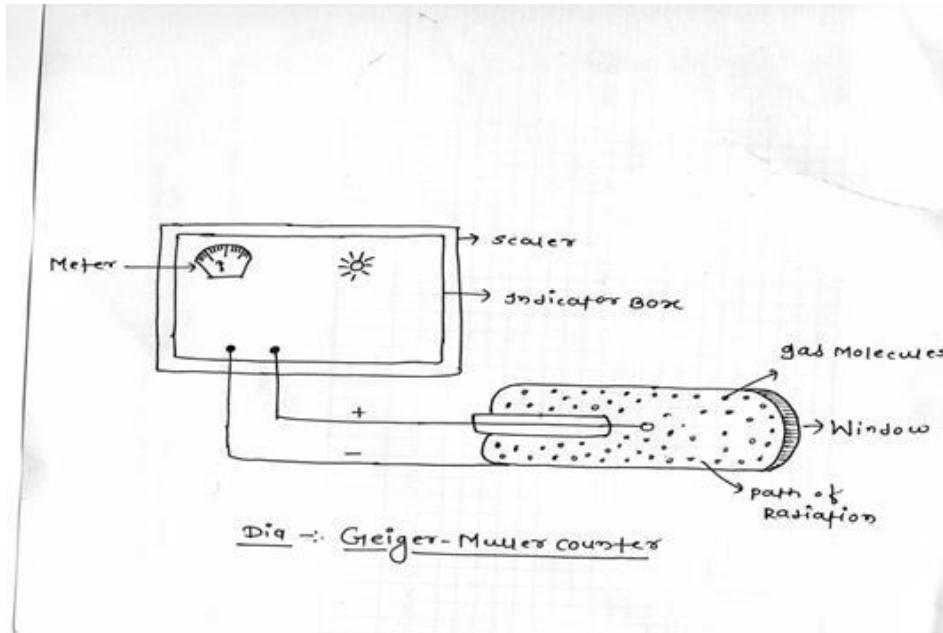
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OR





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Q.No-06 Attempt any three of the following

12 Marks

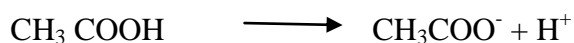
(Each question will carry FOUR Marks)

a) Explain Arrhenius Acid base theory with example.

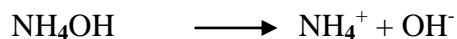
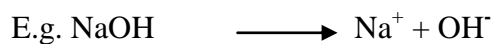
(For theory 02 Marks, for limitations 01 mark, for examples 01 mark)

Ans- Acid or Base on dissolution in water dissociates forming ions and establishes equilibrium between ionized and unionized molecule.

Acid is defined as a substance which when dissolved in water gives hydrogen ions. (H^+)



Base is defined as a substance which when dissolved in water gives hydroxyl ions. (OH^-)



Limitations of Arrhenius Theory:

- 1) The definition of acid and base are only in term of aqueous solution not in term of substance.
- 2) The theory does not explain acidic and basic properties of substance in non-aqueous solvent.
- 3) The neutralization of acid and base in absence of solvent is not explained.
- 4) The basic substance which does not contain hydroxide ion is not explained by the theory.



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b) What is ORS? Give the formula of ORS given by WHO and UNICEF.

(01 Mark for meaning, 03 Marks for formula.)

Ans-These are the dry powder preparations to be mixed in specific amount of water and are used for oral rehydration therapy. Oral rehydration salt contains anhydrous glucose, sodium chloride, potassium chloride and either sodium bicarbonate or sodium citrate. These preparations may contain a flavouring agent.

Composition-

Ingredients	Formula II Quantity(WHO)	Formula III Quantity (UNICEF)
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
Purified water	1 litre	1 litre



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c) Define “radio-opaque contrast media”, and give properties and uses of Barium Sulphate.

(For definition 01 Mark, properties 1 ½ Marks, uses 1 ½ Marks)

Ans-

Radio-opaque contrast media or the X-ray contrast media are the chemical compounds which have the ability to absorb X-rays & block the passage of X-rays. Thus, they are opaque to x-ray examination, such compounds & their preparations are called as radio opaque contrast media. X-rays are electromagnetic radiation of short wavelength & thus have high penetrating power. The electrons of high atomic number element can interact with x-rays. The interaction causes interference in their passage through the medium.

Properties:

-It is a fine, white, odorless, tasteless & bulky powder that is free from grittiness.

-The salt is insoluble in water, organic solvents & dilute acid & alkalies. It is soluble in concentrated H_2SO_4 .

-It can be solubilized with sulphuric acid or by fusing it with alkali carbonates. Once it is converted to carbonates, it reacts with acids easily.

Uses: 1. It is used for preparation of barium sulphate compound powder & also as a contrast medium for x-rays examination of the alimentary tract. It is administered orally by enema for examination of the colon.

2. Barium sulphate is ingested for use in GIT, in the form of a suspension usually with flavouring & suspending agents (200-300g orally).



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d) Give one medicinal use of – (01 Mark for use of each compound)

(i) Aluminium hydroxide gel

(ii) Magnesium sulphate

(iii) Bismuth subcarbonate

(iv) Selenium sulphide.

Ans- (i) Aluminium hydroxide gel-

- It is non systemic or non absorbable antacid.
- Externally it is used as mild astringent.
- Used in the treatment of diarrhea & cholera.
- Externally used as dusting powder.

(ii) Magnesium sulphate-

- Magnesium sulphate is given orally in dilute solution. About 5gm of magnesium sulphate produces laxative effect. Because of its bitter and nauseating taste it is given in fruit juices.
- It is used as antidote in heavy metal poisoning.

(iii) Bismuth sub carbonate -

- Protective & adsorbent.
- Antidiarrheal, treatment of enteritis, colitis and dysentery.
- Astringent action- It is used in cosmetic lotion & face powder.
- Antacid.

(iv) Selenium sulphide-

- It is mainly used topically as Anti-dandruff.
- It is used in shampoo in 1-2.5% as Anti-sebberhic.



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e) Give the properties and uses of- (Any two)

(01Mark for properties, 01Mark for use)

(i) Talc

(ii) Calamine

(iii) Potassium permanganate

(iv) Hydrogen peroxide.

Ans-(i) Talc-

Properties-

- It is odorless, tasteless, light, homogeneous, very fine white or grayish white powder.
- It is free from grittiness and unctuous to touch.
- It is insoluble in water, dilute acid and dilute alkali.

Uses-

- Pharmaceutical aid.
- Dusting powder.
- It is used as filtering medium.
- Lubricant, excipient & fillers for pills and tablets.
- It is used in cosmetic preparation.
- Used as protective.



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(ii) Calamine-

Properties-

- It occurs as a pink powder, almost odorless and tasteless.
- It passes through sieve no 100.
- It is practically insoluble in water and dissolves in mineral acids with effervescence.

Uses-

- Topical protective.
- Dusting powder.
- Used in the preparation of ointment, creams and lotions for its soothing, protective & Adsorption property.
- Used in cosmetic preparation.
- Used in dermatological conditions.
- Antiseptic and astringent.
- It is the main ingredient of calamine lotion.
- Phenolated calamine lotion is used as Antiseptic and antipruritic.

iii) Potassium permanganate-

Properties-

- Potassium permanganate occurs in the form of dark purple colored monoclinic prisms, almost opaque with a blue metallic luster.
- It is odorless. An aqueous solution has sweetish astringent taste.
- It is water soluble and more soluble in boiling water.
- When heated, it decrepitates.
- Potassium permanganate is a powerful oxidizing agent.
- In acidic solution potassium permanganate is reduced from Mn^{+7} to manganous ion Mn^{+2} with evolution of oxygen.
- In neutral or alkaline media also oxygen is liberated.



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- It brings bleaching action.
- 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-

- Topical anti-infective.
- Antiseptic & Antibacterial.
- Antidote in barbiturate poisoning.
- Oxidizing agent.
- 1:5000-1:15,000 solutions is used in cleaning wounds & ulcers.

(iv) Hydrogen peroxide-

Properties-

- It is colorless, syrupy liquid.
- Odorless with slightly acidic taste.
- It decomposes with oxidisable organic matter.
- It is miscible with water.
- It easily undergoes decomposition when stored improperly.

Uses-

- Mild antiseptic.
- Disinfectant.
- Cleansing agent for cuts & wounds and for loosening ear wax.
- 1.6% solution is used in deodorants, Gargles & mouth washes.
- Antidote in phosphorous & cyanide poisoning.
- Bleaching agent.



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