



**SUMMER – 15 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 judgments 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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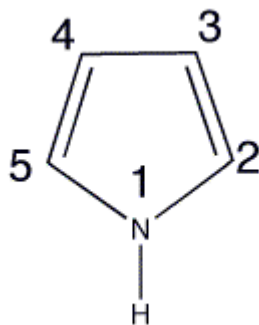
Q.1. Attempt any FIVE of the following (20 marks)

A) Give structure and numbering method for (Any four)

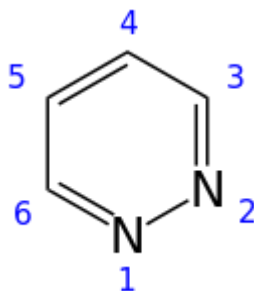
- i) Pyrrole
- ii) Pyridazine
- iii) Benzimidazole
- iv) Isoquinoline
- v) Azepine
- vi) Thiophene

[One mark for structure with numbering of each compound.]

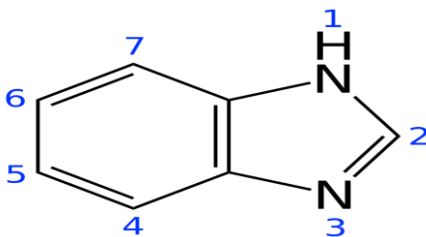
i) Pyrrole



ii) Pyridazine



iii) Benzimidazole



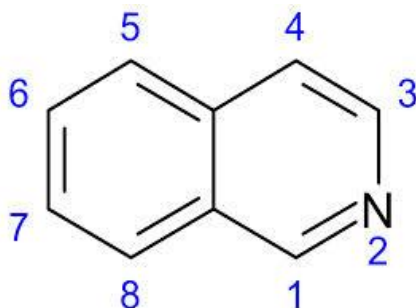
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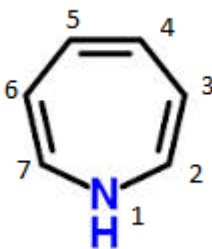
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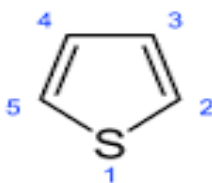
iv) Isoquinoline



v) Azepine



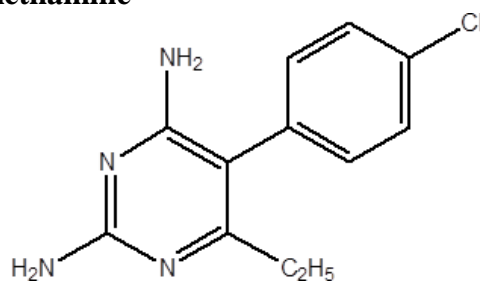
vi) Thiophene



b) Write structure of (Any four)

[One mark for structure of each compound.]

(i) Pyrimethamine



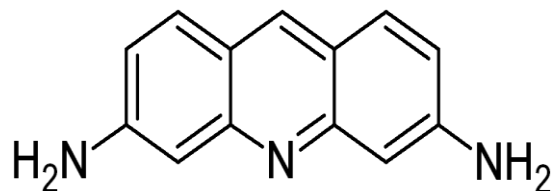
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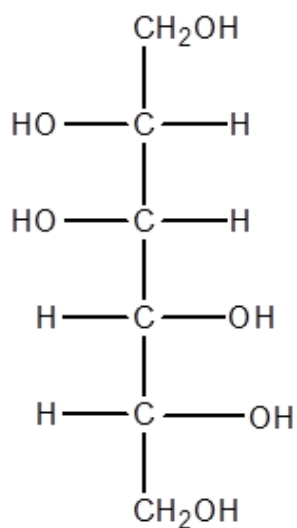
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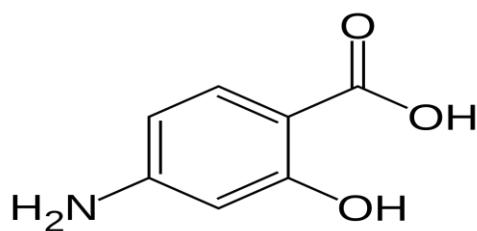
(ii) Proflavine:



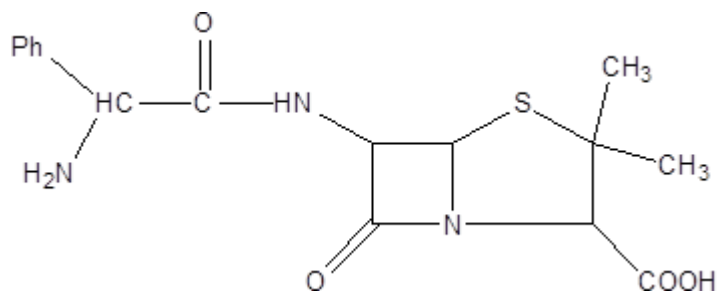
(iii) Mannitol:



(iv) PAS:



(v) Ampicillin:



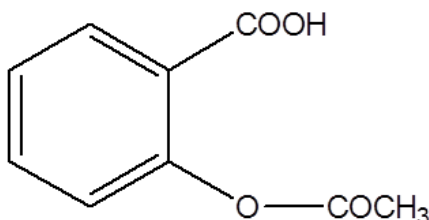
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(vi) Aspirin:



c) Define following terms (Any four)

[One mark for definition of each term. Total 1X4 = 4 marks]

- (i) **Anticonvulsant:** The drugs / agents that prevent or diminish the severity of epileptic seizures.
- (ii) **Analeptics :** The drugs which increase the activity of various subunits or parts of central nervous system ( brain and spinal cord ) are called Analeptics or CNS stimulants.
- (iii) **Diuretics:** Diuretics are the drugs which increases the rate of urine excretion by kidneys mainly by inhibiting tubular reabsorption of sodium and its osmotic equivalent amount of water.
- (iv) **Antineoplastics:** The drugs used in the treatment of neoplasm or cancer are called as antineoplastic.
- (v) **Parasympathomimetics:** The drug which exert or mimic the pharmacological action / effects of acetylcholine or drugs which bring about stimulation of parasympathetic nervous system are called parasympathomimetics.
- (vi) **Local anaesthetics:** Local anaesthetics are the drugs which produce reversible loss of sensation in limited area without loss of consciousness. They act by blocking the conduction of sensory nerve impulses near the site of their application or injuries.



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**d) Give uses of (Any four)**

**[One mark for two uses of each compound. Total 1X4 = 4 marks]**

**(i) Promethazine :**

1. Antihistaminic in Allergic condition

Treatment of-

2. Motion sickness

3. Insect bite

4. Urticaria

5. Parkinsonism

6. Insomnia

7. Premedication where sedation is necessary

**(ii) Clofibrate :**

1. Lipid lowering agent to treat hyperlipidemia

2. For prophylaxis of ischaemic heart disease

**(iii) Furosemide :**

1. Diuretics

2. To treat edema associated with congestive heart failure, cirrhosis of liver and renal disease.

3. For management of mild hypertension.

**(iv) Hexachlorophene :**

It has antibacterial property, hence it is used to reduce bacterial flora of skin and bacterial infection and to disinfect hands of surgeon.



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**(v) Griseofulvin :**

1. Antifungal Antibiotic
2. It is used in the treatment of infection caused by ringworms, trichophyton, microsporous species.

**(vi) Sulphadiazine :**

It has antibacterial property, hence used in the treatment of –

1. Meningitis
2. Urinary tract infection
3. Toxoplasmosis
4. Burn Therapy

**e) What is Malaria? Classify antimalarial with examples. Draw structure of Chloroquine.**

**[One mark for malaria, 2 marks for Classification, one mark for structure]**

**Malaria:**

Malaria is disease caused by bite of female anopheles mosquito. The causative agent for malaria is Plasmodium species such as P. falciparum, P. ovalae, P. vivax, P. malaria. . The symptoms of malarial infections are chills followed by fever, anaemia, enlargement of liver, body pain and sweating.

**Classification:**

**On Chemical basis**

- a) Alkaloids – e.g. Quinine
- b) 4-amino quinolines – e.g. Chloroquine, Amodiaquine
- c) 8-amino quinolines – e.g. Primaquine
- d) 9- aminoAcridine : e.g. Mepacrine

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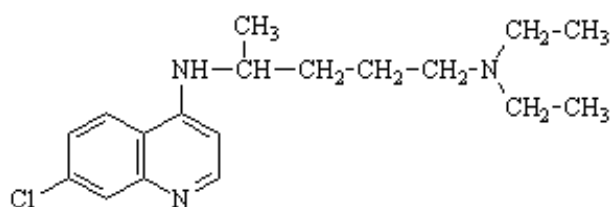
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- e) Biguanides – e.g. Proguanil
- f) Pyrimidines – e.g. Pyrimethamine, Trimethoprim
- g) Miscellaneous – e.g. Protonsil, Dapsone, Artesunate, Artemether etc.

**Structure of Chloroquine :**



**Chloroquine**

**f) Discuss importance of ‘Co-trimoxazole’. Give its uses, official preparations and two famous brand names of combination.**

**[One mark for importance, One mark for uses, One mark for official preparation and one mark for brand names]**

**Importance of Cotrimoxazole:**

When Sulphamethoxazole is given alone, resistance develops to susceptible bacteria and hence higher dose is needed but it produces adverse effect like crystaluria. Trimethoprim also develops resistance when given alone.

Cotrimoxazole is the combination of two drugs i.e. Sulphamethoxazole and Trimethoprim

It is a mixture of 5 parts of Sulphamethoxazole and 1 part of Trimethoprim. Sulphonamides block the biosynthesis of folic acid from p-amino benzoic acid. Trimethoprim inhibits the enzyme folate reductase and blocks the conversion of folic acid to tetrahydrofolic acid (THF). THF is the form required for coenzyme synthesis. Combination of Sulphamethoxazole and Trimethoprim by synergism produces bactericidal effect.





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**Uses of Cotrimoxazole:**

This is used in the treatment of

- i) Genito-urinary tract infection.
- ii) Respiratory tract infections like bronchitis and pneumonia.
- iii) Meningitis
- iv) Enteric fever like Typhoid and paratyphoid.

**Official Preparation:**

1. Cotrimoxazole Tablet I. P.
2. Cotrimoxazole Injection I. P.
3. Cotrimoxazole mixture I. P
4. Cotrimoxazole Dispersible powder I. P

**Brand names :**

Bactrim, Septran, Ciplin, Uritrim, Trimforte, Eusaprim, Omsat, Sulfotrim, Suprim, Microtrim.

**g) What are vitamins? Name four water soluble vitamins with deficiency symptoms, actions and uses.**

**[One mark for explanation, One mark for four names, One mark for deficiency symptoms and One mark for action and uses]**

**Vitamins :**

Vitamins may be defined as potent organic substances which are essential for normal growth and maintenance of life of animals, which are not able to synthesize in adequate quantity.



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**Water soluble Vitamins:**

<b>Name of Vitamin</b>	<b>Deficiency symptoms</b>	<b>Actions and uses</b>
Thiamine/Vit. B1	Beriberi	To treat beriberi in man and polyneuritis in bird. Prosthetic group enzyme Synthesis of acetyl choline
Riboflavin/Vit. B2	Skin lesion, Glossitis, Stomatitis	To treat Skin lesion Component coenzyme for oxidation of carbohydrate and amino acid
Nicotinic acid/ Vit.B3	Pellagra	For prophylaxis & treatment Pellagra. Antilipidemic, Vasodilator
Pyridoxine/Vit. B6	Dermatitis	To treat dermatitis, Epilepsy, aneamia, Nausea vomiting , Depression
Folic acid	Macrocytic anemia	To treat megaloblastic anemia In synthesis of DNA For normal production of RBC Mental Depression
Cyanocobalamine/ Vit. B12	Pernicious anemia	To treat Pernicious anemia
Vitamin C	Scurvy	To prevent and treat scurvy To promote healing of wounds and fractures To facilitate formation of haemoglobin.



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Q.2. Attempt any THREE of the following (12 marks)

a) What are antibiotics? Classify them with giving examples. Draw the structure of Benzyl Penicillin.

[One mark for explanation, two marks for classification, One mark for structure]

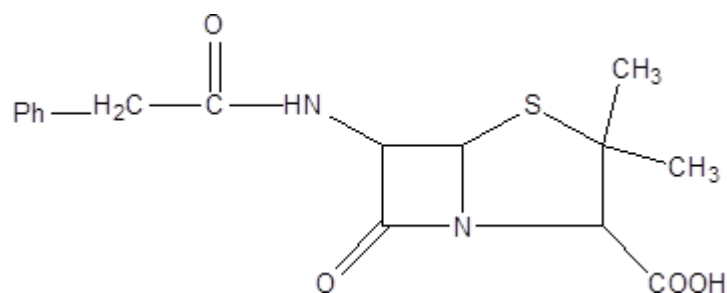
**Antibiotics:**

Antibiotics are the chemical substances derived or produced from living microorganisms which are capable of inhibiting the life processes of other microorganisms in small concentration.

**Chemical Classification:**

1. Beta lactum antibiotics – e.g. Penicillin , Cephalosporin
2. Aminoglycoside antibiotics– e.g. Streptomycin, Gentamycin, Linomycin
3. Polypeptide antibiotics – e.g Bacitracin
4. Polyene antifungal antibiotics – e.g. Nystatin, Amphotericin
5. Macrolide antibiotics – e.g. Erythromycin
6. Ansamycin – e.g. Rifamycin
7. Tetracyclines – e.g. Tetracycline, Oxytetracycline, Chlortetracycline
8. Fluoroquinolones- Ciprofloxacin, Ofloxacin etc.
9. Miscellaneous –e.g. Griseofulvin, Chloramphenicol, Sodium fusidate

**Structure of Benzyl Penicillin:**





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b) Give stability – storage condition and uses of ( Any Two)

- (i) Anesthetic ether
- (ii) Cyclopropane
- (iii) Thrombin
- (iv) Heparin

[One mark for stability – storage condition and One mark for uses of each compound]

i) Anesthetic ether:

**Stability – storage condition:**

It is oxidized by atmospheric oxygen and is affected by light. Hence it is stored in tightly closed, light resistant containers in a cool place. If cork is used as a closer then it should be protected with metal foil. An antioxidant like hydroquinone or propyl gallate in suitable proportion should be added.

**Uses:**

1. General anesthetic
2. Solvent

ii) Cyclopropane:

**Stability – storage condition:**

It is stored in metal cylinder designed to hold compressed gases and kept in a cool room free from inflammable material. The whole cylinder is painted **orange**. The shoulder should be stenciled with name or symbol " $C_3H_6$ ". The name or symbol should be clearly stamped on the cylinder valve.

**Uses:**

1. Potent gaseous anesthetics

iii) Thrombin:

**Stability – storage condition:**

It is affected by air, heat and light. Hence it is stored in the atmosphere of nitrogen, in glass containers which are sealed so as to exclude microorganisms and moisture. The containers are kept at a temperature between  $2^\circ C$  and  $8^\circ C$  and are protected from light. It may contain suitable bactericide.

**Uses:**

1. Blood Coagulant
2. Topically to control minor oozing due to superficial cuts
3. Orally to prevent GIT bleeding

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iv) Heparin:

**Stability – storage condition:**

The aqueous solution is stable for at least 7 years at pH 7 to 8.

It is stored in sealed container so as to exclude microorganism and moisture.

**Uses:**

1. For prophylaxis and treatment of deep vein thrombosis.
2. During heart surgery
3. Blood transfusion as an anticoagulant

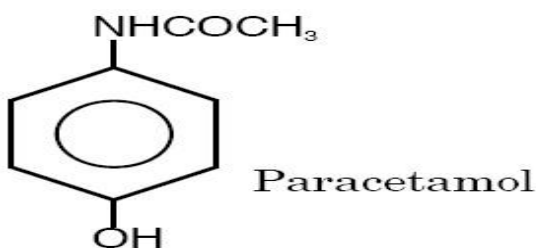
c) What are antipyretics- analgesics? Give structure, chemical name, properties and uses of Paracetamol.

[One mark for explanation, one mark for structure, & chemical name, One mark for properties and one mark for uses]

**Antipyretic:** The drugs which lower the raised (elevated) body temperature and bring it to the normal are called antipyretics.

**Analgesics:** The drugs which decrease sensitivity of pain by acting peripherally or centrally.

**Structure of Paracetamol:**



**Chemical name:** p-hydroxy acetanilide **OR** 4-hydroxy acetanilide

p- acetamido phenol **OR** N-acetyl, p-aminophenol



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**Properties:**

1. It occurs as white crystal or white crystalline powder
2. It is odorless and has a bitter taste.
3. It is sparingly soluble in water and alcohol.
4. When it is treated with ferric chloride, it gives a violet blue colour.

**Uses:**

1. Antipyretic
2. Analgesics for relief of pain such as headache, toothache, neuralgia, rheumatism.

**d) What is the role of Thyroid gland? Give structure, properties and uses of Thyroxine Sodium.**

**[ One mark for role, one mark for structure, One mark for properties and one mark for uses]**

**Role of Thyroid gland:**

Thyroid gland plays an important role in the body. It removes the inorganic iodides from blood plasma and synthesizes the two active hormonal components –

1. Thyroxine 2. Liothyronine. These hormones are required for the growth and development of body and for metabolic process. These hormones increase the basal metabolic rate and in some tissue stimulate oxygen consumption.

The deficiency of it causes hypothyroidism, congenital deficiency leads to cretinism marked by stunted growth and mental retardation. Excessive secretion causes hyperthyroidism, increased metabolic rate, heart rate, anxiety and restlessness.

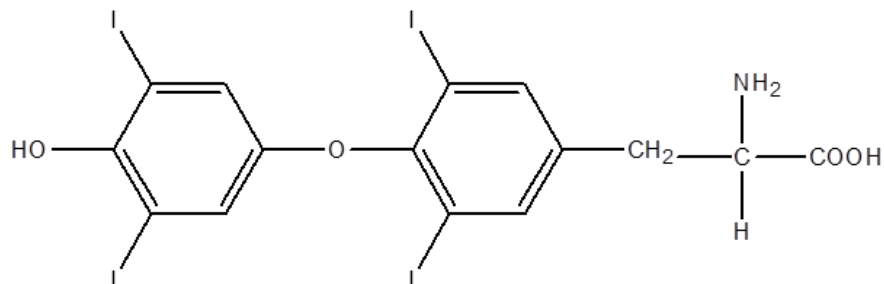
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**Structure of Thyroxin:**



**Properties of Thyroxin:**

1. Its sodium salt is a light yellow to buff colored powder.
2. It is odorless and tasteless.
3. It is slightly soluble in water in alcohol and soluble in alkali hydroxide and carbonate.
4. When it is treated with sodium nitrite in presence of HCl, it gives yellow color.

**Uses of Thyroxin:**

1. To treat Hypothyroidism.
2. To suppress Goiter.
3. To treat cretinism
4. To treat thyrotoxicosis.

e) **Give medicinal uses of (Any Four)**

[ One mark for each compound]

**i) Cyproheptadine:**

1. Antihistaminic
2. It is used as Appetite stimulant
3. To treat migraine
4. Cushing syndrome



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**ii) Warfarin Sodium:**

1. Anticoagulant for prophylaxis and treatment of deep vein thrombosis and systemic embolism.
2. To prevent myocardial infarction.

**iii) Urea:**

1. Diuretic
2. To treat dry skin condition.
3. To treat eczema
4. As an antipruritic
5. To control edema.

**iv) Tolazoline:**

1. It is alpha- adrenergic antagonist used to treat peripheral vascular disorder and Raynaud's Disease.
2. Treatment of Spasm
3. Treatment of thrombophlebitis

**v) Nandrolone :**

1. As substitute or replacement therapy in male hypogonadal disorder
2. For muscular development
3. To treat male infertility
4. To treat aplastic anemia
5. For suppression of lactation
6. Treatment of osteoporosis in postmenopausal women





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vi) **Fluorescein sodium :**

1. Diagnostic agent for detecting lesion and foreign body in ophthalmic practice.
2. For investigation of circulatory disorders.
3. For differentiation of normal and malignant tissue when examined in U.V. light.



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**Q.3 Attempt any THREE of the following**

**(12 marks)**

**a) What are sex hormones? Give properties, uses and official preparations of Testosterone.**

**(1 mark to each sub question)**

**Sex hormones** are the hormones which are produced mainly in gonads, ovaries or testes. They influence the development and directly or indirectly associated with reproduction. There are three main types of sex hormones:

- 1 Androgenic or anabolic steroids
- 2 Estrogens
- 3 Progesterone

**Properties:**

1. It occurs as an odorless, white crystalline powder.
2. It is very slightly soluble in water, freely soluble in alcohol.
3. It is dextrorotatory.

**Uses of testosterone**

1. It has both androgenic and anabolic activity. Its primary use is as androgen replacement therapy in men at maturity age in case of testosterone deficiency.
2. It is useful in certain anemias, osteoporosis and to stimulate growth in undergrown boys.
3. It is used to increase athletic performance and maintain muscle tone.
4. Used in palliative treatment of disseminated breast cancer in postmenopausal women.
5. Used in treatment of gynaecomastia.

**Official preparations:**

1. Testosterone propionate injection I.P., B.P.
2. Testosterone ester injection B.P.C.
3. Testosterone phenyl propionate injection B.P.C.



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**b) What are cardiotonics? Name three cardiac glycosides and their hydrolysis products. Mention uses and official formulations of any one of them.**

**(1 mark to each sub question)**

**Cardiotonics:**

These are the drugs which have stimulating action on the cardiac muscles. They increase the force of muscle contraction without increasing oxygen consumption capacity of heart.

Cardiac glycosides on hydrolysis yield corresponding aglycones and sugar.

Sr.No.	Glycoside	Products of Hydrolysis	
		Sugar	Aglycone
1	Digitoxin	3 molecules of digitoxose	Digitoxigenin
2	Digoxin	3 molecules of digitoxose	Digoxigenin
3	Lanatoside	2 molecules of digitoxose; 1 molecule of acetyl digitoxose and 1 molecule of glucose	Digoxigenin

**Uses of Cardiac glycosides:**

Treatment of-

1. Congestive heart failure
2. Left ventricular failure
3. Atrial fibrillation with tachycardia
4. Atrial flutter

**Official formulations:**

1. Digitoxin injection, tablets I.P.
2. Digoxin injection, tablets I.P.
3. Lanatoside Tablet I.P.



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c) What is Histamine? Define and classify antihistaminies with giving examples. Draw the structure of Diphenhydramine and mention one famous brand name of it.

(0.5 mark each to Histamine and one brand, 0.5 marks to definition and 1.5 classifications, 1 mark to structure)

**Histamine** is an organic substance or chemical found in many cells of human body. It causes wide variety of physiological response; almost every tissue is affected by it. The action of histamine is mediated by two types of receptors i.e. H<sub>1</sub> and H<sub>2</sub>. It plays a major role in allergic reactions like rash, itching, burn, sneezing etc.

**Definition – Antihistaminic agents:**

Antihistaminic drugs are the agents which diminish or prevent several actions of histamine in the body like allergic reaction, rhinitis, urticaria, mild asthma etc.

**Classification:**

**1. H<sub>1</sub> receptor antagonist :-**

- a) Amino alkylethers : Diphenhydramine
- b) Ethylenediamines : Mepyramine, Tripeleminamine
- c) Alkyl amines: Pheniramine, Chlorpheniramine, Bromopheniramine, Triprolidine.
- d) Phenothiazine derivatives :- Promethazine, Trimeprazine
- e) Piperazine derivative :- Cyclizine, Chlorcyclizine, Meclizine, Buclizine,
- f) Miscellaneous: - Cyproheptadine, Diphenylpyraline, Phenindamine tartarate, Antazoline.

**2. H<sub>2</sub> receptor antagonist: -** Cimetidine, Ranitidine, Burimamide, Metiamide.

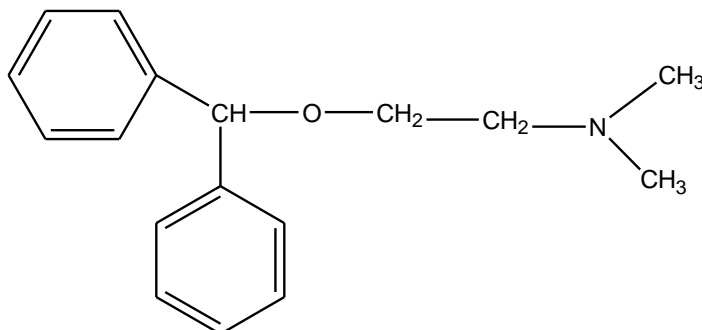
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Structure of Diphenhydramine:



**Brands:** Benadryl, Bronolex, Abcof, Allergin, Amidryl etc.

**d) Give medicinal uses of (Any four):**

**(1 mark for each compound)**

**i) Ibuprofen**

1. It is used as a mild analgesic & antipyretic.
2. It is commonly used for the relief of headaches and other minor aches and pains and is a major ingredient in numerous cold and flu remedies.
3. Treatment of rheumatoid arthritis, osteoarthritis, Spondylitis etc.

**ii) Salbutamol**

1. It has bronchodilator action
2. Treatment of asthma.
3. Prevention of bronchospasm.

**iii) Tetracycline**

1. Treatment of infection of CNS and urinary system.
2. It is active against gram positive and gram negative bacteria.
3. Treatment of infection of chest, soft tissue, superficial infection.
4. It has also application in treating malaria, typhus, pneumonia etc.

**iv) Mebendazole**

1. It is broad spectrum anthelmintic.
2. It is effective against Whipworm, Round worms, Tape worms, Thread worm infestation.

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v) Clofazimine

1. Treatment of leprosy
2. It has antibacterial action against the species of Mycobacterium, and certain other species such as Actinomyces, Streptomyces, Nocardia

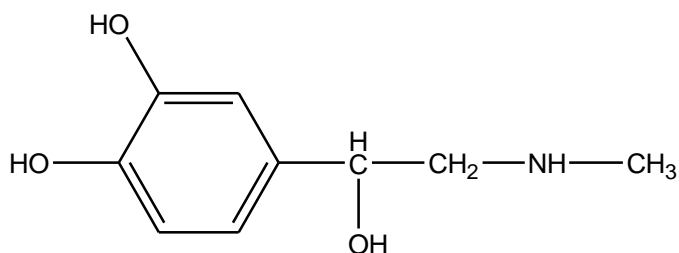
vi) Cetrimide

1. Antiseptic
2. Treatment of wounds, burn
3. Detergent action
4. Active against gram positive organisms.
5. Emulsifying agent, preservative.

e) Give structure and uses of (any two)

(1 mark each to structure and use)

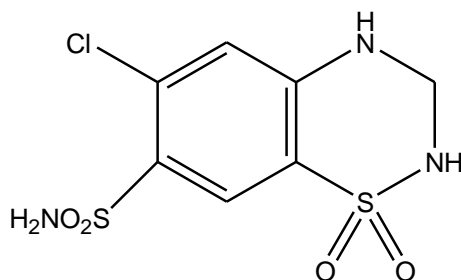
i) Adrenaline



Uses of Adrenaline:

1. Treatment of complete heart block- It is used to raise blood pressure and to accelerate the heart rate.
2. It is primarily used to relieve bronchial spasm in asthma.
3. It is used to prolong the action of local anesthetics.
4. Treatment of allergic disorders

ii) Hydrochlorothiazide



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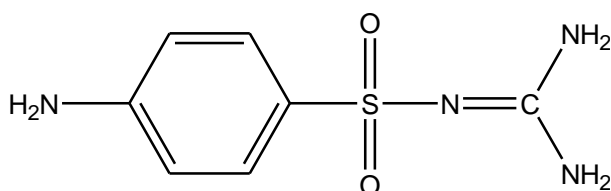
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**Uses:**

1. Diuretic
2. It is useful in edema associated with congestive heart failure, hepatic cirrhosis, steroid therapy, renal dysfunction.
3. Treatment of mild hypertension

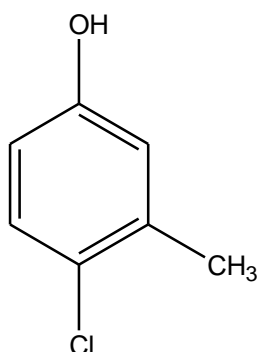
**iii) Sulfaguanidine**



**Uses:**

1. Treatment of local intestinal infection
2. Bacillary dysentery
3. Amoebic dysentery

**iv) Chlorocresol**



1. It is used as an antiseptic and preservative.
2. It is also used as disinfectant. It is commonly dissolved in alcohol in combination with other phenols.



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**Q.4 Attempt any THREE of the following**

**(12 marks)**

**a) What is Diabetes mellitus? Name three oral hypoglycemic agents. Give properties, structure and uses of any one.**

**(1 mark each to diabetes mellitus, any three oral hypoglycemic agents and structure. 0.5 marks each to properties and use of any one drug)**

**Diabetes Mellitus: -**

Diabetes Mellitus is a condition characterized by hyperglycemia (excessive sugar in blood, than the threshold value) and glucosuria (presence of sugar in urine).

The disease is caused by deficiency of insulin, a protein hormone secreted by beta cells of islets of langerhans, responsible for proper carbohydrate metabolism.

**Oral hypoglycemics:-**

Tolbutamide, Chlorpropamide, Phenformin, Metformin, Rosiglitazone, Pioglitazone, Acarbose, Miglitol, Glyburide, Glimepiride, Glipizide etc.

**Properties of Tolbutamide:**

1. It is an odorless, white crystalline powder.
2. It is insoluble in water, but soluble in alcohol, alkali, mineral acids.

**Properties of Glibenclamide:**

It is a white, odorless crystalline powder, practically insoluble in water & ether, soluble in alcohol, chloroform, is light sensitive, potent & orally active & used in the form of tablets.

**Properties of Metformin:**

It is a white crystalline powder, almost odorless, freely soluble in water, less in alcohol, hygroscopic in nature.



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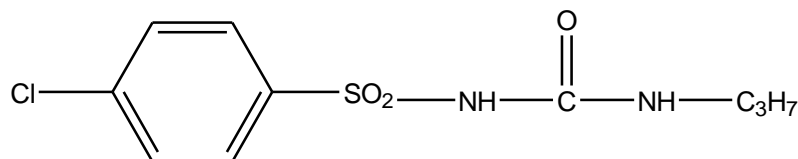
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**Properties of Chlorpropamide:**

1. It occurs as odorless, white crystalline powder, tasteless.
2. It is practically insoluble in water, but soluble in alcohol, alkalis.

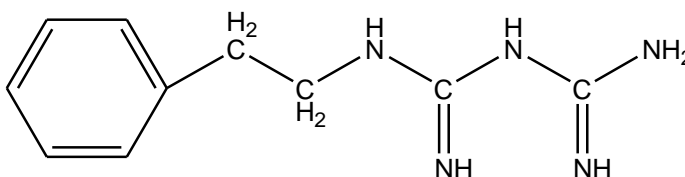
**Chlorpropamide:**



**Properties of Phenformin:**

1. It is an odorless, white crystalline powder with bitter taste.
2. It is freely soluble in water and soluble in alcohol.

**Phenformin:**



**Uses of oral hypoglycemic agents:**

1. Treatment of Diabetes mellitus

**b) What are Tranquillizers? Classify with giving examples. Draw the structure of any one of them.**

**(1 mark each to Tranquillizer and any one structure. 2 marks to classification)**

**Tranquillizers** are CNS depressants which bring about a calming effect and induce a mild sedative effect.

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**Classification:**

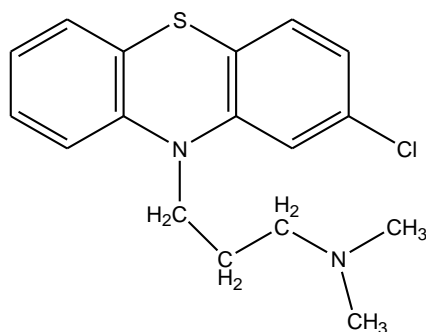
1. Major Tranquillizers or antipsychotics:

- a) Phenothiazines: Chlorpromazine, Pochlorperazine, Trifluoperazine
- b) Butyrophenones: Haloperidol, Trifluperidol
- c) Others: Thioxanthenes, Oxypertine.

2. Minor Tranquillizers:

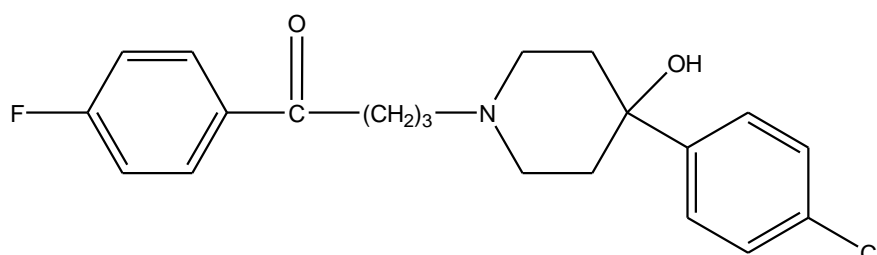
- a) Benzodiazepines: Diazepam, Chlordiazepoxide, Lorazepam, Nitrazepam,
- b) Carbamate: Meprobamate

**Chlorpromazine:**



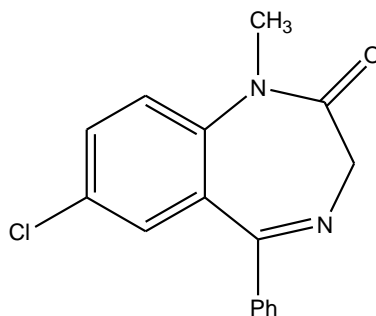
OR

**Haloperidol:**



OR

**Diazepam**



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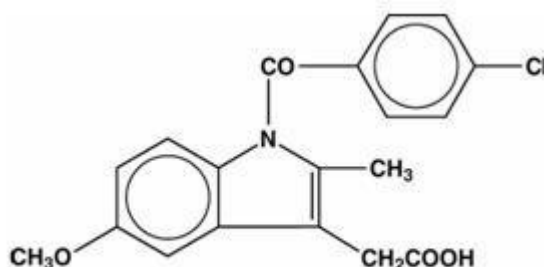
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c) Give structure and uses of (any two)

(1 mark each to structure and use)

i) Indomethacin

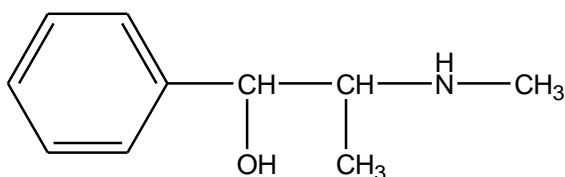


**Uses of Indomethacin:**

It is used as Analgesic, Anti-inflammatory and Antipyretics for the treatment of –

1. Rheumatoid arthritis
2. Acute gout
3. Spondylitis
4. Dysmenorrhea
5. Acute musculo-skeletal disorder
6. Pain in malignant disease

ii) Ephedrine



**Uses:**

1. Treatment of acute and chronic attack of asthma
2. Nasal decongestion
3. Prevention and treatment of hypotension
4. It produces Mydriasis
5. Prevention of nocturnal enuresis

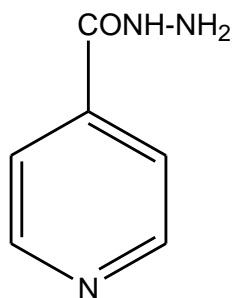
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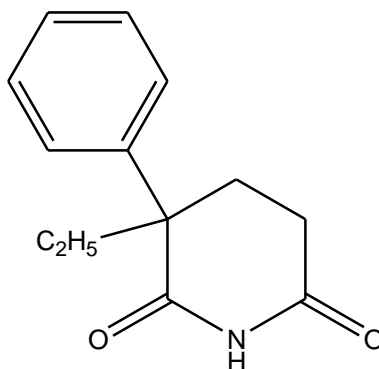
iii) Isoniazid



Uses:

1. Treatment of Tuberculosis
2. Treatment of meningitis, genitourinary infection

iv) Glutethimide



Uses:

1. It is used as Hypnotic
2. Treatment of Insomnia
3. To relieve anxiety and tension

d) What do you know about adrenocortical hormones? Give properties, uses and official preparations of Hydrocortisone.

(1 mark to each sub question)

**Adrenocortical hormones:**

These are steroidal hormones secreted by outer region of adrenal gland. It regulates various functions of the body. It includes glucocorticoides and minerlocorticoides.



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**Properties of Hydrocortisone:**

1. It is a white crystalline powder, odorless, bitter in taste.
2. It is insoluble in alcohol & sparingly soluble in chloroform.
3. It is sensitive to light & should be protected from it during storage.
4. It is a dextrorotatory.

**Uses:**

1. It is a glucocorticoid used in the treatment of all conditions of corticosteroid therapy.
2. This medication is used to treat a variety of skin conditions (e.g., insect bites, eczema, dermatitis, allergies, rash, itching).
3. Hydrocortisone reduces the swelling (anti-inflammatory), itching, and redness that can occur in these types of conditions.

**Official preparations:**

1. Hydrocortisone Cream B.P.C.
2. Hydrocortisone ointment B.P.
3. Hydrocortisone lotion B.P.C.
4. Hydrocortisone Tablets B.P.C.
5. Hydrocortisone Injection I.P., B.P.C.
6. Hydrocortisone eye ointment I.P., B.P.C.

**e) Give uses of (any four)**

**Ans:**

**(1 mark for each compound)**

**i) Fluorouracil**

1. It possess immunosuppressive property
2. Treatment of carcinoma of stomach, colon, rectum, breast, and ovaries

**ii) Benzocaine**

1. It is used as local anesthetic.
2. It is also used as local anesthetic in surface pain, itching.
3. It is used in throat lozenges and in ulcerative condition of digestive tract.



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**iii) Neostigmine**

1. It is used in the treatment of myasthenia gravis.
2. It reduces the heart rate and lowers the blood pressure by peripheral vasodilation.

**iv) Cefalexin**

1. Antibacterial agent
2. Treatment of gram positive and gram negative bacteria
3. Bacterial infection of skin, bone, joint, ear, urinary tract.

**v) Diloxanide furoate**

1. Treatment of acute and chronic intestinal ameobiasis
2. Amoebic hepatitis.

**vi) Thiopentone**

1. Thiopentone sodium is a general anesthetic.
2. It is also used for hypnotic.
3. To control the convulsive states.
4. It is also used as a weak analgesic and muscle relaxant.

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Q.5 Attempt any THREE of the following (12 marks)

A. What are 'cholinergic antagonists? Classify them with giving examples.  
Draw the structure of any one of them.

(One Mark for the definition, two marks for classification, One Mark for the structure.)

**Cholinergic antagonists:**

The drugs which block the action of Acetylcholine on autonomic nervous system or central nervous system through muscarinic and nicotinic receptors are called as cholinergic antagonists. E.g.: Atropine, Homatropine etc.

**Classification:**

**a) Classification-I:**

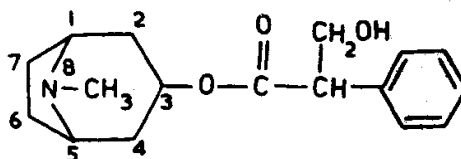
1. Solanaceous alkaloids and related compounds: Atropine, Hyoscine
2. Synthetic drugs:
  - a) Anti secretory drugs: Clidinium, Diphenanil, Isopropamide
  - b) Antispasmodic drugs: Dicyclomine, glycopyrrolate, Propantheline
  - c) Mydriatic and cycloplegic drugs: Cyclopentolate, Tropicamide
  - d) Anti parkinsonism Drugs: Benztropine, benzhexol.

**b) Classification-II:**

1. Amino alcohol esters: Atropine, Hyoscine, homatropine, Propantheline
2. Amino Alkyl ethers: Benztropine, Chlorphenoxamine
3. Amino alcohols: Biperiden, benzhexol
4. Amino amides: Aminopentamide, Isopropamide, Tropicamide

**Structures:**

**1. Atropine:**



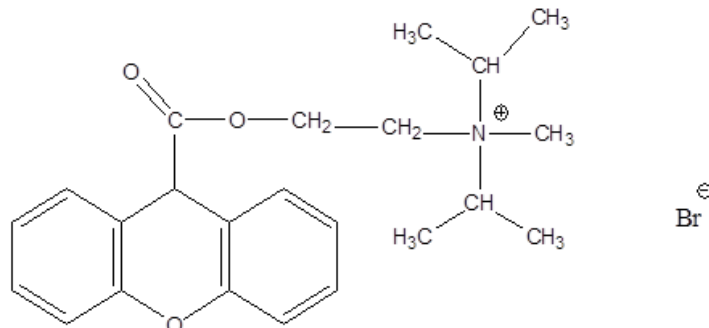
OR

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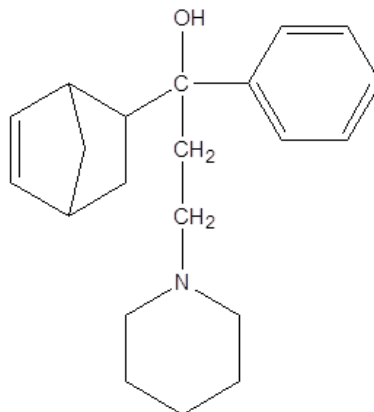
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2. Propantheline:



3. Biperiden:

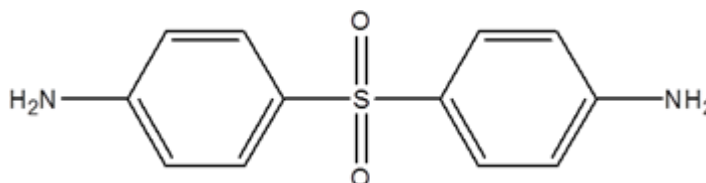


**B. What is leprosy? Give Structure, Chemical name, Properties and Uses of Dapsone.**

(one mark each for definition, structure, chemical name and one mark for properties and uses.)

Leprosy is contagious disease that affects the skin, mucous membranes, and nerves, causing discoloration and lumps on the skin and, in severe cases, disfigurement and deformities.

Leprosy is caused by a slow-growing type of bacteria called *Mycobacterium leprae* (*M. leprae*).



**Dapsone Structure:**





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**Chemical Name: 4,4' Diaminodiphenylsulphone OR Bis(4-aminophenyl) sulphone**

#### **Properties:**

1. It is white or slightly white crystalline powder.
2. It is odorless.
3. It is bitter in taste, practically insoluble in water, soluble in alcohol and freely soluble in acetone and dilute mineral acids.

#### **Uses of Dapsone**

1. Dapsone is used in combination with pyrimethamine in the treatment of malaria.
2. Dapsone is the principal drug used in the treatment of all forms of leprosy.
3. In addition to its use in leprosy, dapsone has been found of value in dermatitis herpetiformis and other dermatoses.

**C. What are diagnostic agents? Name the four agents used to test organ functions. Give properties and uses of Iopanoic acid.**

**(One mark for each.)**

#### **Diagnostic Agents:-**

These are the agents or chemicals used to detect abnormalities in tissues & organs or to test an organ function. These are thus useful for the clinical diagnosis of the diseases. These agents do not usually have any medicinal values or pharmacological effect. They are usually introduced in the body or the specific organ.

#### **Name of agents for organ functions:**

Indigo carmine, Phenolsulphophthalein, Sulphobromophthalein sodium, Fluorescein Sodium, Congo red, Evans blue, Iopanoic acid

#### **Properties of Iopanoic acid:**

1. It is white or cream colored powder.
2. It is tasteless.
3. It has faint characteristic odor.
4. It is insoluble in water, soluble in dilute alkali hydroxides solution, 95% alcohol and in organic solvents.
5. It contains 66.7 % of Iodine.



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**Uses:**

1. It is used for examination of biliary tract and gall bladder (Cholecystography).
2. It is used for treatment of thyrotoxicosis.

**D. Give uses of (Any four):**

**(One mark for each)**

**i) Glyceryl trinitrate:**

1. Its solution in alcohol is used as vasodilator in prophylaxis and treatment of angina pectoris.
2. Nitroglycerin is used for the treatment of acute myocardial infarction, severe hypertension, and coronary artery spasms
3. It is used for the relief of renal and gall bladder colic.
4. It is also used in the treatment of anal fissures.

**ii) Quinine sulphate:**

1. It is used for treatment of Plasmodium falciparum malaria which is resistant to chloroquine or other anti-malarial drugs.

**iii) Chloramphenicol:**

1. It was used in the treatment of typhoid.
2. It may be used as a second-line agent in the treatment of tetracycline-resistant cholera.
3. It is also useful in the treatment of brain abscesses.
4. It is also applied locally for treatment of ear, eye and skin infection.
5. It is used in treatment of Rickettsia, Chlamydia and mycoplasma.

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iv) **Rifampicin:**

1. It is used for treatment of pulmonary tuberculosis.
2. By combination with Dapsone and Clofazimine it is used in the treatment of leprosy.

v) **Progesterone:**

1. It is used in treatment of dysfunctional uterine bleeding.
2. It is also used along with estrogen in menstrual disorders.
3. It is used in treatment of neoplasm of breast and endometriosis.
4. It has also been incorporated into an intra-uterine device for female contraception.

vi) **Guanethidine:**

1. It is used in the treatment of hypertension in conjunction with diuretics or other antihypertensive agent.

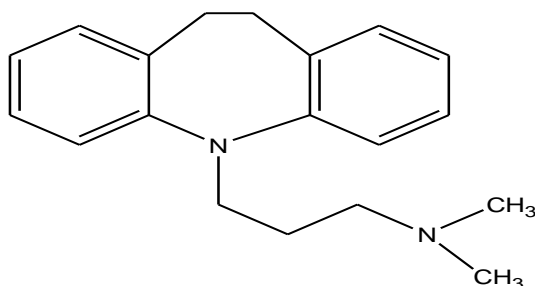
E. Give Structure and uses of (Any two),

1. Imipramine
2. Coramine
3. Halothane
4. D.E.C

(One mark for structure and uses of each)

1. Imipramine:

Structure:



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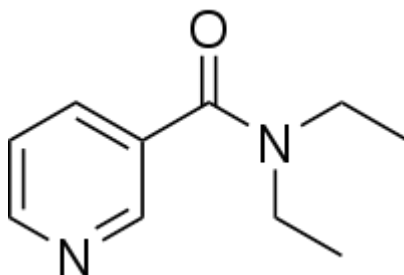
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**Uses:**

1. Imipramine is mainly used in the treatment of major depression and enuresis (inability to control urination).
2. Imipramine is used in the treatment of depression, such as depression associated with agitation or anxiety.

**2. Coramine:**

**Structure:**

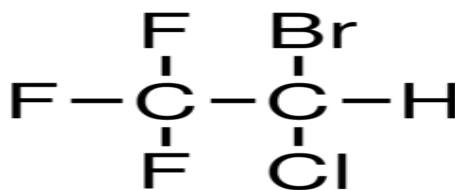


**Uses:**

1. It is use in treatment of depression.
2. It is used to overcome CNS depression and respiratory depression caused by central depressant agent.

**3. Halothane:**

**Structure:**



**Uses:**

1. It is used as inhalational general anesthetics.
2. It is almost used in every type of surgical procedure.



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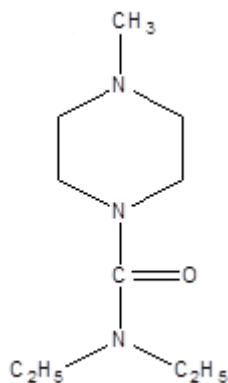
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**4. D.E.C:**

**Structure:**



**Uses:**

1. This drug is categorized as an anthelmintic, particularly antifilarial agent.
2. It is used to treat filariasis particularly when due to *W.bancrofti* or *Loa loa*.
3. It has also been used in the treatment of tropical eosinophilia.



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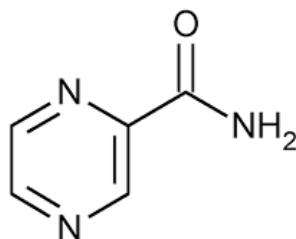
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**Pyrazinamide:**

**Structure:**



**Properties:**

1. It is white or almost white crystalline powder.
2. It is bitter in taste.
3. It is soluble in water.
4. It is slightly soluble in alcohol.

**B. What is Insulin? Give stability storage condition and official preparations of Insulin.**

**(1.5 marks for explanation, 1 mark for storage condition and 1.5 marks for official preparation)**

**Insulin:**

Insulin is the hormone synthesized by beta cells of the islet of Langerhans of the pancreas in the form of pro-insulin. Insulin consists of two peptide chains A- Chain and B- Chain which are connected by two disulphide bonds.

A-chain has 21 amino acids and B- chain has 30 amino acids. The molecular weight of is about 5800 Dalton. Insulin has a profound effect on the regulation of carbohydrate, fat and protein metabolism in body. The deficiency of insulin in body causes a complex disease diabetes mellitus due to disturbance in carbohydrate, protein and lipid metabolism.

**Source:**

Traditionally insulin has been obtained from bovine and porcine pancreas. Insulin for human use is obtained by chemical conversion of porcine insulin. Recently, human insulin has been biotechnologically processed through cultures of E.coli bacteria and is known as Humalin.



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**Stability Storage:**

- As insulin is affected by heat & light, all insulin preparations must be stored at low temperatures between 2-8°C in a dark place.
- It should not be allowed to freeze.

**Uses:**

1. Insulin cannot be given orally and is effective only through injection.
2. Insulin has many effects on metabolic processes. Insulin affects skeletal and heart muscle, adipose tissues, the liver, lens of the eyes and leukocytes.
3. The main use of insulin is treatment of diabetes mellitus caused due to pancreatic disease.

**Official formulations:**

- 1) Insulin injection I.P, B.P
- 2) Insulin injection biphasic B.P
- 3) Neutral insulin injection B.P
- 4) Insulin zinc suspension I.P
- 5) Globin zinc insulin injection I.P, B.P
- 6) Isophane insulin injection I.P, B.P
- 7) Protamine zinc insulin injection B.P

**C. Define Hypnotics and Sedatives. Give properties, uses, and Official preparations of Phenobarbitone Sodium.**

**(One mark for Definition, properties, uses and official preparation)**

**Hypnotics:**

Hypnotics are drugs which induce sleep by depression of central nervous system function.





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**Sedatives:**

Sedatives are the agents which reduce excitement & motor activity, & produce a calming effect without inducing sleep.

**Phenobarbitone Sodium:**

**Properties:**

1. It is White Crystalline Odorless solid.
2. It is having bitter taste.
3. It is soluble in water and alcohol, slightly soluble in chloroform and solution of alkali hydroxide and carbonates.
4. It may exhibit polymorphism.

**Uses:**

1. It is used as antiepileptic agent to control tonic-clonic seizures.
2. It is also have been used as a hypnotic and sedative.

**Official preparations:**

1. Phenobarbitone I.P, B.P
2. Phenobarbitone sodium I.P, B.P
3. Phenobarbitone injection B.P
4. Phenobarbitone tablets I.P, B.P
5. Phenobarbitone elixir B.P

**D. Give medicinal uses of (Any Four)**

**(one mark for each use)**

**i) Morphine**

1. Treatment of acute and chronic severe pain like fracture of longer bones, amputation of limbs in accident, labor pain etc.
2. It has sedative action so induces sleep in the presence of pain
3. Preanesthetic medication in major surgery
4. Treatment of Diarrhoea
5. It suppresses Whooping Cough.
6. Treatment of acute left ventricular failure and pulmonary oedema.



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**ii) Methyl thiouracil**

1. It is used in treatment of hyperthyroidism.

**iii) Propranolol**

1. It is used in the treatment of Cardiac arrhythmia
2. It is used in the treatment of Arterial hypertension
3. It is used in the treatment of Angina pectoris.

**iv) Oxyphenbutazone:**

1. It is used as Anti-inflammatory, analgesics, antipyretics.
2. It has also been used in the management of thrombophlebitis.

**v) Vitamin-A:**

1. Vitamin A is used for treating vitamin A deficiency.
2. Some people use vitamin A for improving vision and treating eye disorders including age-related macular degeneration (AMD), glaucoma and cataracts.
3. It is also used to reduce complications of diseases such as malaria, HIV, measles, and diarrhea in children with vitamin A deficiency.
4. Vitamin A is also used for skin conditions including acne, eczema, psoriasis, cold sores, wounds, burns, sunburn.

**vi) Lignocaine:**

1. It is used as local anesthetics in forms of injection for systemic and cream, ointments, sprays for surface anesthesia.
2. It is also used in treatment of ventricular tachyarrhythmias especially those associated with myocardial infarction.
3. It is also used to control status epilepticus refractory to other treatments.



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**e) What are sympatholytic Agents? Classify them with examples.**

**(One marks for explanation and three marks for classification)**

The drugs which block response to endogenous or exogenous circulating epinephrine or which block response to adrenergic nerve stimulation or which prevent release of adrenergic transmitter substance at sympathetic nerve endings are called as Sympatholytic agent or antiadrenergic drugs.

**Examples-** Propranolol, Practolol, Tolazoline, Phentolamine

**Classification-I**

1. Catecholamines depletors: Reserpine
2. Inhibitors of adrenergic transmitter synthesis:  $\alpha$ -methyl -p- tyrosine
3. Drugs that interfere with transmission impulses: Guanethidine
4. Adrenergic receptor blockers: Can be further classified as

**A. ] Alpha adrenergic receptor blockers:**

a) Competitive alpha blockers:

- i) Ergot and ergot alkaloids: Ergonovine, methyl ergonovine, methylsergide.
- ii) Imidazoline: Tolazoline, phentolamine
- iii) Azepines: Araptine.

b) Non Competitive alpha blockers: Phenoxybenzamines.

**B. ] Beta adrenergic receptor blockers:**

- i) Selective beta blockers: Atenolol, Metoprolol, Betoxolol.
- ii) Non selective beta blockers: Propranolol, Nodolol.