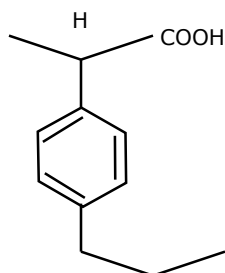


PART-A
SECTION - I

1.
 - 1.1 Simethicone is a component of several antacid formulations. Chemically it is
(a) wax (b) fat (c) Aldehyde (d) silicon
 - 1.2 The pharmacy Council of India is constituted by the
(a) Central Government (b) State Government
(c) Parliament (d) Legislative Assembly
 - 1.3 All of the following physicochemical constants are useful in predicting the solubility of a drug except
(a) Dielectric constants (b) pH of a solution
(c) pKa of the drug (d) Valency
 - 1.4 sigma blade mixers are commonly used in
(a) wet granulation (b) dry granulation
(c) powder mixing (d) crude fibre mixing
 - 1.5 The 5 β pregnane is said to have a
(a) trans-anti-trans-anti-trans backbone (b) cis-anti-trans-trans backbone
(c) cis-syn-trans-syn-trans backbone (d) trans-anti-cis-anti-cis backbone
 - 1.6 Many drugs are chiral. In a synthesis of chiral drug molecules in symmetric environment
(a) always one enantiomer is obtained
(b) always both enantiomers is obtained in equal amounts
(c) always both enantiomers is obtained in unequal amounts
(d) none of the above
 - 1.7 Poorly manufactured tablets may have small pinholes on the surface. This phenomenon is known as
(a) Picking (b) Mottling (c) Leaching (d) Cracking
 - 1.8 Ascorbic acid exists in nature
(a) only in the reduced form which has only biological activity
(b) only in the oxidized form which has only biological activity

- (c) in both reduced and the oxidized forms in the state of reversible equilibrium which has biological activity
- (d) none of the above
- 1.9 In the stable conformation of 5 α -pregnane
- (a) Rings A, B, C are in boat conformation
- (b) Rings A and B are in boat while C in chair conformation
- (c) Ring A is in boat while B and C in chair conformation
- (d) all the three rings are in chair conformation
- 1.10 Among the following preparations, which one will be the most irritating to the eye?
- (a) Purified water (b) 0.7% NaCl solution
- (c) 0.9% NaCl solution (d) 1% NaCl solution
- 1.11 In case of hypothyroidism, the preferred thyroid preparation is
- (a) Levothyroxine (b) Dextrothyroxine
- (c) Leothyroxine (d) None of the above
- 1.12 D-Fructose on simple reduction gives
- (a) L-Fructose (b) only Sorbitol
- (c) Mannitol (d) mixture of Mannitol and Sorbitol
- 1.13 Lugol's solution contains 5% of iodine. How much of Lugol's solution is administered to a patient thrice daily to provide 60 mg of iodine daily?
- (a) 0.2 ml (b) 0.3 ml (c) 0.4 ml (d) 0.5 ml
- 1.14 The anticoagulant Heparin is obtained from
- (a) Sheep's lung (b) Dog's kidney (c) Rabbit's heart (d) Rat's uterus
- 1.15 Which one of the following types of adverse drug reactions are not believed to be dose related phenomenon?
- (a) Side effects and toxic reactions
- (b) Toxic reactions and hypersensitivity
- (c) Side effects and hypersensitivity
- (d) Hypersensitivity and idiosyncrasy

1.16 The structure of a drug having an asymmetric centre is:



- (a) B (b) S (c) α (d) β

1.17 Cryoscopic method is familiar in the calculations of isotonic solutions. This method is based on

- (a) freezing point depression of the drug
(b) molecular concentration of the drug
(c) pH of the drug (d) none of the above

1.18 One thousand nanogram equal to one

- (a) centigram (b) gram (c) kilogram (d) microgram

1.19. Biological role of thiamine is because of facile formation of

- (a) Thiamine hydrochloride (b) Thiamine pyrophosphate "ylid"
(c) Thiamine sulphate (d) None of the above

1.20. Infected blood products may produce serum hepatitis due to the presence of

- (a) Hepatitis A virus (b) Hepatitis B virus
(c) Hepatitis C virus (d) None of the above

1.21. pH of a buffer system can be calculated by using

- (a) pH partition theory (b) Noyes-Whitney law
(c) Henderson-Hasselbalch equation (d) None of the above

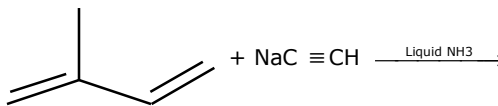
1.22. Osmolality measures the total number of particles dissolved in a _____ of water and depends on the electrolytic nature of the solute.

- (a) kilogram (b) kilolitre (c) litre
(d) specified quantity

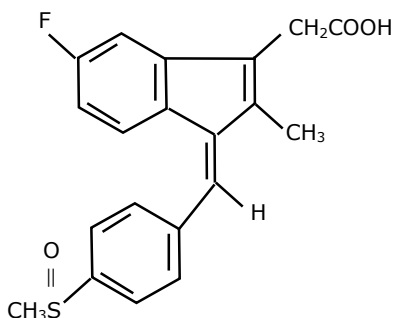
1.23. Ergot is the sclerotium of

- (a) fungus *Claviceps purpurea* (b) fungus *Claviceps notatum*
(c) *Strychnos nuxpotatorium* (d) fungus *Pencillium chrysogenum*

- 1.24. A highly sensitive semiquantitative method of detecting microbial antigen in biological fluid is done by
 (a) Radioimmuno-electrophoresis (b) counterimmuno-electrophoresis
 (c) H.P.L.C (d) Freeze dried centrifugal method
- 1.25 The glass electrode used in pH measurements is
 (a) metal-metaloxide electrode (b) a membrane electrode
 (c) ion selective electrode (d) none of the above
- 1.26 In phenothiazine tranquillizing agents, replacement of C-2 hydrogen by chlorine
 (a) decreases activity (b) increases activity
 (c) activity unaffected (d) leads to decreased penetration into the CNS
- 1.27 The loading dose of a drug is based upon the
 (a) time taken for complete elimination
 (b) percentage of drug excreted unchanged in urine
 (c) percentage of drug bound to plasma protein
 (d) apparent volume of distribution and the desired drug concentration in plasma
- 1.28 Conformation of drugs is commonly determined by
 (a) NMR (b) NMI (c) Mass spectrometry
 (d) pH determination
- 1.29 Aminophylline solutions on exposure to air may develop
 (a) crystals of theophylline (b) precipitate of aminophylline
 (c) precipitate of ethylenediamine (d) straw colour
- 1.30 The hypotensive effect of clonidine is due to its action on
 (a) β -adrenergic receptor (b) α -adrenergic receptor
 (c) H_2 -receptor (d) H_1 -receptor
- 1.31 A step in Vitamin A synthesis is
 The product obtained will be
 (a) 3-hydroxy-3-methyl-1-pentene-4-yne
 (b) hex-1-yn-5-one
 (c) 3-amino-3-methyl-1-pentene-4-yne
 (d) none of the above



- 1.32 Sodium nitroprusside is one of the most potent blood-pressure lowering drugs. Its use is limited because of
- its short duration of action
 - very long duration of action
 - ineffective of oral route
 - none of the above
- 1.33 Cocaine is a monoacid tertiary base which on treatment with hot dilute acids gives
- ecgonine, methyl alcohol and scopic acid
 - ecgonine, methyl alcohol and cinnamic acid
 - ecgonine, methyl alcohol and benzoic acid
 - ecgonine, ethyl alcohol and benzoic acid
- 1.34 Use of Isoniazid is restricted due to
- Ototoxicity
 - Hepatotoxicity
 - Neurotoxicity
 - Bone marrow depression
- 1.35 Diosgenin is
- an alkaloid obtained from dioscorea
 - a carbohydrate obtained from dioscorea
 - a glycoside obtained from dioscorea
 - none of the above
- 1.36 The IUPAC nomenclature of the sulindac analogue is:



- (Z)-5-Fluoro-2-methyl-1-phenylmethylene-1 H-indene-3-acetic acid
 - (E)-5-Fluoro-2-methyl-1-phenylmethylene-1 H-indene-3-acetic acid
 - 5-Fluoro-2-methyl-1-phenylmethylene-1 H-indene-3-acetic acid
 - (R)-5-Fluoro-2-methyl-1-phenylmethylene-1 H-indene-3-acetic acid
- 1.37 Bubble point test is done to determine
- the surface tension of the liquid in capillary tubes
 - the viscosity of the liquid in ampoules

- (c) the pH of a 1% solution
(d) the volume of the solution stored in a specified container
- 1.38 The "Hemiacetal" form of aldosterone is between
(a) C-11, β -hydroxyl and C-20 carbonyl
(b) C-11, β -hydroxyl and C-21 hydroxy
(c) C-11, β -hydroxy and C-18 carbonyl
(d) C-21, β -hydroxyl and C-20 carbonyl
- 1.39 Surfactants are characterized by the presence of
(a) water solubilizing and fat solubilizing groups in the same molecule
(b) only negative charges
(c) only positive charges
(d) none of the above
- 1.40 Acetous perchloric acid solution a common titrant in non-aqueous titrimetry is standardized by
(a) standard alcoholic KOH solution
(b) N/10 Potassium permanganate
(c) Potassium hydrogen phthalate solution in glacial acetic acid
(d) mercuric acetate in glacial acetic acid

SECTION – II

2.

- 2.1 The antibiotics mentioned below are obtained from the organisms listed from a to e. match them.
- | | |
|----------------|------------------------------|
| (1) Neomycin | (a) streptomyces fradiae |
| (2) Gentamycin | (b) micromonospora purpurea |
| (3) Bacitracin | (c) streptomyces tenebrarius |
| (4) Tobramycin | (d) bacillus subtilis |
| | (e) bacillus polymyxa |

2.2. Given below is a list of medicinal plants. Match them correctly with the list of constituents given in a to e.

- | | |
|--------------------------------|-----------------|
| (1) Holarrhena antidysenterica | (a) Conessine |
| (2) cymbopogan flexuosus | (b) Citral |
| (3) Urginea indica | (c) Mucilage |
| (4) Linum usitatissimum | (d) Cocaine |
| | (e) Scillarenin |

2.3. The following drugs are included under the schedules listed in a to e. match them.

- | | |
|-------------------------------------|-----------------------------------|
| (1) Meprobamate | (a) Schedule E |
| (2) Poisonous drugs | (b) Schedule F, F |
| (3) Ophthalmic preparations | (c) Schedule C and C ₁ |
| (4) Biological and special products | (d) Schedule X |
| | (e) Schedule Q |

2.4. Following drugs contain 2 hydroxyl groups each. Nature of these hydroxyl groups are indicated in a to e. Match them correctly.

- | | |
|---------------------|-------------------------------------|
| (1) Morphine | (a) Alcoholic but one 1° another 2° |
| (2) Chloramphenicol | (b) Alcoholic and both 1° |
| (3) Apomorphine | (c) Both phenolic |
| (4) Cortisone | (d) One alcoholic and one phenolic |
| | (e) Alcoholic but 1° and another 3° |

2.5. The following drug molecules contain heterocyclic rings listed in a to e. match them correctly.

- | | |
|-------------------|----------------|
| (1) Haloperidol | (a) Pyrimidine |
| (2) Sulphadiazine | (b) Pyridine |
| (3) Amiloride | (c) Piperidine |
| (4) Pheniramine | (d) Pyrazine |
| | (e) Pyridazine |

2.6. Following drugs exhibit their action by enzyme inhibition. Enzymes are listed in a to e. Match them correctly.

- | | |
|---------------------|-------------------------|
| (1) Captopril | (a) β - lactamase |
| (2) Clavulanic acid | (b) MAO |
| (3) Pargyline | (c) Monooxygenase |
| (4) Methazolamide | (d) Carbonic anhydrase |
| | (e) ACE |

2.7. Following preparations are assayed by biological techniques using the animal or its parts listed in a to e. match them correctly.

- | | |
|------------------------|---------------------------|
| (1) Cod liver oil | (a) Sheep blood |
| (2) Heparin injection | (b) Rabbit |
| (3) Oxytocin injection | (c) Rat |
| (4) Insulin injection | (d) Anaesthetized chicken |
| | (e) Cat |

2.8. Following I.P. assays involve the principles listed in a to e. Match them.

- | | |
|-------------------------------|---|
| (1) Sodium chloride injection | (a) Titration with N/10 iodine |
| (2) Trimethoprim | (b) Oxidation involving 2 : 6 dichlorophenol indophenol |
| (3) Analgin tablets | (c) Argentometry |
| (4) Ascorbic acid | (d) Non-aqueous |
| | (e) Acidimetry |

2.9. Given below are some antihypertensive mechanisms. Drugs which are closely associated with these mechanisms of action are listed in a to e. Match them correctly?

- | | |
|---------------------------------|------------------------|
| (1) Ganglion blocking | (a) Methyl dopa |
| (2) Catecholamine depletor | (b) Hydralazine |
| (3) False neurotransmitter | (c) Reserpine |
| (4) Direct action on arterioles | (d) Mecamylamine |
| | (e) Veratrum alkaloids |

2.10. Listed are Vitamins. Their associations with certain coenzymes are well known. The names of coenzymes are given in a to e. match them correctly.

- | | |
|----------------------|--------------------|
| (1) Thiamine | (a) Co-carboxylase |
| (2) Riboflavin | (b) Co-enzyme A |
| (3) Pantothenic acid | (c) NAD |
| (4) Nicotinamide | (d) FAD |
| | (e) ATP |

2.11. Listed are some of the crude drugs which are tested for the active constituents by the tests mentioned in a to e. Match them correctly.

- | | |
|----------------------|-----------------------|
| (1) Cinchona Bark | (a) Fluorescence test |
| (2) Nux vomica seeds | (b) Keller Killiani |
| (3) Digitalis leaves | (c) Borntrager's test |
| (4) Senna leaves | (d) Mayer's test |
| | (e) Sham's test |

2.12. Listed are some of the common volatile oils. Their active constituents are given in a to e. Match them correctly.

- | | |
|--------------------|----------------------|
| (1) Peppermint oil | (a) (+)-Limonene |
| (2) Turpentine oil | (b) 1:8-Cineole |
| (3) Eucalyptus oil | (c) α -Pinene |
| (4) Lemon oil | (d) (-)-Menthol |
| | (e) (+)-Menthol |

2.13. Match the each pair with the type of a structural relationship they exhibit.

- | | |
|--|--|
| (1) (R) and (S) Naproxen | (a) Tautomers of one another |
| (2) Dilactim and Monolactim form of Barbituric acid | (b) Diastereomers of one another |
| (3) Quinine and Quinidine | (c) Non-superimposable mirror images of each other |
| (4) Eclipsed and staggered form of phenothiazine about side chain carbon-carbon bond | (d) Superimposable mirror images of each other |
| | (e) Conformational isomers of one another |

2.14. Various polymers used in pharmacy are given. Match with the respective monomers a to e.

- | | |
|-------------------|-----------------------------|
| (1) Carbopol | (a) Methacrylate ester |
| (2) Eudragits | (b) Ethylene |
| (3) Polyethylene | (c) Ethylene glycol |
| (4) Polycarbonate | (d) (Bis-phenol + phosgene) |
| | (e) Acrylic acid |

2.15. Following are some naturally occurring substances. They are classified under different categories which are listed in a to e. match them correctly.

- | | |
|--------------------|-----------------|
| (1) Prostaglandins | (a) Opioids |
| (2) Codeine | (b) Eicosinoids |
| (3) Angiotensin II | (c) Corticoids |
| (4) Strophanthidin | (d) Peptide |
| | (e) Cardiolide |

2.16. Following are some of the analytical instruments. Their important components are listed in a to e. Match them correctly.

- | | |
|--------------------------------------|--------------------------------|
| (1) HPLC | (a) Monochromator |
| (2) IR double beam spectrophotometer | (b) Dropping mercury electrode |
| (3) Karl-Fischer titrator | (c) Isocratic pump |
| (4) Polarograph | (d) Platinum electrode |
| | (e) Polariser |

2.17. The hard gelatin capsule sizes are mentioned in their number. Their approximate capacity are listed in a to e. Match their correct volume.

- | | |
|-------|-------------|
| (1) 0 | (a) 0.10 ml |
| (2) 1 | (b) 0.15 ml |
| (3) 3 | (c) 0.30 ml |
| (4) 5 | (d) 0.55 ml |
| | (e) 0.75 ml |

2.18. Listed are some of the commonly used drugs. Their pharmacological actions are listed in a to e. match them.

- | | |
|--------------------|-------------------------------------|
| (1) Aspirin | (a) Rises body temperature |
| (2) Acetaminophen | (b) Non-analgesic anti-inflammatory |
| (3) Phenylbutazone | (c) Non-anti-inflammatory analgesic |
| (4) Probenacid | (d) Increases depth of respiration |
| | (e) Increases fluid retention |

2.19. Match the preservations/antioxidants listed in a to e for the preparations mentioned below.

- | | |
|--------------------------------|-----------------------|
| (1) Anaesthetic ether | (a) Chloroform |
| (2) Formaldehyde | (b) Ethylenediamine |
| (3) Injection of Adrenaline | (c) Paraformaldehyde |
| (4) Injection of Aminophylline | (d) Sodium bisulphate |
| | (e) Alcohol |

2.20. In communiton, certain type of materials listed in a to e are not suitable for the mills mentioned below. Match them.

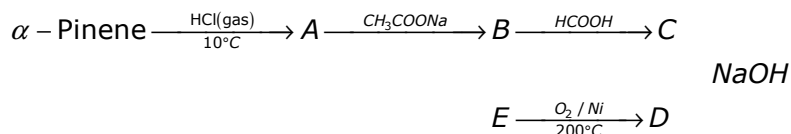
- | | |
|-----------------------|--------------------------|
| (1) Cutter mill | (a) Soft material |
| (2) Hammer mill | (b) Adhesive material |
| (3) Revolving mill | (c) Friable material |
| (4) Fluid energy mill | (d) Liquefiable material |
| | (e) Abrasive material |

PART – B

3. Define:

- Co-solvency
- Hydrotrophy
- Eutectic mixtures

4. Complete the following reactions giving the structures



5. (a) Thiamin when treated with sodium sulphite solution saturated with SO_2 at room temperature, decomposes quantitatively into 2 components. What are they? Give their structural formulae.
 (b) Riboflavin on exposure to light in sodium hydroxide solution forms an insoluble product. What is the product? Write equation. Why is it insoluble?
 (c) Caffeine $\xrightarrow{\text{Cl}_2} \text{A} \xrightarrow[\text{NaOH}]{\text{CH}_3\text{OH}} \text{B} \xrightarrow[\text{Boil}]{\text{dil HCl}} \text{C} \xrightarrow[\text{NaOH}]{\text{CH}_3\text{I}} \text{D}$
 CH_3Cl
6. (a) Name two common equipments used for testing the hardness of a tablet
 (b) Give four factors which affect the hardness of a tablet.
 (c) Why friability test is performed? How is it performed?
7. Give four important tests to detect the emulsion types.
8. (a) List the names of three important semisynthetic hydrocolloids used in pharmacy.
 (b) What is their chemical nature?
 (c) Give three important uses of the above hydrocolloids.
9. (a) Diethyl malonoate is treated with excess of n-propylbromide in presence of sodium ethoxide to give intermediate (a). The intermediate (a) on refluxing in dilute alkali gives anticonvulsant drug. Write the reactions and structures.
 (b) 2-Aminopyridine is reductively alkylated using 1 mol of p-methoxybenzaldehyde and reducing agent to give an intermediate (b). the intermediate (b) on treatment with 1 mol dimethylamino ethylbromide in presence of sodium amide gives an antihistaminic drug. Write the reactions and structures.
 (c) Arrange the nitrogens in the drug referred in (b) above in decreasing order of basicity.
10. (a) Give the graph [include correct scale and values] of cardiac action potential as recorded from a Purkinje fibre. Indicate the phases of depolarization and repolarisation (graph paper not to be used).
 (b) Expand the abbreviations and indicate how they are formed.
 (i) CAMP (B) GABA
11. Write the appropriate reagent(s) and the structures in the following transformations. Give the trivial name of the drug and the category it belongs to.
 (i) p-Methoxyphenylhydrazine $\xrightarrow[\text{heat, solvent}]{\text{ZnCl}_2} \text{A} + \text{NH}_3 + \text{H}_2\text{O}$
 +
 Ethyl 4-oxopentanoate
 (ii) A + p-chlorobenzoyl chloride $\xrightarrow[\text{Pyridine}]{\text{Base}} \text{B}$

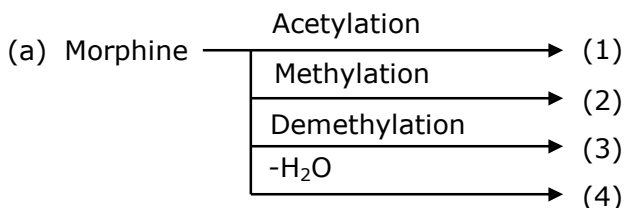
(iii) B [Drug] (contains $-\text{COOH}$)

Note: One step involves Fischer indolisation.

12. (a) Give synthesis of pyridoxine starting from 5-ethoxy-4-methyl isoxazole and cisbutenediol protected with isobutylaldehyde.

(b) Name the key reaction

13. Give the names of products.



(b) Normorphine $\xrightarrow{\text{Allylation}}$ (5)

(c) Give the structural formula for Nalorphine.

14. (a) What is Vitali's test? Which natural products are distinguished by this test?

(b) Give reasons for the following:

(i) Morphine is soluble in aqueous sodium hydroxide.

(ii) In the assay of alkaloids, the final residue is treated with little alcohol before it is finally dissolved in acid and titrated.

15. (a) Alkaloids of ergot exist in stereoisomeric pairs. Which are they? Which one is pharmacologically active?

(b) The principal alkaloids of ipecacuanha are:

(1) _____ (2) _____

(3) _____ (4) _____

(5) _____

(c) Cephaeline $\xrightarrow{\text{Methylation}}$

(6) _____

(d) Catharanthus roseus contains 2 alkaloids which are effective in the treatment of neoplastic diseases.

They are

(7) _____ (8) _____

16. (a) Give the procedure for IP assay for Nikethamide injection.

(b) Give the reactions involved in the above assay.

(c) To which category of drugs this compound belongs?

17. (a) Show the 5β -cis fusion and 5α -trans fusion in case of steroid nucleus. What they are usually called?
 (b) Name the different types of insulin preparations.
 (c) Usual route of administration of insulin preparation is _____
 (d) Since insulin is a _____ it cannot be given orally.

18. (a) Which are the substances defined as Narcotic drugs and Psychotropic substances under Narcotic drugs and Psychotropic Substances Act, 1985 and rules?
 (b) What is the international name for small-pox vaccine?
 (c) How much of sodium chloride is required to render 150 ml of a 2% solution of procaine hydrochloride isotonic with blood serum?
 [Freezing point depression of 1% procaine hydrochloride is -0.12°C and 1% sodium chloride is -0.56°C].

19. What are the particulars to be recorded in analytical records for parenteral preparations as per the G.M.P. requirement under and C rules? List them correctly.

20. (a) An antibiotic isolated from *Streptomyces venezuelae* having an aromatic nitro group, on hydrolysis gives _____
 (A) Dichloroacetic acid
 (B) 2-amino-1-p-nitrophenyl-1 : 3-propanediol
 (1) What is the structural formula of the antibiotic?
 (2) How many asymmetric carbon atoms are present in B?
 (3) What is the optical activity and configuration of the active form of the antibiotic?
 (b) What are the important hydrolytic products of streptomycin? Give their names only.

21. (a) Explain what is $E_{1\text{cm}}^{1\%}$.
 (b) What is Group frequency region and finger print region?
 (c) What is retention volume?

22. (a) What processes are to be adopted in pharmaceutical industry for the
 (i) separation of bacteria from the parenteral liquids
 (ii) purification of colloids and enzymes
 (iii) removal of particulate matter in the air?
 (b) How much of 90% and 20% alcohols are required to produce 350 ml of 60% alcohol?

23. (a) Classify the surfactants with suitable example for each:
(b) LAL test is used as in-process control in parenteral preparations:
(i) What for is it used?
(ii) How is the test performed?
24. How will you rectify the following defects in tablet manufacturing?
(i) Punch variation
(ii) Hardness variation
(iii) Double impression
(iv) Poor flow
25. (a) Name four foam systems used in aerosol technology.
(b) Name four parameters in the evaluation of foam stability.
(c) Explain the following words used in communiton in one sentence for each
(i) Open circuit milling
(ii) Closed circuit milling
26. (a) In the evaluation of soft capsules, the following terms are used. Explain them in one sentence for each.
(i) Soft spot
(ii) Bloating
(iii) Foreign capsule
27. (a) Synthesis of a steroid hormone is given below. Write all the structures. Give the reagents used in Oppenaur oxidation:
(i) $3\beta\text{-Acetoxypregna-5, 16-diene-20-one} \xrightarrow{H_2/[Pd]} (A)$
(ii) $(A) \xrightarrow[H_2O+C_2H_5OH]{NaOH} (B) \xrightarrow[Oxidation]{oppenaur} [Hormone]$
(b) The above hormone shows two absorption bands in carbonyl region in its infrared spectrum. Write the approximate position of the band in wave numbers and indicate the corresponding chromophore.