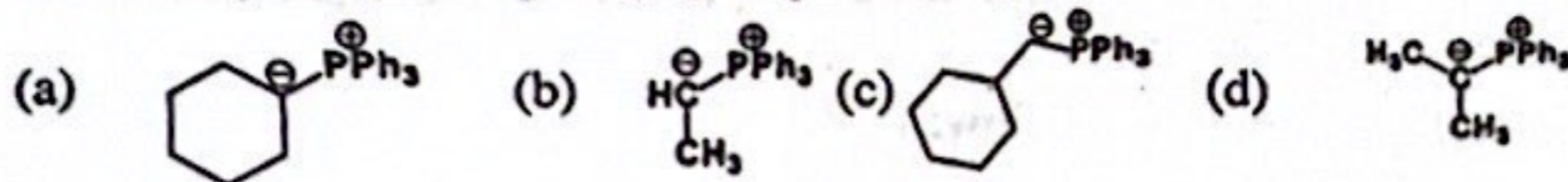
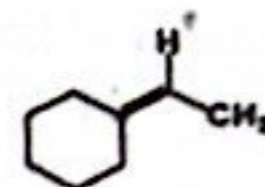


(1) If you have to plan a Wittig reaction for the synthesis of an alkene such as (ethylidenecyclohexane), which portion of the alkene would be preferred as use for ylide (the triphenyl phosphine unit).



(2) Which of the following is the electrophile in the nitration reaction of benzene

(a)  $\text{HNO}_3$  (b)  $\text{H}_2\text{SO}_4$  (c)  $\text{NO}_3$  (d)  $\text{NO}_2$

(3) Give the IUPAC name of the alcohol which on undergoing dehydration yields each of the following alkenes as the major product respectively;

(i)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}=\text{CH}_2$  (ii)  $(\text{CH}_3)_2\text{C}=\text{CHCH}_3$  (iii)  $(\text{CH}_3)_2\text{C}=\text{C}(\text{CH}_3)_2$  (iv)

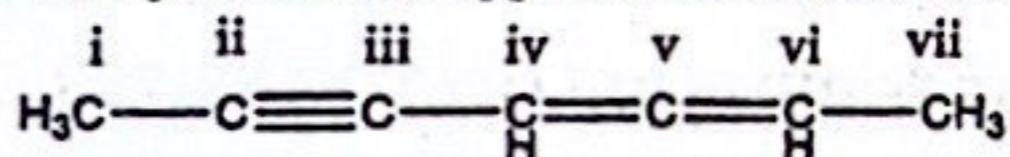
(a) hexan-2-ol; 3-methylbutan-3-ol; 3-methylbutan-3-ol; 1-methylcyclohexan-1-ol

(b) hexen-2-ol; 2-methylbutan-2-ol; 3-methylbutan-2-ol; 2-methylcyclohexan-2-ol

(c) hexan-1-ol; 2-methylbutan-3-ol; 2-methylbutan-3-ol; cyclohexylmethanol

(d) hexan-1-ol; 2-methylbutan-2-ol; 3-methylbutan-2-ol; cyclohexylmethanol

4. Give the hybridisation type in each of the C-atoms in the compound below:



[A] i sp ; ii sp<sup>3</sup> ; iii sp<sup>3</sup>; iv sp<sup>2</sup>; v sp<sup>2</sup>; vi sp<sup>2</sup> ; vii sp **[B]** i sp<sup>3</sup>; ii sp ; iii sp ; iv sp<sup>2</sup>; v sp<sup>2</sup> ; vi sp<sup>2</sup> ; vii sp<sup>3</sup>

[C] i sp<sup>3</sup>; ii sp ; iii sp ; iv sp; v sp<sup>2</sup>; vi sp; vii sp<sup>3</sup> [D] i sp<sup>3</sup>; ii sp; iii sp; iv sp<sup>2</sup>; v sp ; vi sp<sup>2</sup> ; vii sp<sup>3</sup>

5. The following are structural isomers of  $\text{C}_5\text{H}_{10}\text{O}_2$  except: i, 3-hydroxycyclopentanone; ii, pentanoic acid; iii 3-oxo-pentan-1-ol; iv, 3-hydroxypentanal; v, 1, 3-dihydroxycyclopentane; vi 1,3-dihydroxy-5-methylcyclopentane

[A] i, & iii only; **[B]** i & vi only; [C] iv, v & vi only; [D] i, v & vi only

6. Give the name of the alkene that would result from the dehydration of each of the following isomeric alcohols: Hexan-2-ol and 2-methylpentan-3-ol: [A] Hex-1-ene and 2-methylpent-1-ene; [B] Hex-3-ene and 4-methyl pent-2-ene; **[C]** Hex-2-ene and 2-methyl pent-2-ene; [D] Hex-1-ene and 2-methyl-pent-2-ene

7. Which of the solvents below would exhibit H-bonding:

$\text{CH}_3\text{CHO}$ ;  $(\text{CH}_3)_2\text{CO}$ ;  $\text{CH}_3\text{Cl}$ ;  $(\text{CH}_3)_2\text{NH}$ ;  $\text{CH}_3\text{CHOHCH}_3$

I

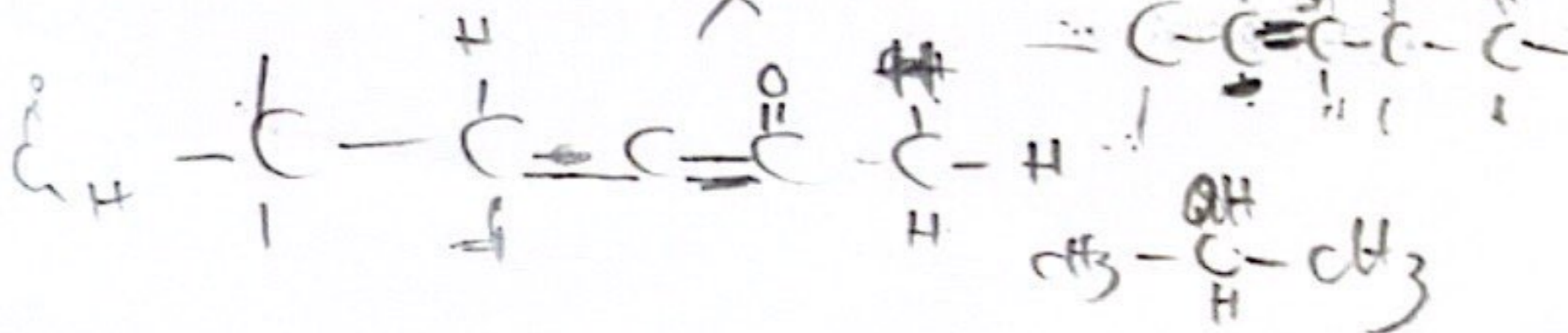
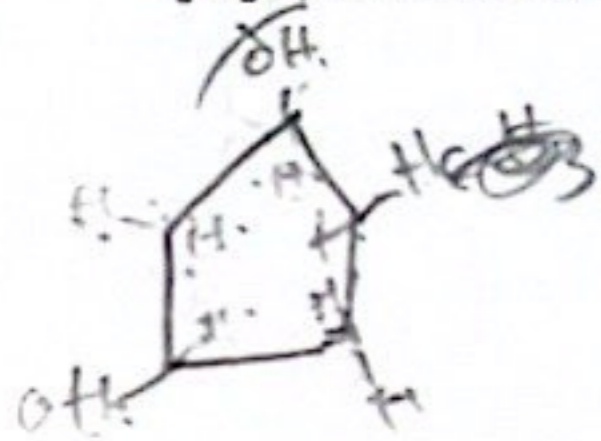
II

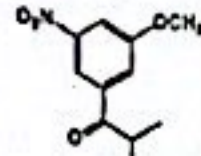
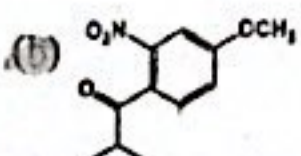
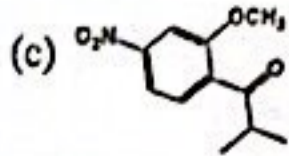
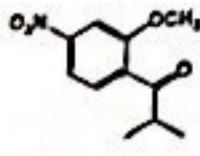
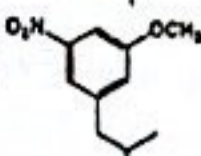
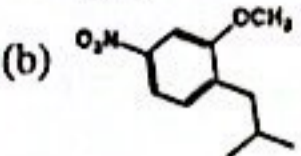
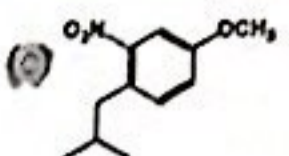
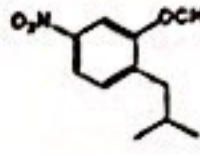
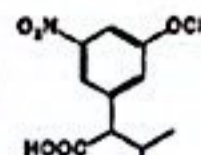
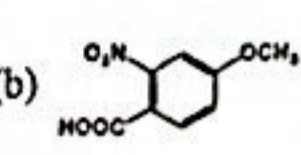
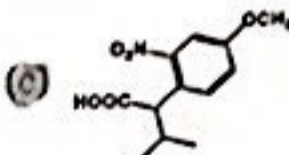
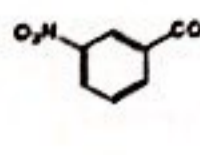
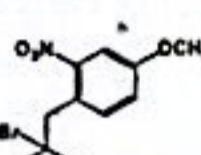
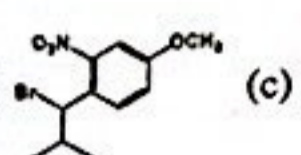
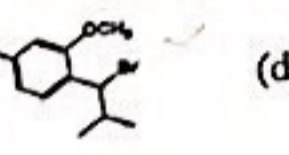
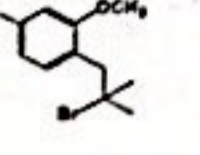
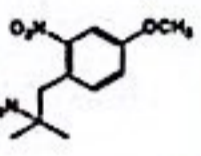
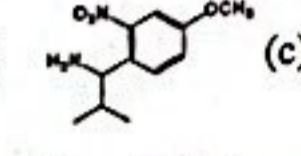
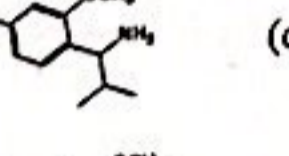
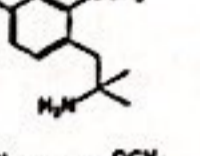
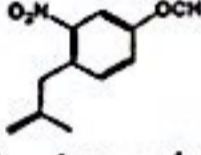
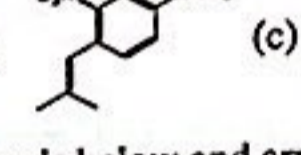
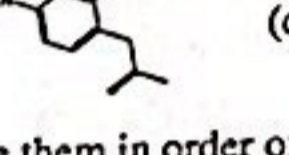
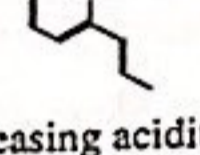
III

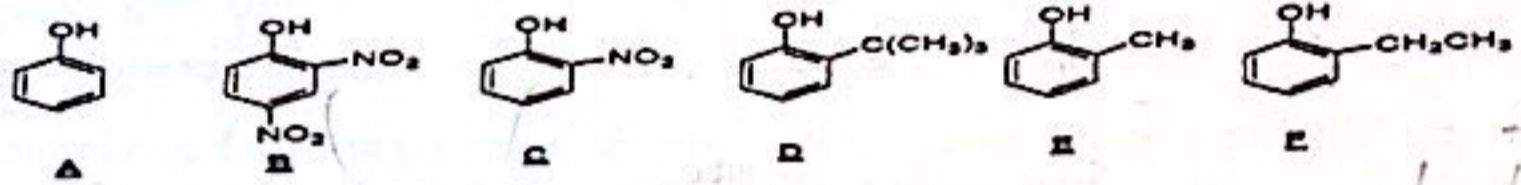
IV

V

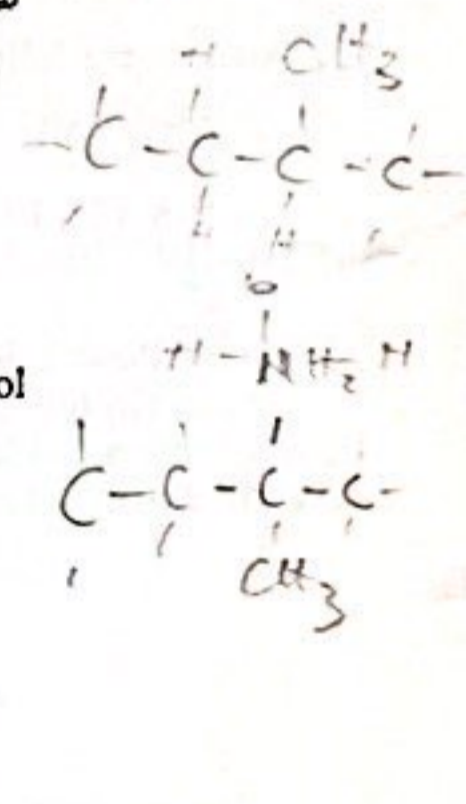
[A] I, II & III only; [B] I, IV & V only; **[C]** IV & V only; [D] I, III, IV & V



- (15) Compound B is (a)  (b)  (c)  (d) 
- (16) Compound C is (a)  (b)  (c)  (d) 
- (17) Compound D is (a)  (b)  (c)  (d) 
- (18) Compound E is (a)  (b)  (c)  (d) 
- (19) Compound F is (a)  (b)  (c)  (d) 
- (20) Compound G is (a)  (b)  (c)  (d) 
- (21) Consider the following lettered compounds below and arrange them in order of decreasing acidity;



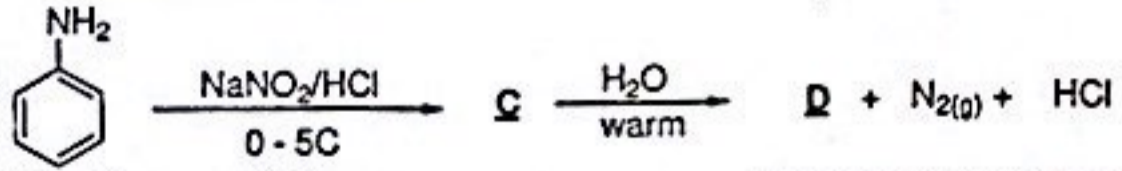
- (a) D > F > E > A > C > B  
 (b) C > B > A > D > F > E  
 (c) B > C > A > E > F > D  
 (d) B > D > A > E > D > F



22. Which of the following alcohol will not give a Lucas reagent test?  
 (a) N-butanol (b) Isobutyl alcohol (c) Tert-butyl alcohol (d) sec-butyl alcohol

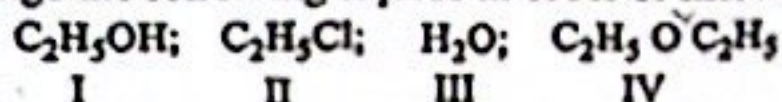
23. Lucas reagent is the solution of  
 (a) Anhydrous zinc chloride and concentrated hydrochloric acid  
 (b) Anhydrous copper chloride and concentrated hydrochloric acid  
 (c) Anhydrous zinc chloride and dilute hydrochloric acid  
 (d) Anhydrous copper chloride and dilute hydrochloric acid

24. The reaction in the scheme below produced **C** as an intermediate which reacted further to give **D**. What is **C** and **D** in the given reaction?

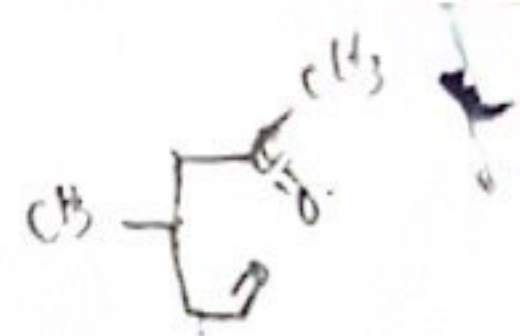


- (a) Chlorobenzene & Benzene (b) Benzene & Chlorobenzene  
 (c) Benzene diazonium chloride & Phenol (d) Phenoxide & Benzene diazonium chloride

8. Arrange the following liquids in order of increasing boiling point:



[A] III < I < IV < II; [B] II < IV < I < III; [C] I < III < IV < II; [D] IV < II < I < III



9. Which of the following is correct?

- (a) When a Grignard reagent reacts with a ketone, the addition product is a primary alcohol.
- (b) When a Grignard reagent reacts with a ketone, the addition product is a secondary alcohol.
- (c) When a Grignard reagent reacts with an aldehyde, the addition product is a tertiary alcohol.
- (d) None of the above are correct.

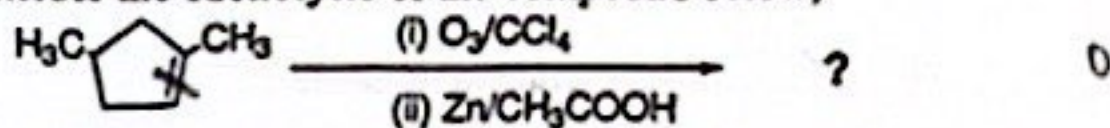
10. Which of the following is formed when phenol is exposed to air?

- (a) o-Benzoquinone (b) p-Benzoquinone (c) Phenoquinone  (d) o- and p-Benzoquinone

11. Aldehydes and ketones are carbonyl compounds. Which of them react with  $NaBH_4$  and react with Fehling's reagent?

- (a) Both aldehydes and ketone  (b) aldehydes only (c) Ketones only (d) Neither aldehydes and ketones

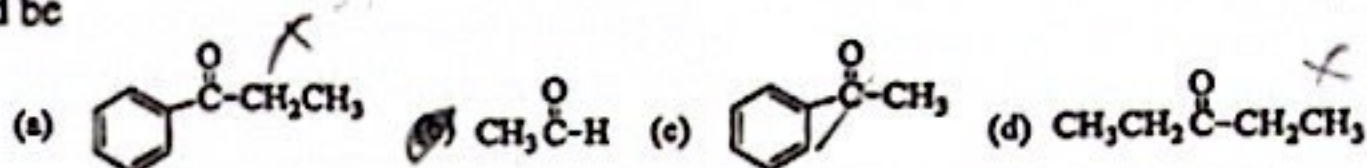
12. Consider the ozonolysis of the compound below;



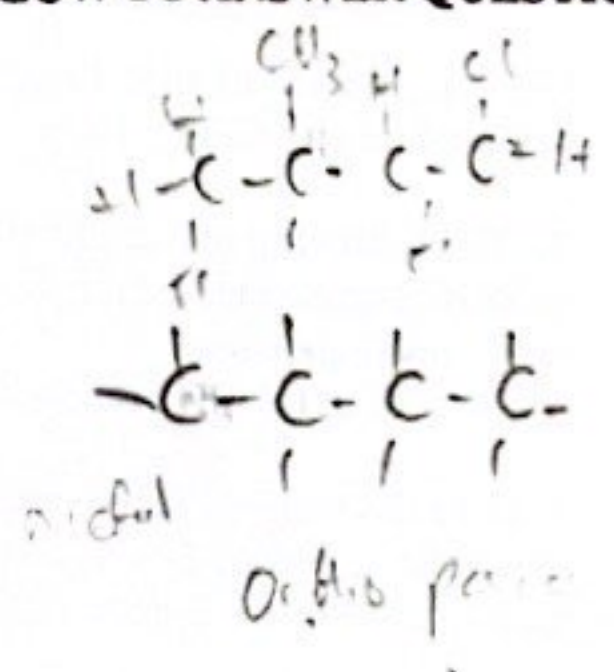
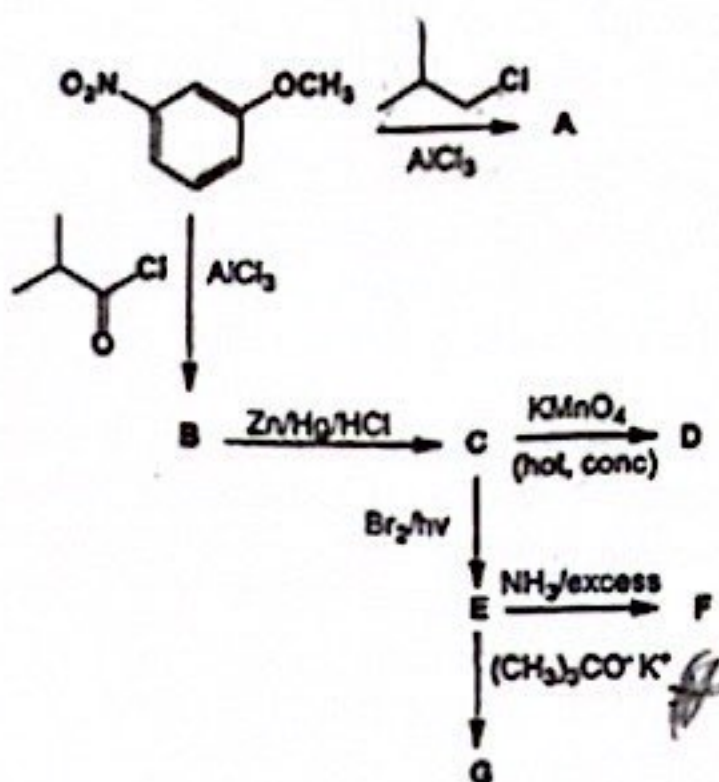
Give the IUPAC name(s) of the product(s) of this reaction?

- (a) 3-methyl-5-oxohexanal (b) 3,5-dimethylpentanal
- (c) 2-methylpropanone and methanol (d) 5-keto-3-methylpentanal

13. A compound **B** gave a positive iodoform test, but did not reduce silver nitrate in ammonia solution. Compound **B** could be



USE THE INFORMATION CONTAINED IN THE SCHEME BELOW TO ANSWER QUESTIONS 14-20



- (14) Compound A is (a) CC(C)CC1=CC(OC)=C([N+](=O)[O-])C=C1 (b) CC(C)CC1=CC(OC)=C([N+](=O)[O-])C=C1 (c) CC(C)C1=CC(OC)=C([N+](=O)[O-])C=C1 (d) CC(C)CC1=CC(OC)=C([N+](=O)[O-])C=C1

25. Phenol is an ortho-para director because the hydroxyl group;
- donates electrons that increase electron density at ortho and para positions favouring nucleophilic attack.
  - donates electrons that increase electron density at ortho and para positions favouring electrophilic attack.
  - donates electrons to the ortho and para positions and attracts electrons away from meta positions favouring nucleophilic attack of the ring.
  - donates electrons to the ortho and para positions and attracts electrons away from meta positions favouring electrophilic attack on the ring

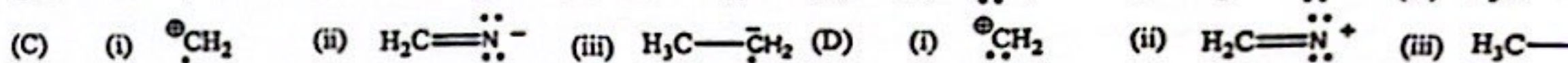
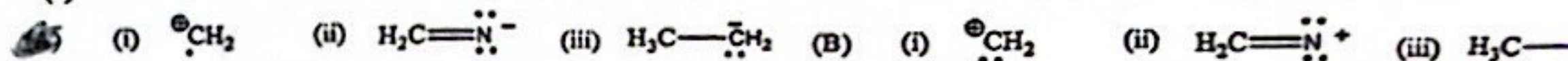
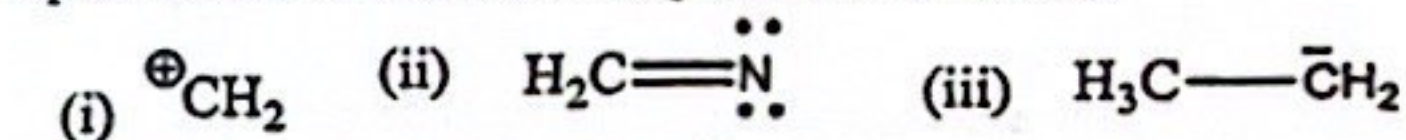
26. Consider: 2,3-dichloro-but-1,4-dioic acid, how many of its optical isomers are active, give the possible specific configuration of the chiral C-atom(s) of the optically active isomer(s)  
 [A] 1, + ; [B] 2, + & - ; [C] 2, + & + ; [D] 1, -

27. Arrange the following in order of increasing boiling point:

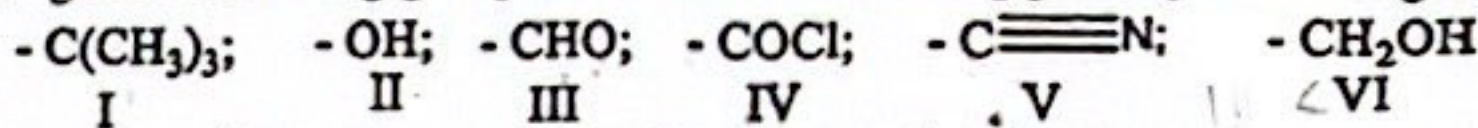
I = C<sub>2</sub>H<sub>5</sub>OH; II = C<sub>2</sub>H<sub>5</sub>Cl; III = H<sub>2</sub>O; IV = C<sub>2</sub>H<sub>5</sub>OC<sub>2</sub>H<sub>5</sub>.

[A] III < I < IV < II ; [B] II < IV < I < III ; [C] I < III < IV < II ; [D] IV < II < I < III

28. According to Lewis structure, by adding appropriate charges or electron dot(s) the correct representation of the chemical species below will be:



29. Arrange the following groups in order of decreasing priority according to Cahn Ingold Prelog rule:



[A] I < V < VI < III < IV < II ;    [B] I < III < IV < V < VI < II ;

[C] II < IV < III < VI < V < I ;    [D] VI < I < V < III < IV < II

30. The following is/are correct for S<sub>N</sub>1 reaction mechanism except: (i) The geometry of the transition state is planar; (ii) It is favoured with primary alkyl halide; (iii) The substrate and product are of opposite configuration (iv) It usually lead to formation of a racemate.

(A) (ii) & (iii) only;    (B) (iii) only;    (C) (i) & (ii) only;    (D) (i) & (iv) only