FIITJEE

CBSE TERM - I

ALL XIITH STUDYING BATCHES

Full Test – I

CHEMISTRY

(16th November 2021)

Time: 1:30 Hours **Maximum Marks: 45**

General Instructions:

1. The question paper contains three sections A, B and C
2. Section A consists of 25 questions MCQ Single Option Correct, out of which students will attempt any 20 questions only. Each question carries +1 Mark.
3. Section B consists of 24 questions MCQ Single Option Correct, out of which 5 questions are Assertion-Reasoning type. Students will attempt any 20 questions only. Each question carries +1 Mark.
4 Section C consists of 6 questions MCQ Single Option Correct out of which 4 questions are based on case studies. Students will attempt any 5 questions only. Each question carries +1 Mark.
5. There is no negative marking.

Name of the Candidate : .....

Enroll Number : .....

Date of Examination : .....

CHEMISTRY

SECTION – A

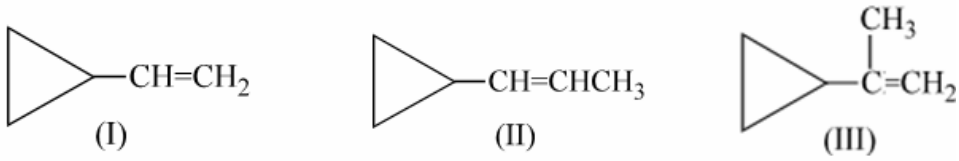
*This section contains **25 Multiple Choice Questions** number **1 to 25**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

1. In a cubic packed structure of mixed oxides, the lattice is made up of oxide ions, one fifth of tetrahedral voids are occupied by divalent (X^{2+}) ions, while one-half of the octahedral voids are occupied by trivalent ions (Y^{3+}), then the formula of the oxides.
(A) XY_2O_4 (B) X_2YO_4
(C) $X_4Y_5O_{10}$ (D) $X_5Y_4O_{10}$

2. The molecular weight of benzoic acid in benzene as determined by depression in freezing point method corresponds to
(A) ionization of benzoic acid (B) dimerization of benzoic acid
(C) trimerization of benzoic acid (D) salvation of benzoic acid

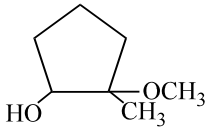
3. Which of the following compound on reaction with $LiAlH_4$ (in excess) in dry ether and subsequent hydrolysis will give isobutyl alcohol only?
(A) $CH_3-CH(CH_3)-CH_2-C(=O)-OCH_2-CH(CH_3)-CH_3$
(B) $CH_3-CH(CH_3)-CH_2-O-C(=O)-CH(CH_3)-CH_3$
(C) $CH_3-CH(CH_3)-O-C(=O)-CH_2-CH(CH_3)-CH_3$
(D) $CH_3-CH(CH_3)-O-CH_2-O-CH(CH_3)-CH_3$

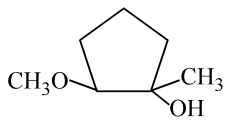
4. Rate of hydration of

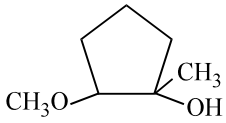


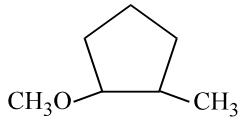
will be in order:
(A) I < II < III (B) I < III < II
(C) II < I < III (D) III < II < I

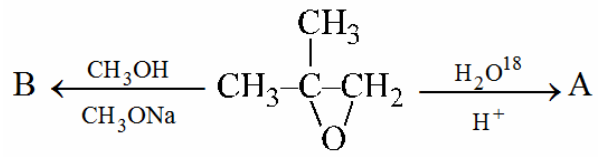
5. If the starting material is 1–methyl–1, 2–epoxy cyclopentane, of absolute configuration, decide which one compound correctly represent the product of its reaction with sodium methoxide in methanol.

(A) 

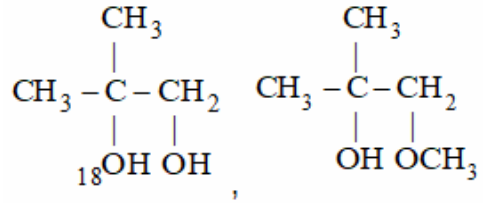
(B) 

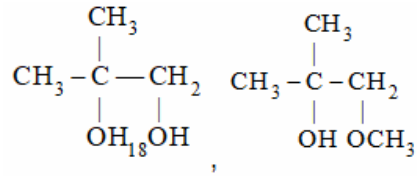
(C) 

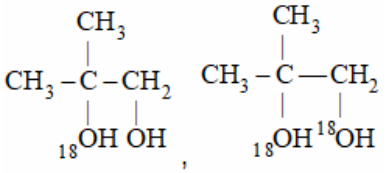
(D) 

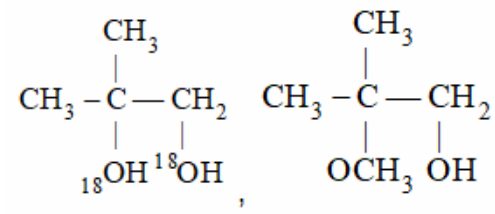
6. 

A and B are

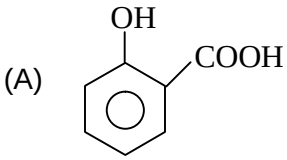
(A) 

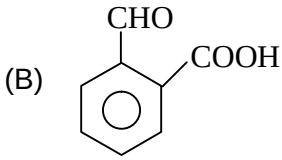
(B) 

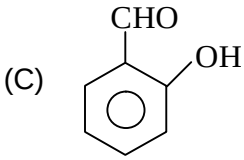
(C) 

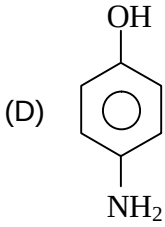
(D) 

7. Which one of the following compounds gives aspirin on reaction with acetic anhydride in presence of H_2SO_4?

(A) 

(B) 

(C) 

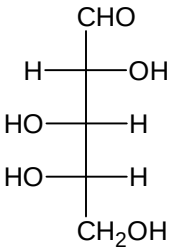
(D) 

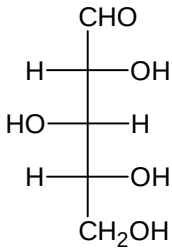
8. Picric acid and benzoic acid can be distinguished by

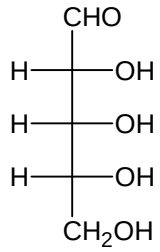
(A) Aqueous $NaHCO_3$ (B) Aqueous NaOH

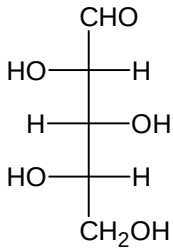
(C) Aqueous $FeCl_3$ (D) Aqueous Na_2CO_3

9. Which L-sugar on oxidation gives an optically active dibasic acid?

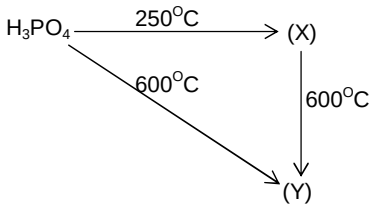
(A) 

(B) 

(C) 

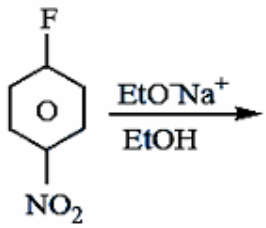
(D) 

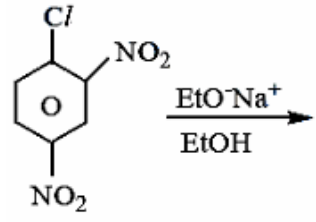
10. Conc. H_2SO_4 cannot be used to prepare HBr from NaBr because it
(A) reacts slowly with NaBr (B) oxidised HBr
(C) reduces HBr (D) disproportionates HBr

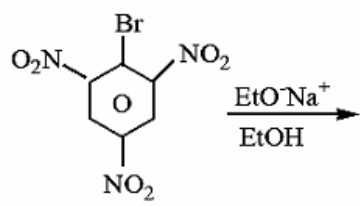
11. 

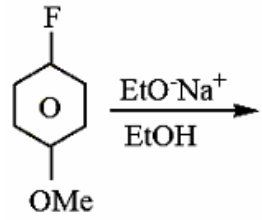
(A) (X) = pyrophosphoric acid (liquid), (Y) = Metaphosphoric acid (liquid)
(B) (X) = pyrophosphoric acid (liquid), (Y) = Metaphosphoric acid (solid)
(C) (X) = pyrophosphoric acid (solid), (Y) = Metaphosphoric acid (solid)
(D) (X) = pyrophosphoric acid (solid), (Y) = Metaphosphoric acid (liquid)

12. Which of the following reaction should show maximum reactivity for reaction below?

(A) 

(B) 

(C) 

(D) 

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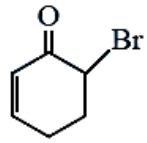
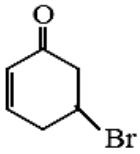
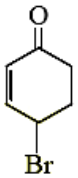
Reaction (1)  alc.KOH → (A) (major)

Reaction (2)  alc.KOH → (B) (major)

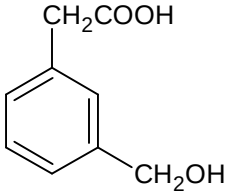
Reaction (3)  alc.KOH → (C) (major)

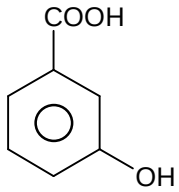
Product obtained in above reaction (1), (2) & (3) is

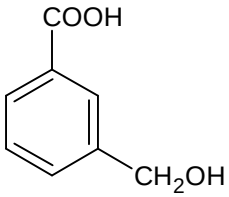
(A) A = B = C all product(s) are identical (B) A = C, but B is different

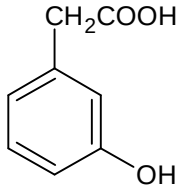
(C) B = C, but A is different (D) A = B, but C is different

14. The acid, which on decarboxylation forms phenol is:

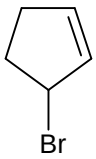
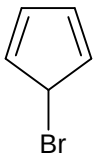
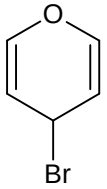
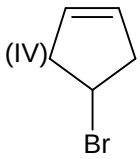
(A) 

(B) 

(C) 

(D) 

15. The increasing order of reactivity of the following bromides in S_N1 reaction is

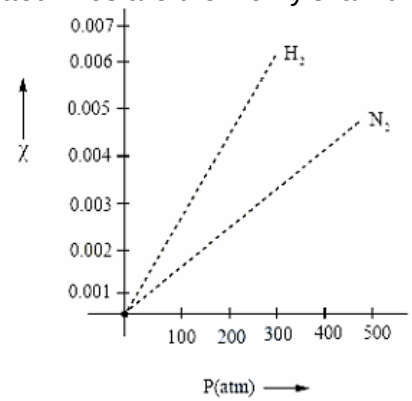
(I)  (II)  (III)  (IV) 

(A) III > I > II > IV (B) III > I > IV > II

(C) II > III > I > IV (D) II > I > III > IV

16. Thiazyl chloride$[NSCl_2]^-$ has been recently reported. The ion is isoelectronic with Thionyl chloride $OSCl_2$. Both the structures have only one π-bond. Which option is true?
(A) Thiazyl chloride has greater Cl – S – Cl bond angle & lesser S – Cl bond length than thionyle chloride.
(B) Thionyl chloride has greater Cl – S – Cl bond angle & lesser S – Cl bond length than thiazylechloride.
(C) Cl – S – Cl bond angle and S – Cl bond length are identical in $SOCl_2$ and $[NSCl_2]^-$.
(D) Cl – S – Cl bond angle and S – Cl bond length are identical in $[NSCl_2]^-$ & $OSCl_2$ cannot be compared

17. Mole fraction solubilities of H_2 and N_2 in water at 50^oC on y-axis versus gas partial pressure on x-axis is given below
The dotted lines are the Henry's law times

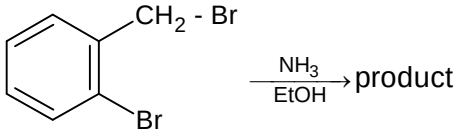


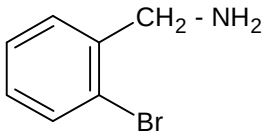
Which of the following is correct?
(A) N_2 is more soluble than H_2 in water
(B) Henry constant(k_g, atm) of H_2 gas is more than N_2 gas
(C) On increasing temperature solubility of H_2 gas will increase
(D) $\frac{1}{\text{Slope of dotted line}}$ is equal to Henry constant(k_H, atm)

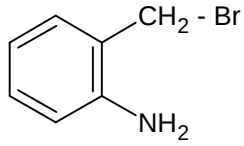
18. Analysis show that nickel oxide consists of nickel ion with 96% ions having d^8 configuration and 4% having d^7 configuration. Which amongst the following best represents the formula of the oxide?
(A) $Ni_{1.02}O_{1.00}$ (B) $Ni_{0.96}O_{1.00}$
(C) $Ni_{0.98}O_{0.98}$ (D) $Ni_{0.98}O_{1.00}$

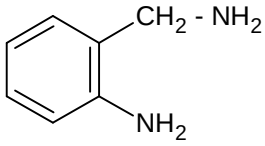
19. Which of the following reaction does not form alcohol?
(A) $CH_3CH=CHCH_3 \xrightarrow[NaOH,H_2O_2]{B_2H_6,THF}$
(B) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH=CH_2 \xrightarrow[NaBH_4]{Hg(CH_3COO)_2,H_2O}$
(C) $CH_3CH_2COOH \xrightarrow[H^+]{LiAlH_4}$
(D) $CH_3CH_2\overset{\displaystyle O}{\overset{\|}{C}}CH_3 \xrightarrow[Conc.HCl]{Zn-Hg}$

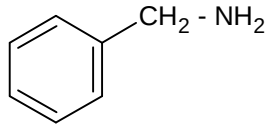
20. What is the major product obtained in the following reaction?



(A) 

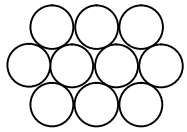
(B) 

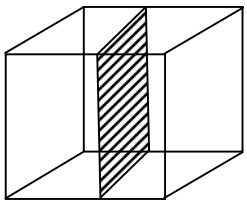
(C) 

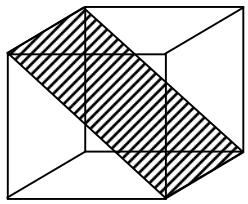
(D) 

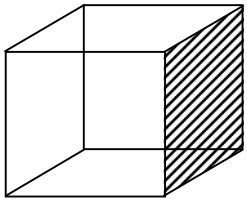
21. Which of the following property does not conform the cyclic structure of glucose?
(A) Reaction with NH_2–OH (B) Mutarotation
(C) Existence into two anomeric form (D) Negative schiff's reagent test

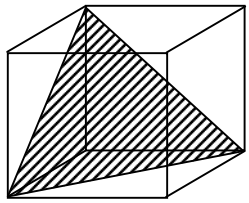
22. In an FCC crystal, which of the following shaded planes contain the given type of arrangement?



(A) 

(B) 

(C) 

(D) 

23. Phenol is heated with a solution of mixture of KBr and $KBrO_3$. The major product obtained in the above reaction is:
(A) 2 – bromophenol (B) 3 – bromophenol
(C) 4 – bromophenol (D) 2, 4, 6 – tribromophenol

24. Two liquids A and B are mixed at temperature T in a certain ratio to form an ideal solution. If it is found that the partial vapour pressure o A. i.r… p_A is equal to p_B, the vapour pressure of B for the liquid mixture. What is the total vapour pressure of the liquid mixture in terms of p_A^0 and p_B^0

(A) $\frac{p_A^0 p_B^0}{p_A^0 + p_B^0}$ (B) $\frac{2p_A^0 p_B^0}{p_A^0 + p_B^0}$

(C) $\frac{p_A^0}{p_A^0 + p_B^0}$ (D) $\frac{2p_B^0}{p_A^0 + p_B^0}$

25. In a tetragonal crystal

(A) $a = b = c,\ \alpha = \beta = 90^o \neq \gamma$ (B) $\alpha = \beta = \gamma = 90^o,\ a = b \neq c$

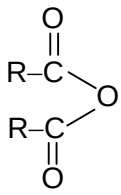
(C) $\alpha = \beta = \gamma = 90^o,\ a \neq b \neq c$ (D) $\alpha = \beta = 90^o,\ \gamma = 120^o,\ a = b \neq c$

SECTION – B

*This section contains **24 Multiple Choice Questions** number **26 to 49, out of which 5 questions are Assertion-Reasoning type.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

26. The freezing point (in°C) of solution containing 0.1 g of $K_3[Fe(CN)_6]$ (mol. wt. 329) in 100 g of water (K_f = 1.86 K kg mol^{-1}) is
(A) -2.3×10^{-2} (B) -5.7×10^{-2}
(C) -5.7×10^{-3} (D) -1.2×10^{-2}

27. Pick out the statement which is not true:
(A) NaCl structure on heating transforms to CsCl structure
(B) In CaF_2 structure, each F^- ion in coordinated by four
(C) NaCl has 6: 6 coordination; while CsCl is with 8:8 coordination
(D) In Na_2O, each oxide ion is coordinated by eight Na^+ ions and each Na^+ ion by four oxide ions

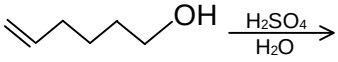
28. The acid derivative which does not give alcohol on reduction
(A) $R-\overset{\overset{O}{\|}}{C}-X$ (B) $R-\overset{\overset{O}{\|}}{C}-NH_2$
(C) $R-\overset{\overset{O}{\|}}{C}-OR'$ (D) 

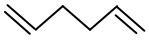
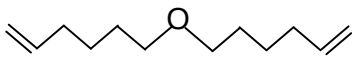
29. 2–Butene is allowed to react with CF_3CO_3H. The product formed (A) is heated with $LiAlH_4$ in dry ether and finally acidified to give (B).

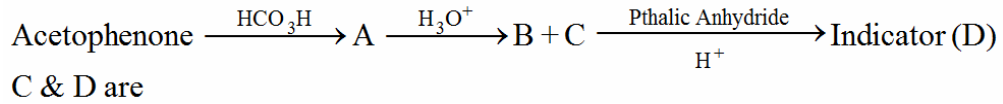
$$CH_3CH{=}CHCH_3 \xrightarrow{CF_3CO_3H} (A) \xrightarrow[2.\ H_3O^+]{1.\ LiAlH_4} (B)$$

The final product (B) is
(A) $CH_3\underset{\underset{O}{\diagdown\diagup}}{CH}-CHCH_3$ (B) $CH_3\underset{\underset{OH}{|}}{CH}-\underset{\underset{OH}{|}}{CH}CH_3$
(C) $CH_3CH_2CH(OH)CH_3$ (D) $CH_3CH_2CH_2CH_3$

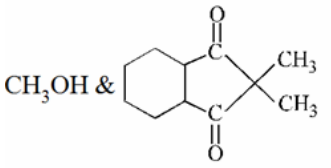
30. The major product (A) of the reaction,

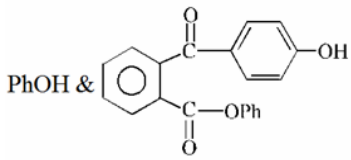


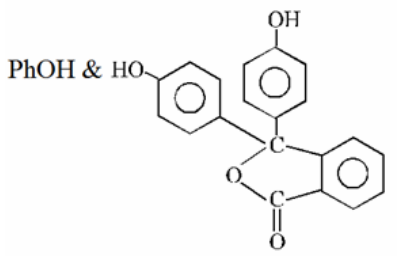
is
(A)  (B) 
(C)  (D) 

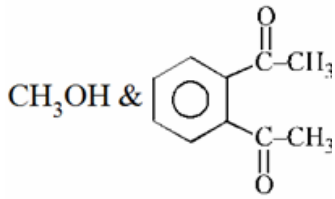
31. 

C & D are

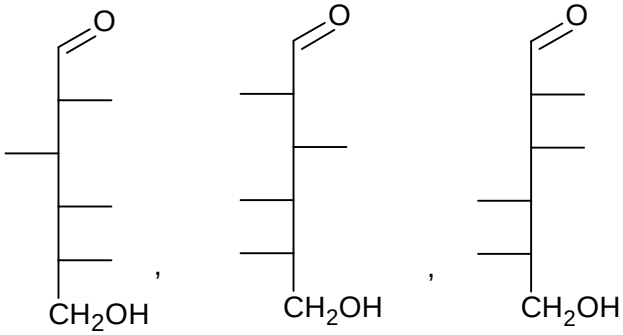
(A) 

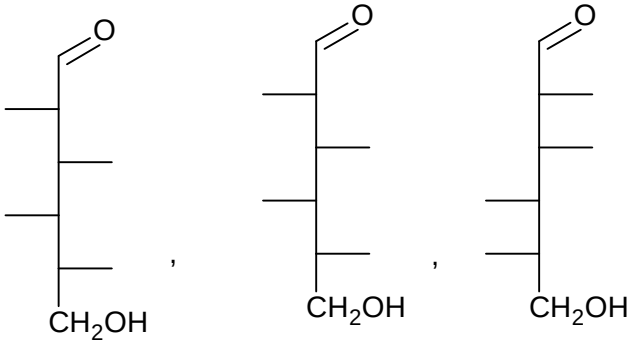
(B) 

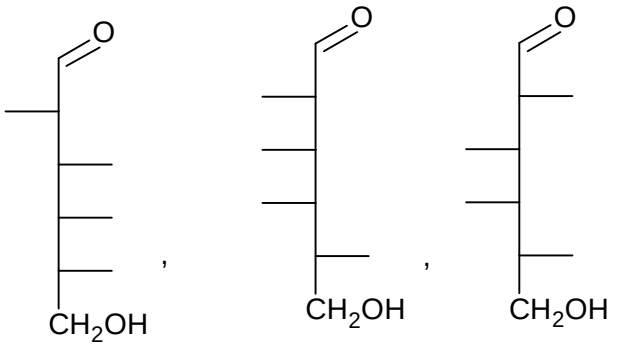
(C) 

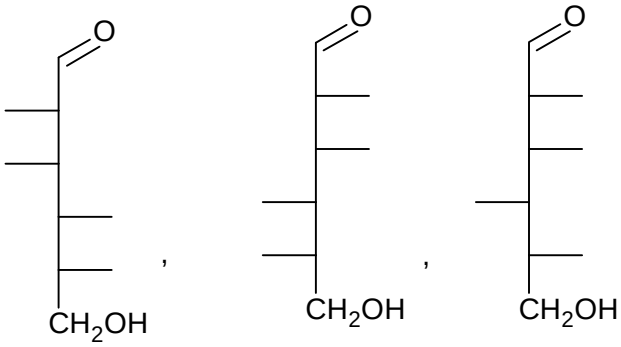
(D) 

32. A, B & C are three aldohexose compounds A and B yield the same optically active alditol when they are reduced with hydrogen and a catalyst, A and B yield different phenylosazones when treated with phenyl hydrazine. B and C give the same phenylosazone but different alditols. Assuming that all are D-sugars, structure for A, B and C are respectively:

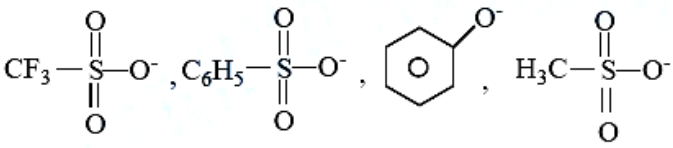
(A) 

(B) 

(C) 

(D) 

33. Consider the following anions



(i) (ii) (iii) (iv)

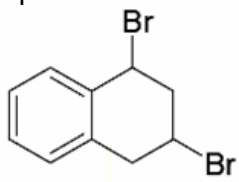
When attached to SP^3-hybridized carbon, their leaving group ability in nucleophilic substitution reaction decreases in the order.

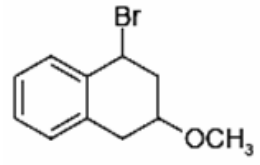
(A) i > ii > iii > iv
(B) i > ii > iv > iii
(C) iv > i > ii > iii
(D) iv > iii > ii > i

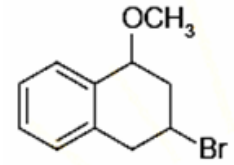
34. An inorganic salt (A) is decomposed at about 523K to give product (B) and (C) is a liquid at room temperature and is neutral to litmus paper while oxide (B) on burning with white phosphorus, give a dehydrating agent (D). Compounds (A), (B), (C) and (D) will be identified as

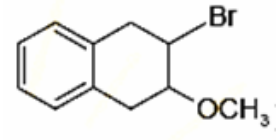
(A) $NH_4NO_3, N_2O, H_2O, P_2O_5$
(B) $NH_4NO_2, K_2O, H_2O, P_2O_5$
(C) $CaCO_3, CaO, H_2O, CaCl_2$
(D) $CaCO_3, CaO, H_2O, Ca(OH)_2$

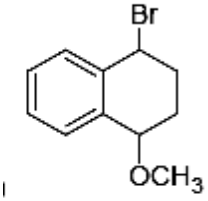
35. The major product formed when the compound reacts with one mole of methanol is

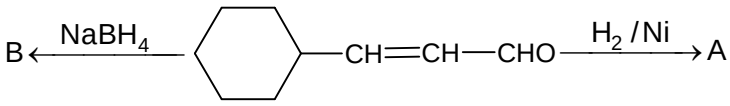


(A) 

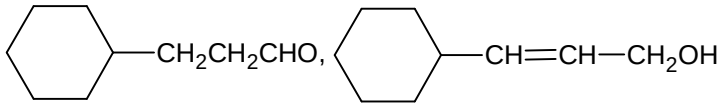
(B) 

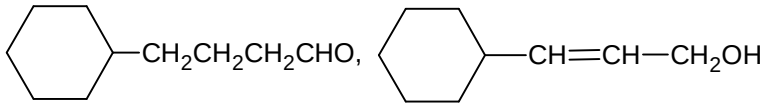
(C) 

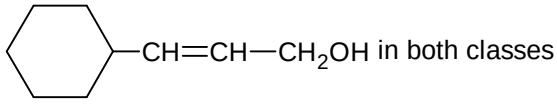
(D) 

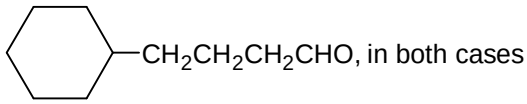
36. 

A and B are :

(A) 

(B) 

(C)  in both classes

(D)  , in both cases

37. The correct statement among the given are

(1) α – sulphur is rhombic sulfur whose melting point is 393 K

(2) β - sulphur is monoclinic sulfur whose melting point is 385.8 K

(3) α, β both forms of sulphur are insoluble in CS_2

(4) α – sulphur is stable below 639 K

(A) only 1, 2 (B) All 1, 2, 3, 4

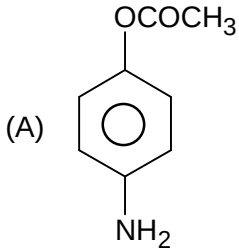
(C) only 1, 3 (D) only 4

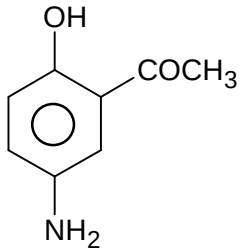
38. Which of the following statements is not correct when a mixture of NaCl and $K_2Cr_2O_7$ is gently warmed with conc.H_2SO_4?
(A) a deep red vapour is evolved
(B) the vapour when passed into NaOH solution gives a yellow solutions of Na_2CrO_4
(C) chlorine gas is evolved as major product
(D) chromyl chloride is formed

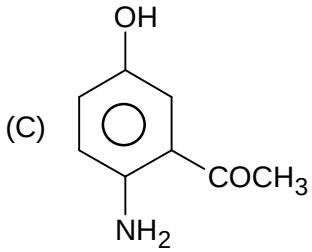
39. 3.24 g of $Hg(NO_3)_2$ (molar mass = 324) dissolved in 1000 g of water constitutes and solution having a freezing point of -0.0558°C while 21.68 g of $HgCl_2$ (molar mass = 271) in 2000 g of water constitutes a solution with a freezing point of -0.0744°C, the K_f of water is 1.86 K per molal. About the state of ionization of these two solids in water it can be inferred that
(A) $Hg(NO_3)_2$ and $HgCl_2$ both are completely ionized
(B) $Hg(NO_3)_2$ is completely ionized by $HgCl_2$ is fully unionized
(C) $Hg(NO_3)_2$ and $HgCl_2$ both are completely unionized
(D) $Hg(NO_3)_2$ is fully unionized by $HgCl_2$ is fully ionized

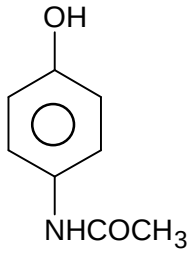
40. FeO, crystal has a cubical structure and each edge of the unit cell is 5 Å. Taking density of the oxide as 4 gm/cc, the number of Fe^{2+} and O^{2-} ions present in each unit cell are
(A) 4 Fe^{2+} and 4O^{2-} (B) 6 Fe^{2+} and 8O^{2-}
(C) 2 Fe^{2+} and 2.5O^{2-} (D) 1 Fe^{2+} and 1.5O^{2-}

41. Paracetamol an antipyretic drug, is prepared by acetylation of p-aminophenol with one equivalent of acetic anhydride in the presence of pyridine. The structure of paracetamol is

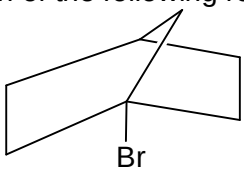
(A) 

(B) 

(C) 

(D) 

42. Which of the following reactant will not favour nucleophilic substitution reaction?

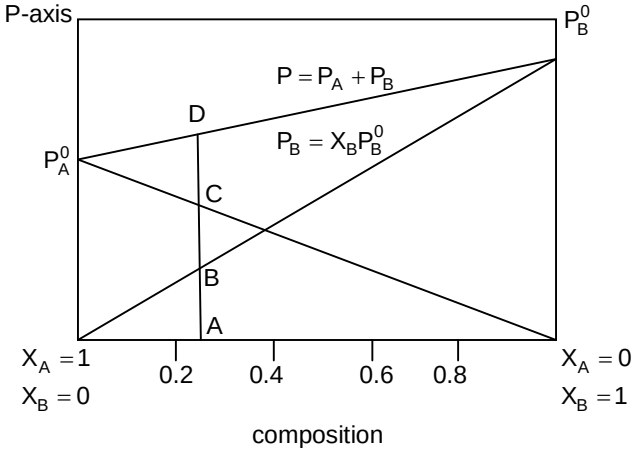
(A) 

(B) Ph – Br

(C) $CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}} - CH_2 - Br$

(D) All of these

43. Consider the following vapour-pressure composition graph



Which of the following equality holds?

(A) AD = AB + BC + CD
(B) AD = AB + CD
(C) AD = AB + AC
(D) AD = AC + BC

44. Which of the following property does not conform the cyclic structure of glucose?

(A) Reaction with NH_2–OH
(B) Mutarotation
(C) Existence into two anomeric form
(D) Negative schiff's reagent test

Assertion – Reason

45. Assertion: In any ionic solid [MX] with Schottky defects, the number of positive and negative ions are the same.
Reason :Equal number of cation and anion vacancies are present.

(A) Both assertion and reason are true and the reason is the correct explanation of assertion.
(B) Both assertion and reason are true but the reason is not the correct explanation of assertion.
(C) Assertion is true but reason is false.
(D) Assertion is false but reason is true.

46. Assertion : Graphite is a good conductor of electricity however diamond belongs to the category of insulators.
Reason : Graphite is soft in nature on the other hand diamond is very hard and brittle.
(A) Both assertion and reason are true and the reason is the correct explanation of assertion.
(B) Both assertion and reason are true but the reason is not the correct explanation of assertion.
(C) Assertion is true but reason is false.
(D) Assertion is false but reason is true.

47. Assertion: Phosphorus chlorides (tri and penta) are preferred over thionyl chloride for the preparation of alkyl chlorides from alcohols.
Reason: Phosphorus chlorides give pure alkyl halides.
(A) Both assertion and reason are true and the reason is the correct explanation of assertion.
(B) Both assertion and reason are true but the reason is not the correct explanation of assertion.
(C) Assertion is true but reason is false.
(D) Assertion is false but reason is true.

48. Assertion : D (+) – Glucose is dextrorotatory in nature.
Reason : 'D' represents its dextrorotatory nature.
(A) Both assertion and reason are true and the reason is the correct explanation of assertion.
(B) Both assertion and reason are true but the reason is not the correct explanation of assertion.
(C) Assertion is true but reason is false.
(D) Assertion is false but reason is true.

49. Assertion : When a solution is separated from the pure solvent by a semipermeable membrane, the solvent molecules pass through it from pure solvent side to the solution side.
Reason : Diffusion of solvent occurs from a region of high concentration solution to a region of low concentration solution.
(A) Both assertion and reason are true and the reason is the correct explanation of assertion.
(B) Both assertion and reason are true but the reason is not the correct explanation of assertion.
(C) Assertion is true but reason is false.
(D) Assertion is false but reason is true.

SECTION – C

*This section contains **6 Multiple Choice Questions** number **50 to 55, out of which 4 questions are based on case studies.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

(Case study, 50 - 53)

Under the normal conditions, noble gases are monoatomic and have closed shell electronic configuration. Lighter noble gases have low boiling points due to weak dispersion forces between the atoms and the absence of other interatomic interactions. Xenon, one of the important noble gas, forms a series of compounds with fluorine with oxidation number +2, +4 and +6. All xenon fluorides are strong oxidizing agents. XeF_4 reacts violently with water to give XeO_3. The geometry of xenon compounds can be deduced by considering the total number of electron pairs in the valence shell.
Choose the most appropriately answer of the following questions.

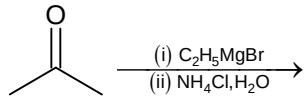
50. Among noble gases (from He to Xe) only xenon reacts with fluorine to form stable xenon fluorides because xenon
(A) has the largest size
(B) has the lowest ionization enthalpy
(C) has the highest heat of vapourisation
(D) is the most readily available noble gas

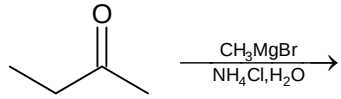
51. The structure of XeO_3 is
(A) square planar
(B) pyramidal
(C) linear
(D) T-shaped

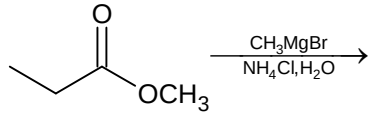
52. In the preparation of compound of xenon, Bartlett has taken $O_2^+PtF_6^-$ as a base compound. This is because
(A) both O_2 and Xe have same size
(B) both Xe and O_2 have same electron gain enthalpy
(C) both have almost same ionization enthalpy
(D) both Xe and O_2 are gases

53. The oxidation state of xenon in XeO_3 is
(A) +4
(B) +2
(C) +8
(D) +6

54. Choose the reagent and reactant that would produce 2-methyl-2-butanol as the major product

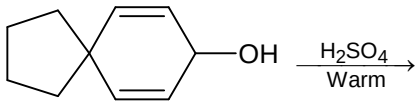
I 

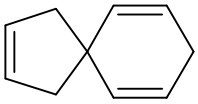
II 

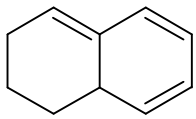
III 

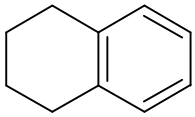
(A) I, II and III
(B) both I and III
(C) only I
(D) only III

55. The major product formed in the following reaction is



(A) 

(B) 

(C) 

(D)