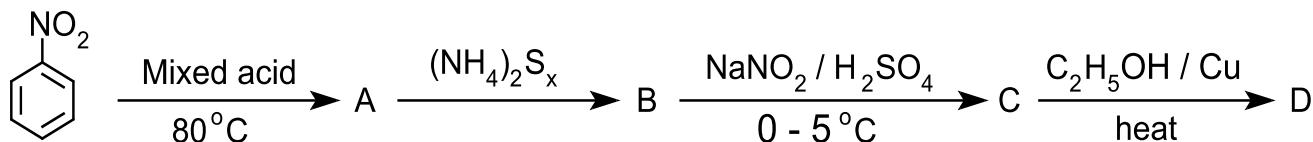


RAMAKRISHNA MISSION VIVEKANANDA CENTENARY COLLEGE, RAHARA, KOLKATA
Undergraduate Admission Test 2025: Chemistry Honours

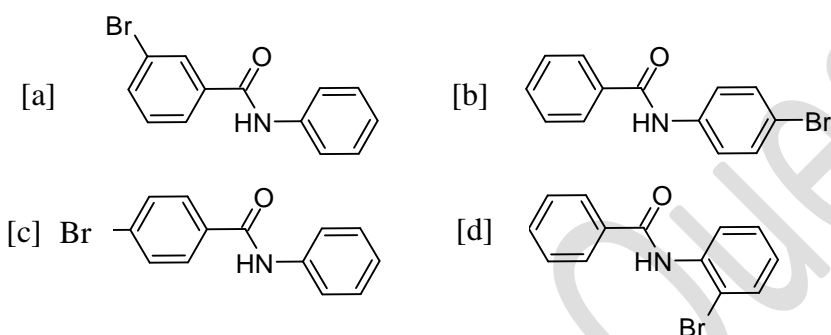
Full Marks : 75

Time : 1 hour

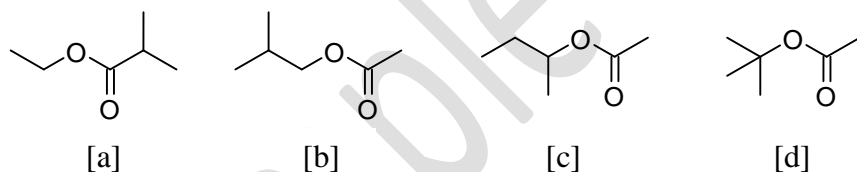
1. Identify compound D in the following sequence of reactions.

[a] *m*-nitrophenol [b] nitrobenzene [c] *m*-aminophenol [d] *m*-nitrophenetole.

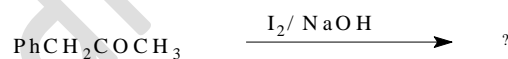
2. When benzanilide is brominated in acetic acid the major monobrominated compound is-



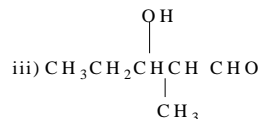
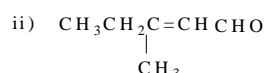
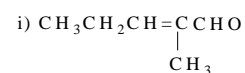
3. 2-Butyl ethanoate is -



4. Products of the following reaction are -

[a] PhCO_2Na , CHI_3 [b] $\text{PhCH}_2\text{CO}_2\text{Na}$, CHI_3 [c] PhCHO , CHI_3 [d] PhCOCO_2Na , CHI_3

5. Which product do you expect from the following reaction?



iv) None of these

[a] (i) and (ii)

[b] (ii) and (iii)

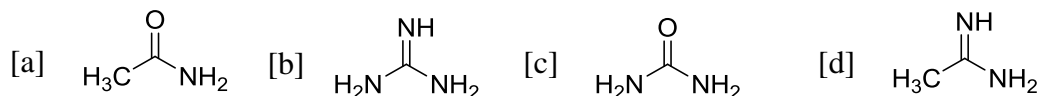
[c] (ii) and (iv)

[d] (i) and (iii)

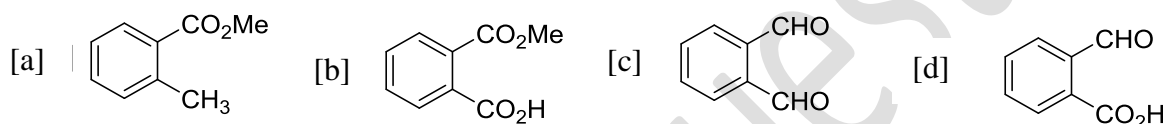
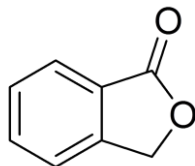
6. In strong alkaline solution benzaldehyde is allowed to react with formaldehyde, and after acidification the products are -

- [a] PhCH₂OH, CH₃OH [b] PhCO₂H, CH₃OH [c] PhCH₂OH, HCO₂H [d] none of these

7. Which of the following compound is more basic?



8. Which of the following compound on treatment with aqueous alkali followed by acidification gives the following lactone?



9. Among the following, the set of parameters that represent(s) path function is/are:

- (i) $q + w$; (ii) q ; (iii) w ; (iv) $H - TS$

- [a] (i) and (iv) [b] (ii), (iii) and (iv)
[c] (ii) and (iii) [d] (i), (ii) and (iii)

10. The equilibrium constants of the following are:



The equilibrium constant (K) of the reaction, $2\text{NH}_3 + 2.5 \text{O}_2 \rightleftharpoons 2\text{NO} + 3\text{H}_2\text{O}$, will be-

- [a] $\frac{K_2 K_3^3}{K_1}$ [b] $\frac{K_2 K_3}{K_1}$ [c] $\frac{K_2^3 K_3}{K_1}$ [d] $\frac{K_1 K_3^3}{K_2}$

11. In the given reaction: $\text{A} + 2\text{B} \rightleftharpoons 2\text{C}$, 2 moles each of A and B present in 10 litre of solution combine to form 1 mole of C. Calculate K_C for the reaction.

- [a] 1.5 [b] 6.67 [c] 0.15 [d] 2.3

12. Which option is valid for a Zero-order chemical reaction?

- [a] $t_{3/4} = \frac{3}{2}t_{1/2}$ [b] $t_{1/2} = \frac{3}{2}t_{3/4}$ [c] $t_{1/2} = 2t_{3/4}$ [d] $t_{3/4} = \left(t_{1/2}\right)^2$

13. The role of a catalyst is to change _____.

- [a] Gibbs free energy of the chemical reaction.
 [b] Enthalpy of the chemical reaction.
 [c] Activation energy of the chemical reaction.
 [d] Equilibrium constant of the reaction.

14. Boiling point of a 2% aqueous solution of a non-volatile solute "A" is equal to the boiling point of 8% aqueous solution of another non-volatile solute "B". The relation between molecular weight of "A" (M_A) and molecular weight of "B" (M_B) is-

- [a] $M_A = 4M_B$ [b] $M_B = 4M_A$ [c] $M_A = 8M_B$ [d] $M_B = 8M_A$

15. The following solutions were prepared by dissolving 10 g glucose ($C_6H_{12}O_6$) in 250 mL of water (P_1); 10 g of urea (CH_4N_2O) in 250 mL of water (P_2); 10 g of sucrose ($C_{12}H_{22}O_{11}$) in 250 mL of water (P_3). The right option for the order of osmotic pressure of these solutions is -

- [a] $P_3 > P_2 > P_1$ [b] $P_2 > P_1 > P_3$ [c] $P_1 > P_2 > P_3$ [d] $P_2 > P_3 > P_1$

16. Given: $Cu^{2+} + 2e \rightarrow Cu$ $E^{\circ} = +0.337 V$
 $Cu^{2+} + e \rightarrow Cu^+$ $E^{\circ} = +0.153 V$

Electrode potential, E° , for the reaction, $Cu^+ + e \rightarrow Cu$, will be

- [a] 0.90 V [b] 0.30 V [c] 0.38 V [d] 0.52 V

17. Bond dissociation energy of H_2 , Cl_2 and $HCl(g)$ are 104, 58 and 103 kcal.mol⁻¹, respectively. Calculate the enthalpy of formation of HCl gas.

- [a] - 22.0 kcal [b] + 22.0 kcal [c] + 184 kcal [d] - 184 kcal

18. Molecular formula of water is:

- [a] H_2O [b] $(H_2O)_4$ [c] $(H_2O)_n$ [d] None of these

19. What type of bonding(s) is (are) present in NH_4Cl :

- [a] Ionic [b] Covalent [c] Ionic and Covalent [d] Ionic, Covalent and Coordinate

20. In a radioactive decay, which of the following quantity depends on the number of atoms?

- [a] half life [b] decay constant [c] rate of decay [d] none of these.

21. In XeF_2 and XeF_4 , the number of lone pairs on Xenon atom are respectively-

- [a] 2, 3 [b] 1, 3 [c] 4, 1 [d] 3, 2

22. The order of the atomic radii is -

- [a] $B > Al > Ga > In > Tl$ [b] $B < Al < Ga < In < Tl$
 [c] $B < Al > Ga < In < Tl$ [d] $B < Ga < Al < In < Tl$

23. Al^{3+} has a lower ionic radius than Mg^{2+} because-

- [a] Mg atom has less number of neutrons than Al
- [b] Al^{3+} has a higher nuclear charge than Mg^{+2}
- [c] Their electronegativities are different
- [d] Al has a lower ionisation potential than Mg

24. What is the strength (in normality) of 100 mL solution containing 0.63 gram oxalic acid ($\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$)?

- [a] 0.05 (N) [b] 0.10 (N) [c] 0.20 (N). [d] 6.3 (N)

25. Which of the following is correct option?

Oxide	Nature
(A) CO	(i) Basic
(B) BaO	(ii) Neutral
(C) Al_2O_3	(iii) Acidic
(D) Cl_2O_7	(iv) Amphoteric

- (A) (B) (C) (D)
- [a] (i) (ii) (iii) (iv)
- [b] (ii) (i) (iv) (iii)
- [c] (ii) (iv) (i) (iii)
- [d] (iii) (ii) (i) (iv)