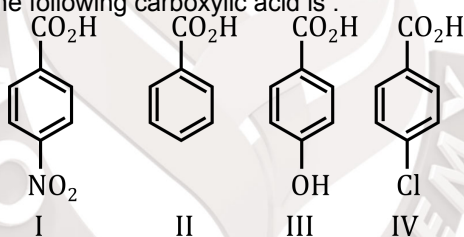


## Chemistry

Single Correct Questions +4 | -1

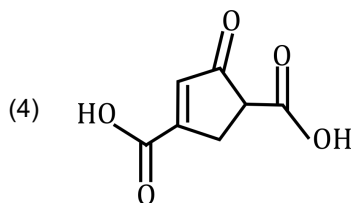
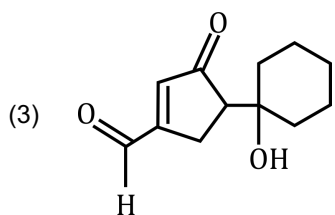
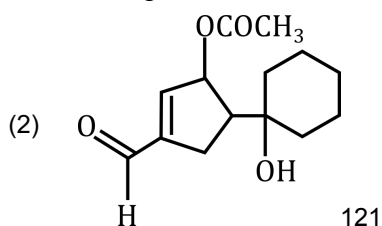
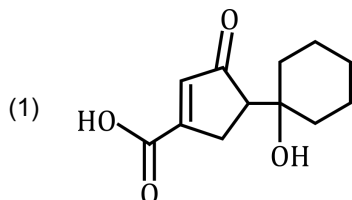
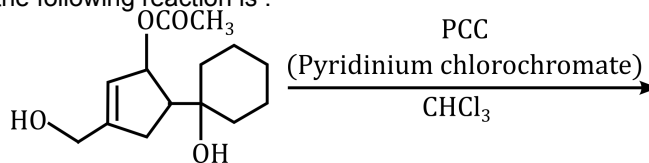
1. In  $XeO_3F_2$ , the number of bond pair(s),  $\pi$ -bond(s) and lone pair(s) on  $Xe$  atom respectively are :
  - (1) 5, 3, 0
  - (2) 5, 2, 0
  - (3) 4, 2, 2
  - (4) 4, 4, 0
  
2. For per gram of reactant, the maximum quantity of  $N_2$  gas is produced in which of the following thermal decomposition reaction? (Given : Atomic wt. -  $Cr = 52u$ ,  $Ba = 137u$ )
  - (1)  $(NH_4)_2Cr_2O_7(s) \rightarrow N_2(g) + 4H_2O(g) + Cr_2O_3(s)$
  - (2)  $2NH_3(g) \rightarrow N_2(g) + 3H_2(g)$
  - (3)  $2NH_4NO_3(s) \rightarrow 2N_2(g) + 4H_2O(g) + O_2(g)$
  - (4)  $Ba(N_3)_2(s) \rightarrow Ba(s) + 3N_2(g)$
  
3. In  $KO_2$ , the nature of oxygen species and the oxidation state of oxygen atom are, respectively :
  - (1) Superoxide and  $-1$
  - (2) Oxide and  $-2$
  - (3) Peroxide and  $-1/2$
  - (4) Superoxide and  $-1/2$
  
4. The increasing order of the acidity of the following carboxylic acid is :



- (1)  $II < IV < III < I$
- (2)  $IV < II < III < I$
- (3)  $III < II < IV < I$
- (4)  $I < III < II < IV$

Space for rough use

5. The major product formed in the following reaction is :



6. At a certain temperature in a 5 L vessel, 2 moles of carbon monoxide and 3 moles of chlorine were allowed to reach equilibrium according to the reaction,  $CO + Cl_2 \rightleftharpoons COCl_2$ . At equilibrium, if one mole of  $CO$  is present then equilibrium constant ( $K_C$ ) for the reaction is :

- (1) 3  
 (2) 2  
 (3) 2.5  
 (4) 4

Space for rough use

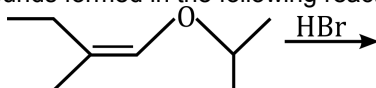
7. For a first order reaction,  $A \rightarrow P$ ,  $t_{1/2}$  (half-life) is 10 days. The time required for  $\frac{1}{4}$ <sup>th</sup> conversion of A (in days) is :  
( $\ln 2 = 0.693$ ,  $\ln 3 = 1.1$ )
- (1) 4.1
  - (2) 3.2
  - (3) 5
  - (4) 2.5
8.  $\Delta_f G^\circ$  at 500 K for substance 'S' in liquid state and gaseous state are  $+100.7 \text{ kcal mol}^{-1}$  and  $+103 \text{ kcal mol}^{-1}$ , respectively. Vapour pressure of liquid 'S' at 500 K is approximately equal to :  
( $R = 2 \text{ cal K}^{-1} \text{ mol}^{-1}$ )
- (1) 100 atm
  - (2) 10 atm
  - (3) 1 atm
  - (4) 0.1 atm
9. Biochemical Oxygen Demand (BOD) value can be a measure of water pollution caused by the organic matter. Which of the following statements is correct ?
- (1) Polluted water has BOD value higher than 10 ppm.
  - (2) Anaerobic bacteria increase the BOD value.
  - (3) Clean water has BOD value higher than 10 ppm.
  - (4) Aerobic bacteria decrease the BOD value.
10. Which of the following statements is not true ?
- (1) Nylon 7 is an example of step-growth polymerisation.
  - (2) Step growth polymerisation requires a bifunctional monomer.
  - (3) Chain growth polymerisation includes both homopolymerisation and copolymerisation.
  - (4) Chain growth polymerisation involves homopolymerisation only.
11. Given
- (i)  $2Fe_2O_3(s) \rightarrow 4Fe(s) + 3O_2(g)$ ;  $\Delta_r G^\circ = +1487.0 \text{ kJ mol}^{-1}$
- (ii)  $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$ ;  $\Delta_r G^\circ = -514.4 \text{ kJ mol}^{-1}$
- Free energy change,  $\Delta_r G^\circ$  for the reaction  $2Fe_2O_3(s) + 6CO(g) \rightarrow 4Fe(s) + 6CO_2(g)$  will be :
- (1)  $-168.2 \text{ kJ mol}^{-1}$
  - (2)  $-56.2 \text{ kJ mol}^{-1}$
  - (3)  $-112.4 \text{ kJ mol}^{-1}$
  - (4)  $-208.0 \text{ kJ mol}^{-1}$

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Space for rough use

12. Two compounds I and II are eluted by column chromatography (adsorption of I > II). Which one of the following is a correct statement ?
- (1) II moves faster and has higher  $R_f$  value than I
  - (2) I moves faster and has higher  $R_f$  value than II
  - (3) II moves slower and has higher  $R_f$  value than I
  - (4) I moves slower and has higher  $R_f$  value than II

13. The total number of optically active compounds formed in the following reaction is :

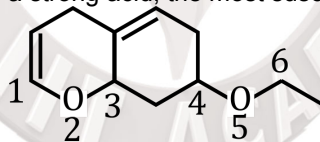


- (1) Two
  - (2) Four
  - (3) Zero
  - (4) Six
14. Lithium aluminium hydride reacts with silicon tetrachloride to form :
- (1)  $LiCl$ ,  $AlCl_3$  and  $SiH_4$
  - (2)  $LiH$ ,  $AlH_3$  and  $SiH_4$
  - (3)  $LiCl$ ,  $AlH_3$  and  $SiH_4$
  - (4)  $LiH$ ,  $AlCl_3$  and  $SiCl_2$

15. All of the following share the same crystal structure except :

- (1)  $CsCl$
- (2)  $LiCl$
- (3)  $RbCl$
- (4)  $NaCl$

16. On treatment of the following compound with a strong acid, the most susceptible site for bond cleavage is :



- (1)  $C1 - O2$
- (2)  $O5 - C6$
- (3)  $O2 - C3$
- (4)  $C4 - O5$

Space for rough use

17. When 2-butyne is treated with  $H_2$ /Lindlar's catalyst, compound  $X$  is produced as the major product and when treated with  $Na/liq.NH_3$  it produces  $Y$  as the major product. Which of the following statements is correct ?
- $X$  will have higher dipole moment and higher boiling point than  $Y$
  - $Y$  will have higher dipole moment and lower boiling point than  $X$
  - $Y$  will have higher dipole moment and higher boiling point than  $X$
  - $X$  will have lower dipole moment and lower boiling point than  $Y$
18. Two 5 molal solutions are prepared by dissolving a non-electrolyte non-volatile solute separately in the solvents  $X$  and  $Y$ . The molecular weights of the solvents are  $M_X$  and  $M_Y$ , respectively where  $M_X = \frac{3}{4}M_Y$ . The relative lowering of vapour pressure of the solution in  $X$  is " $m$ " times that of the solution in  $Y$ . Give that the number of moles of solute is very small in comparison to that of solvent, the value of " $m$ " is :
- $\frac{1}{2}$
  - $\frac{1}{4}$
  - $\frac{4}{3}$
  - $\frac{3}{4}$
19. The total number of possible isomers for square-planar  $[Pt(Cl)(NO_2)(NO_3)(SCN)]^{2-}$  is :
- 16
  - 8
  - 12
  - 24
20. Following four solutions are prepared by mixing different volumes of  $NaOH$  and  $HCl$  of different concentrations,  $pH$  of which one of them will be equal to 1 ?
- $75mL \frac{M}{5} HCl + 25mL \frac{M}{5} NaOH$
  - $100mL \frac{M}{10} HCl + 100mL \frac{M}{10} NaOH$
  - $60mL \frac{M}{10} HCl + 40mL \frac{M}{10} NaOH$
  - $55mL \frac{M}{10} HCl + 45mL \frac{M}{10} NaOH$

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Space for rough use

21. The correct order of spin-only magnetic moments among the following is :

(Atomic number :  $Mn = 25, Co = 27, Ni = 28, Zn = 30$ )

- (1)  $[NiCl_4]^{2-} > [CoCl_4]^{2-} > [MnCl_4]^{2-} > [ZnCl_4]^{2-}$
- (2)  $[MnCl_4]^{2-} > [CoCl_4]^{2-} > [NiCl_4]^{2-} > [ZnCl_4]^{2-}$
- (3)  $[CoCl_4]^{2-} > [MnCl_4]^{2-} > [NiCl_4]^{2-} > [ZnCl_4]^{2-}$
- (4)  $[ZnCl_4]^{2-} > [NiCl_4]^{2-} > [CoCl_4]^{2-} > [MnCl_4]^{2-}$

22. The correct order of electron affinity is :

- (1)  $F > O > Cl$
- (2)  $Cl > F > O$
- (3)  $O > F > Cl$
- (4)  $F > Cl > O$

23. The dipeptide, Gln-Gly, on treatment with  $CH_3COCl$  followed by aqueous work up gives :

- (1)
- (2)
- (3)
- (4)

Space for rough use

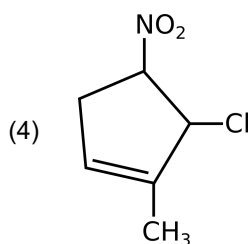
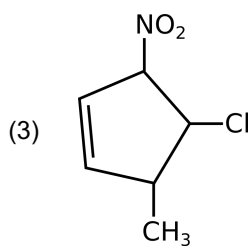
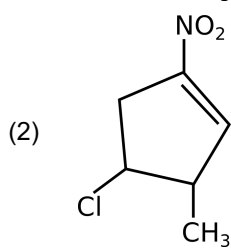
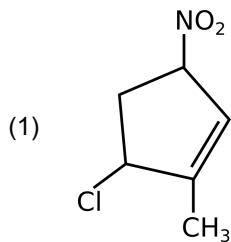
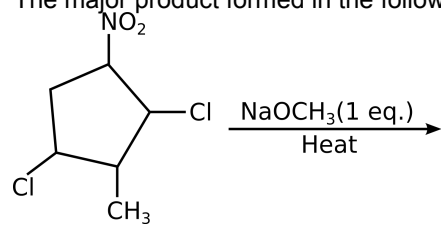
24. If  $x$  gram of gas is adsorbed by  $m$  gram of adsorbent at pressure  $P$ , the plot of  $\log \frac{x}{m}$  versus  $\log P$  is linear. The slope of the plot is :  
( $n$  and  $k$  are constants and  $n > 1$ )
- (1)  $n$
  - (2)  $\log k$
  - (3)  $2k$
  - (4)  $\frac{1}{n}$
25. The de-Broglie's wavelength of electron present in first Bohr orbit of ' $H'$ ' atom is :
- (1)  $4 \times 0.529 \text{ \AA}$
  - (2)  $\frac{0.529}{2\pi} \text{ \AA}$
  - (3)  $0.529 \text{ \AA}$
  - (4)  $2\pi \times 0.529 \text{ \AA}$
26. The number of  $P - O$  bonds in  $P_4O_6$  is :
- (1) 6
  - (2) 18
  - (3) 12
  - (4) 9



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Space for rough use

27. The major product formed in the following reaction is :



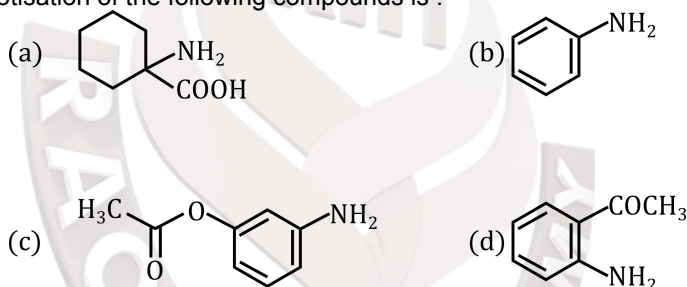
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28. Which of the following best describes the diagram below of a molecular orbital ?



- (1) A non-bonding orbital  
 (2) An antibonding  $\pi$  orbital  
 (3) An antibonding  $\sigma$  orbital  
 (4) A bonding  $\pi$  orbital
29. In the leaching method, bauxite ore is digested with a concentrated solution of  $NaOH$  that produces ' $X$ '. When  $CO_2$  gas is passed through the aqueous solution of ' $X$ ', a hydrated compound ' $Y$ ' is precipitated. ' $X$ ' and ' $Y$ ' respectively are :
- (1)  $Na[Al(OH)_4]$  and  $Al_2(CO_3)_3 \cdot xH_2O$   
 (2)  $NaAlO_2$  and  $Al_2(CO_3)_3 \cdot xH_2O$   
 (3)  $Al(OH)_3$  and  $Al_2O_3 \cdot xH_2O$   
 (4)  $Na[Al(OH)_4]$  and  $Al_2O_3 \cdot xH_2O$
30. The increasing order of diazotisation of the following compounds is :



- (1) (a) < (d) < (b) < (c)  
 (2) (d) < (c) < (b) < (a)  
 (3) (a) < (d) < (c) < (b)  
 (4) (a) < (b) < (c) < (d)

Space for rough use