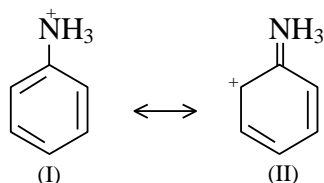



CHEMISTRY

- 20 g of a sample of $\text{Ba}(\text{OH})_2$ is dissolved in 50 ml of 0.1 N HCl solution. The excess of HCl was titrated with 0.1 N NaOH. The volume of NaOH used was 20 cc. The percentage of $\text{Ba}(\text{OH})_2$ in the sample is
 (a) 128 (b) 1.28
 (c) 2.28 (d) 4.08
- The hybridization of atomic orbital of nitrogen in NO_2^+ , NO_3^- and NH_4^+ respectively are
 (a) sp , sp^3 and sp^2 (b) sp , sp^2 and sp^3
 (c) sp^2 , sp and sp^3 (d) sp^2 , sp^3 and sp
- The reaction is $2\text{NO} + \text{Cl}_2 \longrightarrow 2\text{NOCl}$.
 If the concentration of both the reactants is doubled, the rate becomes eight times. What will be the total order?
 (a) 0 (b) 2
 (c) 3 (d) 1
- For $\text{NH}_4\text{HS}(\text{s}) \rightleftharpoons \text{NH}_3(\text{g}) + \text{H}_2\text{S}(\text{g})$, if $K_p = 64 \text{ atm}^2$, equilibrium pressure of mixture is
 (a) 8 atm (b) 16 atm
 (c) 64 atm (d) 4 atm
- The degree of hydrolysis of 0.1 M CH_3COOK at 18°C [$K_a \text{CH}_3\text{COOH} = 1.8 \times 10^{-5}$ at 18°C] is
 (a) 7.4×10^{-10} (b) 7.4×10^{-5}
 (c) 7.0×10^{-6} (d) 8.5×10^{-5}
- $\text{Cu}^+ + e \longrightarrow \text{Cu}$, $E^\circ = X_1 \text{ Volt}$
 $\text{Cu}^{2+} + 2e \longrightarrow \text{Cu}$, $E^\circ = X_2 \text{ Volt}$
 For $\text{Cu}^{2+} + e \longrightarrow \text{Cu}^+ + E^\circ$ will be
 (a) $X - 2X_2$ (b) $X_1 + 2X_2$
 (c) $X_1 + X_2$ (d) $2X_2 - X_1$
- The ratio of closed packed atoms to tetrahedral holes in cubic close packing is
 (a) 1 : 1 (b) 1 : 2
 (c) 1 : 3 (d) 2 : 1
- $\text{CH}_3\text{NH}_2 + \text{CHCl}_3 + 3\text{KOH} \longrightarrow \text{X} + \text{Y} + 3\text{H}_2\text{O}$; compounds X and Y are
 (a) $\text{CH}_3\text{CN} + 3\text{KCl}$ (b) $\text{CH}_3\text{NC} + 3\text{KCl}$
 (c) $\text{CH}_3\text{CONH}_2 + 3\text{KCl}$ (d) $\text{CH}_3\text{NC} + \text{K}_2\text{CO}_3$
- Arrange the following compounds in order of increasing dipole moment, Toluene(I), m-dichlorobenzene(II), o-dichlorobenzene(III), p-dichlorobenzene(IV):
 (a) (I) < (IV) < (II) < (III) (b) (IV) < (I) < (II) < (III)
 (c) (IV) < (I) < (III) < (II) (d) (IV) < (II) < (I) < (III)
- Examine the following two structures for the anilinium ion and choose the correct statement



- (a) (II) is not an acceptable canonical structure because carbonium ions are less stable than ammonium ions.
- (b) (II) is not an acceptable canonical structure because it is non-aromatic.
- (c) (II) is not an acceptable canonical structure because nitrogen has 10 valence electrons.
- (d) (II) is an acceptable canonical structure.
11. Anti-Markownikoff's addition of HBr is not observed in
- (a) propene (b) benzene
(c) 2-butene (d) 2-pentene
12. The reaction of propene with HOCl proceeds via the addition of
- (a) H^+ in the first step (b) Cl^+ in the first step
(c) OH^- in the first step (d) Cl^+ and ^-OH in the single step
13. 5.6 g of a metal forms 12.7 g of metal chloride. Hence, equivalent weight of metal is
- (a) 127 (b) 254
(c) 56 (d) 28
14. The number of orbital in a subshell is equal to
- (a) n^2 (b) $2l$
(c) $2l + 1$ (d) m
15. A flask containing 12 g of a gas of relative molecular mass 120 at a pressure of 100 atm, was evacuated by means of a pump until the pressure was 0.01 atm at the same T. Which of the following is the best estimate of the number of molecules left in the flask
- (a) 6×10^{19} (b) 6×10^{18}
(c) 6×10^{17} (d) 6×10^{13}
16. The solubility of $Fe(OH)_3$ is $x \text{ mol L}^{-1}$. Its K_{sp} would be
- (a) $9x^3$ (b) $3x^4$
(c) $27x^4$ (d) $9x^4$
17. How many tetrahedral holes are occupied in diamond?
- (a) 25% (b) 50%
(c) 75% (d) 100%
18. Number of structural isomers represented by molecular formula $C_4H_{10}O$ is
- (a) 3 (b) 4
(c) 7 (d) 10
19. Which of the following is not cleaved by HI even at 525 K?
- (a) $C_6H_5-O-CH_3$ (b) $C_6H_5-O-C_6H_5$
(c) $C_6H_5OC_3H_7$ (d) 
20. Uncertainty in position and momentum are equal. Uncertainty in velocity is
- (a) $\sqrt{h/\pi}$ (b) $\sqrt{h/2\pi}$
(c) $1/2m\sqrt{h/\pi}$ (d) none
21. If the speed of the electron in the first Bohr's orbit of hydrogen atom be 'x' then the speed of electron in the third Bohr's orbit is

- (a) $\frac{x}{9}$ (b) $\frac{x}{3}$
 (c) $3x$ (d) $9x$

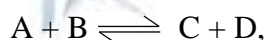
22. Structure of XeO_2F_2 is

- (a) triangular planar (b) distorted tetrahedral
 (c) square planar (d) tetrahedral

23. The reaction $\text{A}(\text{g}) + 2\text{B}(\text{g}) \longrightarrow \text{C}(\text{g}) + \text{D}(\text{g})$ is an elementary process. In an experiment, the initial partial pressure of A and B are $P_A = 0.60$ and $P_B = 0.80$ atm. When $P_C = 0.2$ atm the rate of reaction relative to the initial rate is

- (a) $1/48$ (b) $1/24$
 (c) $9/16$ (d) $1/6$

24. For the reaction,



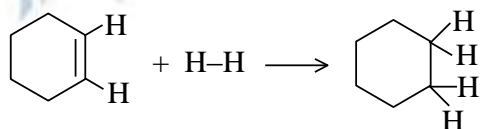
ΔH for forward reaction is $+20$ kcal and has activation energy 40 kcal. The activation energy and ΔH for backward reaction are respectively:

- (a) $20, 40$ (b) $40, 20$
 (c) $20, -20$ (d) $-20, 40$

25. A weak base (BOH) with $K_b = 10^{-5}$ is titrated with a strong acid HCl. At $3/4$ th of the equivalent point, pH of the solution is

- (a) $5 + \log$ (b) $5 - \log 3$
 (c) $14 - 5 + \log 3$ (d) 8.523

26. For the reaction,



bond energies are given as

- (i) C-C, 346 kJ/mol (ii) C-H, 413 kJ/mol
 (iii) H-H, 437 kJ/mol and (iv) C=C, 611 kJ/mol

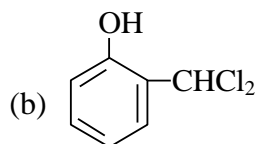
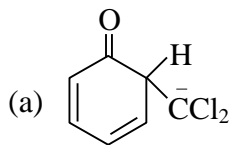
What will be the value of ΔH 25°C for the above reaction?

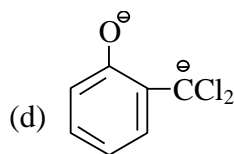
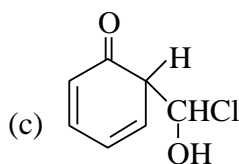
- (a) -289 kJ mol $^{-1}$ (b) -124 kJ mol $^{-1}$
 (c) $+124$ kJ mol $^{-1}$ (d) $+289$ kJ mol $^{-1}$

27. The difference between heats of reaction at constant pressure and constant volume for the reaction $2\text{C}_6\text{H}_6(l) + 15\text{O}_2(\text{g}) \longrightarrow 12\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(l)$ at 25°C in kJ mol $^{-1}$ is

- (a) -7.43 kJ mol $^{-1}$ (b) 7.43 kJ mol $^{-1}$
 (c) 2.477 kJ mol $^{-1}$ (d) -2.477 kJ mol $^{-1}$

28. When phenol is reacted with CHCl_3 and NaOH followed by acidification, salicylaldehyde is obtained. Which of the following species is involved in the above mentioned reaction as intermediates





29. In the complete combustion of C_nH_{2n+2} , the number of moles of oxygen required is

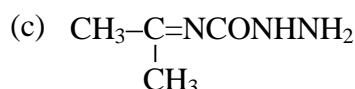
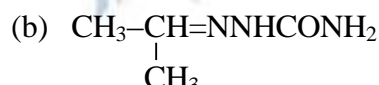
(a) $n/2O_2$

(b) $\left(\frac{n+1}{2}\right)O_2$

(c) $\left(\frac{3n+1}{2}\right)O_2$

(d) $\left(\frac{n+2}{2}\right)O_2$

30. Compound 'A' (molecular formula C_3H_8O) is treated with acidified potassium dichromate to form a product 'B' (molecular formula C_3H_6O). 'B' forms shining silver mirror on warming with ammonical silver nitrate. 'B' when treated with an aqueous solution of $NH_2CONHNH_2$, HCl and sodium acetate gives a product 'C'. Identify the structure of 'C':



31. For preparing M/10 solution of H_2SO_4 in one litre we need H_2SO_4

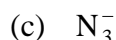
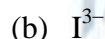
(a) 9.8 g

(b) 49.0 g

(c) 4.8 g

(d) 0.09 g

32. Which of the following species is not linear?



33. At low pressure vander Waal's equation for 3 moles of a real gas will have its simplified form

(a) $\frac{PV}{R_T - \frac{3a}{V}} = 3$

(b) $\frac{PV}{R_T - Rb} = 3$

(c) $\frac{PV}{R_T - 3Pb} = 1$

(d) $\frac{PV}{R_T - \frac{9}{V}} = 3$

34. For the reaction, $2NH_3 \longrightarrow N_2 + 3H_2$

$$\frac{d[NH_3]}{dt} = K_1[NH_3], \quad \frac{d[N_2]}{dt} = K_2[NH_3], \quad \frac{d[H_2]}{dt} = K_3[NH_3]$$

Then relation between K_1 , K_2 and K_3 is

(a) $1.5 K_1 = 3K_2 = K_3$

(b) $2K_1 = K_2 = 3K_3$

(c) $K_1 = K_2 = K_3$

(d) $K_1 = 3K_2 = 2K_3$

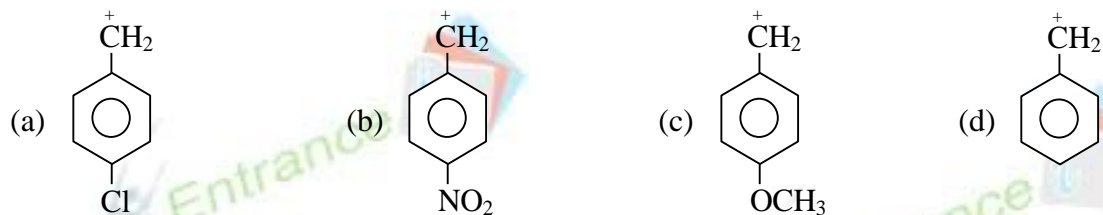
35. E° values of Mg^{2+} / Mg is -2.37 volts of Zn^{2+} / Zn is -0.76 volt and Fe^{+2} / Fe is -0.44 volt. Which of the following statement is correct?

- (a) Zn oxidises Fe. (b) Zn will reduce Fe^{2+} .
(c) Zn will reduce Mg^{2+} . (d) Mg oxidises Fe.

36. A white salt is insoluble in cold water but soluble in boiling water. Its solution when treated with potassium chromate solution gives yellow precipitate. The salt may be

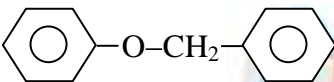
- (a) BaCl_2 (b) SrCl_2
(c) PbCl_2 (d) $\text{Hg}(\text{NO}_3)_2$

37. Most stable carbonium ion is



38. 2-Phenyl ethanol may be prepared by the reaction of phenyl magnesium bromide with

- (a) HCHO (b) CH_3CHO
(c) CH_3COCH_3 (d) 

39. The ether  when treated with HI produces

- (a)  (b) 
(c)  (d) 

40. Which of the following is the weakest acid?

- (a)  (b) CH_3COOH
(c) HCOOH (d) 