

## CHEMISTRY

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1 - Which of the following is dependent on temperature?

A-Molarity

2 - Molality of 2.5 g of ethanoic acid ( $\text{CH}_3\text{COOH}$ ) in 75 g of benzene is

A-0.556 mol  $\text{kg}^{-1}$

3 -  $p_A$  and  $p_B$  are the vapour pressures of pure liquid components, A and B, respectively of an ideal binary solution. If  $x_A$  represents the molefraction of component A, the total pressure of the solution will be

A- $p_B + x_A (p_A - p_B)$

4 - Which of the following is true for an ideal solution?

A- $\Delta H_{\text{mix}} = 0$

5 -The freezing point depression constant ( $K_f$ ) of benzene is  $5.12 \text{ K kg mol}^{-1}$ . The freezing point depression for the solution of molality 0.078 m containing a non-electrolyte solute in benzene is (rounded off upto two decimal places)

A-0.40 K

6 - The van't Hoff factor ( $i$ ) for a dilute aqueous solution of the strong electrolyte barium hydroxide is

A,-3

7 -Which of the following compounds have the same value of vant Hoff's factor ( $i$ ) as that of  $\text{Al}_2(\text{SO}_4)_3$

A- $\text{K}_4[\text{Fe}(\text{CN})_6]$

8 -Standard electrode potentials of three metals X, Y and Z are 0.52 V,  $-2.87 \text{ V}$  and  $-0.44 \text{ V}$  respectively. The reducing power of these metals are

A- $Y > Z > X$

9 Assertion (A): Zinc displaces copper from copper sulphate solution.

Reason (R): The E cell of Zn is  $-0.76 \text{ V}$  and that of Cu is  $+0.34 \text{ V}$  .

A-Both A and R are correct and R is the correct explanation of A .

10 - Assertion (A): Molar conductivity of a weak electrolyte at infinite dilution cannot be determined experimentally.

Reason (R): Kohlrausch law helps to find the molar conductivity of a weak electrolyte at infinite dilution.

A- both A and R are correct and R is the correct explanation of A .

11 - Assertion (A): Conductivity of all electrolytes decreases on dilution.

Reason (R) : On dilution number of ions per unit volume decreases,  
A-A is incorrect but R is correct.

12 - The number of Faradays ( F ) required to produce 20 g of calcium from molten  $\text{CaCl}_2$  (Atomic mass of Ca =  $40 \text{ g mol}^{-1}$ ) is  
A-1

13 - How many faradays of electricity are required for the given reaction to occur ?  
 $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$   
A-5F

14 - Zinc can be coated on iron to produce galvanized iron but the reverse is not possible. It is because  
A-zinc has higher negative electrode potential than iron.

15 - Mechanism of a hypothetical reaction  
 $\text{X}_2 + \text{Y}_2 \rightarrow 2\text{XY}$ , is given below :  
(i)  $\text{X}_2 \rightarrow \text{X} + \text{X}$  (fast)  
(ii)  $\text{X} + \text{Y}_2 \rightleftharpoons \text{XY} + \text{Y}$  (slow)  
(iii)  $\text{X} + \text{Y} \rightarrow \text{XY}$  (fast)  
The overall order of the reaction will be  
A-1.5

16 - For a chemical reaction,  $m\text{A} \rightarrow x\text{B}$ , the rate law is  $r = k[\text{A}]^2$ .  
If the concentration of A is doubled, the reaction rate will be  
A-quadrupled

17 - The rate constant for a first order reaction is  $4.606 \times 10^{-3} \text{ s}^{-1}$ .  
The time required to reduce 2.0 g of the reactant to 0.2 g is  
A-500 s

18 - Which among the following reactions is an example of pseudo first order reaction?  
A-Inversion of cane sugar

19 - When initial concentration of the reactant is doubled, the half-life period of a zero order reaction  
A-is doubled

20 - In a first order reaction, the concentration of the reactant decreases from 0.6 M to 0.3 M in 30 minutes. The time taken for the concentration to change from 0.1 M to 0.025 M is  
A-60 min

21 - What is the activation energy (kJ/mol) for a reaction if its rate constant doubles when the temperature is raised from 300 K to 400 K ?

( $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$ )

A-34.4

22 - The addition of a catalyst during a chemical reaction alters which of the following quantities?

A-Activation energy

23 - An increase in the concentration of the reactants of a reaction leads to change in  
A-collision frequency

24 - Sc( $Z = 21$ ) is a transition element but Zn( $Z = 30$ ) is not because

A-in case of Sc, 3d orbitals are partially filled but in Zn these are filled

25 - The calculated spin only magnetic moment of  $\text{Cr}^{2+}$  ion is

A-4.90 BM

26 - Which has least covalent radius?

A-Ni

27 - Which of the following ions has the same number of unpaired electrons as present in  $\text{V}^{3+}$  ?

A- $\text{Cr}^{3+}$

28 - Which of the following element has lowest melting point

A-Cu

29 -  $\text{KMnO}_4$  on reaction with  $\text{KOH}$  does not give

A- $\text{MnO}_2$

30 - Which of the following does not give oxygen on heating?

A- $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$

31 - Which of the following is most basic?

A- $\text{La}(\text{OH})_3$

32 - Which one of the following statements related to lanthanons is incorrect?

A-All the lanthanons are much more reactive than aluminium.

33- The correct order of the stoichiometries of  $\text{AgCl}$  formed when  $\text{AgNO}_3$  in excess is treated with the complexes:  $\text{CoCl}_3 \cdot 6\text{NH}_3$ ,  $\text{CoCl}_3 \cdot 5\text{NH}_3$ ,  $\text{CoCl}_3 \cdot 4\text{NH}_3$  respectively is

A-3  $\text{AgCl}$ , 2  $\text{AgCl}$ , 1  $\text{AgCl}$

34 - Ethylene diaminetetraacetate (EDTA) ion is

A-hexadentate ligand with four "O" and two "N" donor atoms

35 -For  $K_4 [Fe(CN)_6]$ , coordination number and oxidation state are respectively  
A-6,2

36 - The name of complex ion,  $[Fe(CN)_6]^{3-}$  is  
A-Hexacyanidoferrate (III) ion.

37- A gaseous reaction  $A \rightarrow B$  follows first order kinetics. The initial concentration of A is 0.8 M and after 20 minutes it becomes 0.2 M. Calculate the time required for the concentration to become 0.05 M.  
A-60 min

38 - A solution containing 1 g of a non-volatile solute in 100 g water shows a depression in freezing point of  $0.186^\circ C$ . If  $K_f$  of water is  $1.86 K\ kg\ mol^{-1}$ , calculate molar mass of solute.  
A-100

39 - For the reaction  $2A + B \rightarrow$  products, rate law is  $r = k[A]^2[B]$ . If concentration of A is doubled and B is halved, the rate becomes:  
A-double

40 - The emf of a cell at 298 K is 0.5 V and involves transfer of 2 electrons.  
Calculate  $\Delta G$  (in kJ/mol).  
( $F = 96500\ C$ )  
A- -96.5

41 - A gas expands against constant external pressure of 2 atm from 5 L to 10 L. Calculate work done (in L·atm).  
A- -10

42 - The degree of dissociation of a weak electrolyte is 0.2. Calculate van't Hoff factor for  
 $AB \rightleftharpoons A^+ + B^-$   
A-1.2

43 - For an ideal gas, if temperature is doubled and volume is halved, the pressure becomes:  
A- four times

44 - The pH of a solution prepared by mixing equal volumes of 0.1 M HCl and 0.1 M NaOH is:  
A-7

45 - Which one of the following has maximum boiling point elevation?  
A- 0.1 M  $CaCl_2$

46 - For a spontaneous process, which condition must be satisfied?  
A-  $\Delta G < 0$

47 - Consider the reaction:  $\text{CH}_3\text{-Br} + \text{OH}^- \rightarrow \text{CH}_3\text{OH} + \text{Br}^-$ . This reaction follows:

A-  $\text{S}_\text{N}2$

48 - . Which carbocation is most stable?

A-  $3^\circ$

49 - In electrophilic substitution of benzene, the intermediate formed is:

A- Sigma complex

50 - Which compound gives positive Tollens' test?

A- Benzaldehyde

51 - Which one is strongest acid?

A- Acetic acid

52 - The major product of addition of HBr to propene in presence of peroxide is:

A- 1-bromopropane

53 - Number of structural isomers of pentane is:

A-3

54 -Which functional group is present in aldehydes?

A- -CHO

55 - Which of the following shows optical isomerism?

A-  $\text{CHBrClF}$

56 - Benzene prefers substitution rather than addition because:

A- Stability due to resonance

57-. Which element has highest electronegativity?

A-F

58 - The shape of  $\text{NH}_3$  molecule is:

A- Pyramidal

59 - Oxidation state of chromium in  $\text{K}_2\text{Cr}_2\text{O}_7$  is:

A-+6

60 - Which of the following is amphoteric oxide?

A-  $\text{Al}_2\text{O}_3$

61 - The coordination number of Fe in  $[\text{Fe}(\text{CN})_6]^{3-}$  is:

A-6

62 - A first-order reaction  $A \rightarrow \text{products}$  has a half-life of 30 minutes. A sample initially at 1 M is allowed to react. After 90 minutes, the concentration of A becomes  $C_1$ . The reaction mixture is then diluted to double its volume, and the reaction continues. Calculate the time required (in minutes) for concentration to reach  $C_1/4$  from that point.

A-60

63 - Two ideal gases A and B are allowed to expand isothermally and reversibly from the same initial volume and temperature. Gas A doubles its volume, while gas B triples its volume. If the work done by gas A is  $W_1$  and that by gas B is  $W_2$ , then  $W_2/W_1$  is:

A-  $\ln(3)/\ln(2)$

64 - A solution contains 0.2 mol of urea and 0.1 mol of NaCl in 1 kg water. Assuming complete dissociation of NaCl, calculate total molality of particles in solution.

A-0.4

65 - For the reaction:  $2A + B \rightarrow \text{products}$ , rate law is  $r = k[A]^2[B]$ . If volume of system is halved at constant temperature, the rate changes by factor:

A-8

66 - A galvanic cell operates with reaction:  $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$ . If concentration of  $\text{Zn}^{2+}$  is increased 100 times, the emf change (approx) is:

A-  $-0.059 \text{ V}$

67 - A gas undergoes adiabatic expansion where  $PV^\gamma = \text{constant}$ . If volume is doubled and  $\gamma = 1.4$ , the pressure becomes:

A-  $0.38P$

68 - The pH of a buffer solution containing 0.1 M acetic acid and 0.1 M sodium acetate is 4.74. If 0.01 mol HCl is added to 1 L solution, new pH is approximately:

A-4.64

69 - A reaction has activation energy 75 kJ/mol. If temperature increases from 300K to 310K, rate increases by factor (approx):

A-2

70 For a reversible reaction,  $\Delta H = -40 \text{ kJ/mol}$ . Increasing temperature will:

A -Decrease K

71 A mixture of ideal gases has partial pressures 2 atm, 3 atm, and 5 atm. Mole fraction of second gas is:

A-0.3

72 - Consider SN1 reaction of tert-butyl bromide in aqueous medium. The rate of reaction depends on:

A- [tert-butyl bromide]

73 - In the reaction of 2-bromobutane with alcoholic KOH, the major product formed is:

A- But-2-ene

74-which of the following shows maximum resonance stabilization

A- Carboxylate ion

75 - In nitration of benzene, the active electrophile is generated by:

A-  $\text{HNO}_3 + \text{H}_2\text{SO}_4$

76 - Which compound undergoes Cannizzaro reaction fastest?

A- HCHO

77 - The number of stereoisomers possible for compound  $\text{CH}_3\text{-CHOH-CHOH-CH}_3$  is:

A-3

78 - Which of the following has highest boiling point?

A- n-pentane

79 - In electrophilic substitution,  $-\text{NO}_2$  group directs substitution to:

A- meta

80 - Which compound gives positive iodoform test?

A- Ethanol

81 - Grignard reagent reacts with aldehyde to give:

A- Secondary alcohol

82 - Among the following, the strongest ligand in spectrochemical series is:

A-  $\text{CN}^-$

83 - The hybridization of central atom in  $\text{SF}_6$  is:

A-  $\text{sp}^3\text{d}^2$

84 - Which oxide is amphoteric?

A-  $\text{Al}_2\text{O}_3$

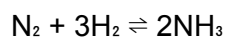
85 - The magnetic moment of  $\text{Fe}^{3+}$  (high spin) is approximately:

A- 5.9 BM

86 - Which of the following has maximum bond angle?

A-  $\text{CO}_2$

87 - A closed vessel contains 1 mole of  $\text{N}_2$  and 3 moles of  $\text{H}_2$  at equilibrium for reaction:



If total pressure is doubled by reducing volume at constant temperature, which statement is correct regarding equilibrium shift and amount of  $\text{NH}_3$  formed?

A- Shifts right,  $\text{NH}_3$  increases

88 - A weak acid HA ( $K_a = 10^{-5}$ ) is 10% ionized in solution. What will be approximate concentration of HA?

A-  $10^{-3}$  M

89 - A first-order reaction completes 75% in 40 minutes. Time required for 87.5% completion is:

A- 60 min

90 - two solutions A and B have same molarity, but A is NaCl and B is glucose. Which has higher boiling point and why?

A- A, due to ionization

91 - For a reversible reaction, when  $\Delta G = 0$  and  $Q \neq K$ , which is correct?

A- Impossible condition

92 - Which intermediate is most stable in following reaction sequence?



A-  $\text{Ph}-\text{CH}_2^+$

93 - In  $\text{S}_\text{N}2$  reaction, rate decreases drastically when:

A- Steric hindrance increases

94 - Which compound shows maximum +I effect?

A-  $-\text{C}(\text{CH}_3)_3$

95 - Among following, which has highest acidity?

A-  $\text{Cl}_3\text{CCOOH}$

96 - In electrophilic substitution of anisole, major substitution occurs at:

A- ortho & para

97 - Which species has highest bond order?

A-  $\text{O}_2^+$

98 - Among the following, which has maximum lattice energy?

A- MgO

99 - Which of the following has highest hydration energy?

A-  $\text{Mg}^{2+}$

100 - In  $[\text{Fe}(\text{CN})_6]^{4-}$ , Fe is:

A- Both B & diamagnetic