

KATHMANDU UNIVERSITY
End Semester Examination [C]
July, 2024

Marks Scored:

Level : B.E./B.Sc.
Year : I

Course : CHEM 101
Semester : I

Exam. Roll No. : _____ Time : 30 mins.

F.M. : 20

Registration No. : _____

Date : 18 JUL 2024

SECTION "A"
[20 Q. × 1 = 20 marks]

Choose the most appropriate answer and mark [X] in the box.

- The conjugate base of HCO_3^- is
 CO_2 CO_3^{2-} HCO_3^{2-} H_2CO_3
- For a reaction, $\text{A} + \text{B} \longrightarrow \text{C}$; the rate law equation is $\frac{d[\text{C}]}{dt} = k[\text{A}]^2[\text{B}]^0$. On increasing the concentration of A and B by three times, the rate of reaction is increased by _____ times.
 6 9 18 27
- If the equilibrium constants for $\text{H}_2\text{O}_{(g)} = \text{H}_{2(g)} + \frac{1}{2}\text{O}_{2(g)}$ and $2\text{H}_{2(g)} + \text{O}_{2(g)} = 2\text{H}_2\text{O}_{(g)}$ are K_1 and K_2 respectively, which one of the following relations is correct?
 $K_2 = \frac{1}{K_1}$ $K_2 = \left(\frac{1}{K_1}\right)^{\frac{1}{2}}$ $K_2 = 2\left(\frac{1}{K_1}\right)$ $K_2 = \left(\frac{1}{K_1}\right)^2$
- Which one of following steps in chain reaction produces more free radicals or chain carriers than they consume
 chain initiation chain propagation
 chain branching chain termination
- A process is spontaneous at low temperature if _____
 $\Delta H > 0$ & $\Delta S > 0$ $\Delta H < 0$ & $\Delta S < 0$
 $\Delta H > 0$ & $\Delta S < 0$ $\Delta H > 0$ & $\Delta S = 0$
- The unit of rate constant for zero order reaction is
 sec^{-1} M sec^{-1} $\text{M}^{-1} \text{sec}^{-1}$ $\text{M}^{-2} \text{sec}^{-1}$
- Which one of the following salts has higher solubility in water at 25°C ?
 CaF_2 with $K_{sp} = 1.7 \times 10^{-10}$ CaSO_4 with $K_{sp} = 2.4 \times 10^{-5}$
 BaSO_4 with $K_{sp} = 1.1 \times 10^{-10}$ BaF_2 with $K_{sp} = 1.7 \times 10^{-6}$
- The Nernst equation is used to calculate
 Standard cell potential Concentration of electrolyte solution
 Standard electrode potential Cell potential under non-standard condition

9. The standard electrode potential of two half cells are,
 $\text{Zn}^{2+} + 2\text{e}^- = \text{Zn} \quad E^\circ = -0.76 \text{ v}$
 $\text{Fe}^{2+} + 2\text{e}^- = \text{Fe} \quad E^\circ = -0.44 \text{ v}$
 Which one of following is the strongest oxidizing agent?
 Fe Zn Fe^{2+} Zn^{2+}
10. A solution of two liquids boils at a temperature less than the boiling point of either of them. Hence, the binary solution shows _____
 negative deviation from raoult's law ideal behavior
 positive deviation from raoult's law colligative properties

Fill in the blanks with most appropriate value or word.

11. A sample of KClO_3 on decomposition yielded 637 ml of oxygen gas at STP. The weight of KClO_3 originally taken is _____
12. The expression for the temperature dependence of entropy change for n mole of substance from T_1 to T_2 at constant pressure is _____
13. In concentration cell, the value of standard cell voltage (ΔE°) is _____
14. If $\Delta H_f = 1.44 \text{ kcal/mol}$ for the ice-water transition, the molar entropy change (ΔS_f) for melting of ice at 0°C is _____
15. The enthalpy of formation of Ca(OH)_2 from following data will be _____
 $\text{H}_2(\text{g}) + \frac{1}{2} \text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) \quad \Delta H = -68.3 \text{ kcal}$
 $\text{CaO}(\text{s}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{Ca(OH)}_2(\text{s}) \quad \Delta H = -15.3 \text{ kcal}$
 $\text{Ca}(\text{s}) + \frac{1}{2} \text{O}_2(\text{g}) \rightarrow \text{CaO}(\text{s}) \quad \Delta H = -151.8 \text{ kcal}$
16. If the enthalpy change (ΔH_{sol}) for solution formation is negative, then the solubility of the solute _____ as temperature increases.
17. CuSO_4 solution is electrolyzed for 7 minutes with 0.6 ampere current. The mole of copper metal deposited during electrolysis is _____
18. The solutions which distill with no change in composition are called _____
19. The relation between K_p and K_c for a reaction, $\text{N}_{2(\text{g})} + 3\text{H}_{2(\text{g})} = 2\text{NH}_{3(\text{g})}$, is _____
20. The value of ΔS° for the reaction, $\frac{1}{2} \text{N}_{2(\text{g})} + \frac{1}{2} \text{O}_{2(\text{g})} = \text{NO}_{(\text{g})}$, is _____
 (Given, $S^\circ(\text{N}_2) = 45.7 \text{ calmol}^{-1}\text{K}^{-1}$, $S^\circ(\text{O}_2) = 49 \text{ calmol}^{-1}\text{K}^{-1}$ and $S^\circ(\text{NO}) = 50.3 \text{ calmol}^{-1}\text{K}^{-1}$)