

UNIT TEST

STANDARD -11

SUBJECT-CHEMISTRY

CODE-052

Total Marks : 25

Time: 1 Hour

Medium: English

SECTION A

- **Answer the following Q1 to Q7 as directed. (Each question is of 1 mark). [07]**

1. What would be the SI unit for the quantity pV^2T^2/n ?
2. The pressure of a 1:4 mixture of dihydrogen and dioxygen enclosed in a vessel is one atmosphere. What would be the partial pressure of dioxygen? (At mass: H = 1, O = 16)
(A) 0.8×10^5 atm (B) 0.008 Nm^{-2}
(C) $8 \times 10^4 \text{ Nm}^{-2}$ (D) 0.25 atm
3. ΔU^0 of combustion of methane is $-X \text{ kJ mol}^{-1}$. The value of ΔH^0 is
(A) $= \Delta U^0$ (B) $> \Delta U^0$
(C) $< \Delta U^0$ (D) = 0
4. Given: $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$; $\Delta_r H^0 = -92.4 \text{ kJ mol}^{-1}$
What is the standard enthalpy of formation of NH_3 gas?
5. Write Oxidation number of oxygen in O_2F_2 .
6. Which alkali metal ion has maximum degree of hydration?
7. Complete and balance the reaction: $\text{BeCl}_2 + \text{LiAlH}_4 \rightarrow$

SECTION B

- **Answer any two of the following Q8 to Q10. (Each question is of 2 marks) [04]**

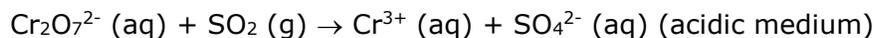
8. What will be the pressure exerted by a mixture of 3.2 g of methane and 4.4 g of carbon dioxide contained in a 9 dm^3 flask at 27°C ? (At mass: H = 1, C = 12, O = 16)
9. Justify that the reaction: $2\text{Cu}_2\text{O}(\text{s}) + \text{Cu}_2\text{S}(\text{s}) \rightarrow 6\text{Cu}(\text{s}) + \text{SO}_2(\text{g})$ is a redox reaction. Also identify the species which acts as an oxidant and which acts as a reductant.
10. Give main points of diagonal relationship between Beryllium and Aluminium.

SECTION C

- **Answer any three of the following Q11 to Q15. (Each question is of 3 marks) [09]**

11. The combustion of one mole of benzene takes place at 298 K and 1 atm. After combustion, $\text{CO}_2(\text{g})$ and $\text{H}_2\text{O}(\text{l})$ are produced and 3267.0 kJ of heat is liberated. Calculate the standard enthalpy of formation, $\Delta_f H^0$ of benzene.
Standard enthalpies of formation of $\text{CO}_2(\text{g})$ and $\text{H}_2\text{O}(\text{l})$ are $-393.5 \text{ kJ mol}^{-1}$ and $-285.83 \text{ kJ mol}^{-1}$ respectively.

12. Balance the following redox reaction by ion – electron method :



13. Balance the following redox reaction in basic medium by oxidation number method.



14. Write main points showing anomalous behavior of Lithium.

15. Comment on each of the following observations:

(a) The mobilities of the alkali metal ions in aqueous solution are $\text{Li}^+ < \text{Na}^+ < \text{K}^+ < \text{Rb}^+ < \text{Cs}^+$

(b) Lithium is the only alkali metal to form a nitride directly.

(c) E^0 for $\text{M}^{2+} (\text{aq}) + 2\text{e}^- \rightarrow \text{M}(\text{s})$ (where $\text{M} = \text{Ca}, \text{Sr}$ or Ba) is nearly constant.

SECTION D

- **Answer any one of the following Q16 to Q17. (Each question carries 5 marks) [05]**

16. *Answer as asked:*

(i). Find out the value of equilibrium constant for the following reaction at 298 K.



Standard Gibbs energy change, $\Delta_r G^0$ at the given temperature is $-13.6 \text{ kJ mol}^{-1}$ (2 marks)

(ii). At 60°C , dinitrogen tetroxide is 50 per cent dissociated. Calculate the standard free energy change at this temperature and at one atmosphere. (3 marks)

17. *Answer as asked:*

(i). Density of a gas is found to be 5.46 g/dm^3 at 27°C at 2 bar pressure. What will be its density at STP? (2 marks)

(ii). Pay load is defined as the difference between the mass of displaced air and the mass of the balloon. Calculate the pay load when a balloon of radius 10 m, mass 100 kg is filled with helium at 1.66 bar at 27°C . (Density of air = 1.2 kg m^{-3} and $R = 0.083 \text{ bar dm}^3 \text{ K}^{-1} \text{ mol}^{-1}$). (3 marks)

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