Chemical Thermodynamics and Redox Reactions

Episode no:14
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1. The reactions stored in a thermos flask is an example of . . . . .
   a) Open System Reaction b) Closed System **c) Isolated System** d) Reversible

2. Which of the following is / are examples of state function?
   a) Internal Energy b) Enthalpy c) Entropy **d) All of These**

3. Which of the following is not a state Function?
   a) Pressure **b) Work** c) Volume d) Temperature

4. Internal energy of the system can undergo changes, When
   a) Heat passes into OR out of the system
   b) Work is done on OR by the system
   c) Matter enters OR leaves the system
   d) **All are true**

5. For the reaction, $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$, the reaction between ΔH and ΔU is.
   a) ΔH = ΔU b) ΔH > ΔU **c) ΔH < ΔU** d) ΔH + ΔU = 0

6. Which of the following conditions is valid for a spontaneous reaction ?
   a) ΔH > 0, ΔS < 0 **b) ΔH < 0, ΔS > 0** c) ΔH < 0, ΔS < 0 d) ΔH<0,ΔS =0

7. If ΔG^0 for a reaction is 0, then its Kp value would be . . . . . .
   a) -1 **b) 1** c) 0 d) ∞

8. Bond dissociation enthalpies of H_2, Cl_2 and Hcl are 434, 242 and 431 KJ/mol respectively. The enthalpy of formation of Hcl is ……
   a) 93 KJ/mol b) -245 KJ/mol **c) -93 KJ/mol** d) 245 KJ/mol

9. The enthalpy of dissociation of $BaCl_{2(s)}$ and $BaCl_2\ 2H_2O_{(s)}$ are -20.6 and 8.8 KJ / mol respectively. The enthalpy change for the reaction
   $BaCl_{2(s)} + 2H_2O \rightarrow BaCl_2.2H_2O_{(s)}$ is
   a) 29.4 KJ **b) -29.4 KJ** c) -11.8 KJ d) 38.2 KJ

10. If enthalpies of formation of $C_2H_{4\,(g)}CO_{2\,(g)}$ and $H_2O_{(s)}$ @ 25^0C and 1 atm pressure are +52, -394 and -286 KJ / mol respectively. Then the enthalpy of combustion of $C_2H_{4(g)}$will be

a) 1412 KJ/mol b) +14.12 KJ/mol **c) -1412 KJ/mol** d) 141.2 KJ/mol

11. Given that

$C_{(s)} + O_{2\,(g)} \rightarrow CO_{2\,(g)} \Delta H^0 = -X$ KJ

$2CO_{(g)} + O_{2\,(g)} \rightarrow 2CO_{2\,(g)} \Delta H^0 = -Y$ KJ

The enthalpy of formation of CO will be . . . .

a) y-2x b) $\frac{2x-y}{2}$ **c)** $\frac{y-z}{z}$ d) 2x-y

12. Which of the following is the unit of enthalpy?

a) **$JK^{-1}\ mol^{-1}$** b) Jg^{-1} c) $Jmol^{-1}$ d) $K^{-1}mol$

13. If the enthalpy change for the transition of liquid water to steam is 30 KJ/mol @ 27^0C, the entropy change for the process would be.

a) **100 J/mol/K** b) 10 $Jmol^{-1}K^{-1}$ c) 1.0 $Jmol^{-1}K^{-1}$ d) 0.1 $Jmol^{-1}K^{-1}$

14. Which of the following values of enthalpy of formation indicates that the product is least stable?

a) -94 K cal b) -231.6 K cal c) +21.4 K cal **d) +64.8 K cal**

15. The relation between free energy, enthalpy and entropy change is

a) **$\Delta G = \Delta H - T\Delta S$** b) $\Delta G = T\Delta S - \Delta H$ c) $\Delta S = \Delta G + T\Delta S$ d) $T = G - S$

16. Standard entropy of X_2, Y_2 and XY_3 are 60, 40 and 50 $JK^{-1}mol^{-1}$ respectively. For the reaction $\frac{1}{2}X_2 + \frac{3}{2}Y_2 \rightarrow XY_3$ $\Delta H = -30$KJ, to be @ equilibrium, the temp will be.

a) 1250K b) 500K **c) +750K** d) 1000K

17. What is the oxidation number of Mn in $KMnO_4$ and MnO_4^-?

a) **+7, +7** b) +7, +9 c) +7, +8 d) +8, +7

18. The oxidation state of 'S' in H_2SO_5[Caro's Acid] is.

a) **+6** b) +7 c) +8 d)10

19. The oxidation number of x, y and z are +2, +5 and -2. The compound may be. . . .

a) XYZ b) $x_2(YZ_3)_2$ **c) $X_3(YZ_4)_2$** d) $X_3(Y_4Z)_2$

20. Which of the following oxides cannot act as a reducing agent?

a) SO_2 b) NO_2 **c) CO_2** d) ClO_2

21. Reducing agent is a substance which can.

a) Accept electrons b) Accept protons **c) Donate electrons** d) Donate protons

22. In the reaction

$P_4 + 3NaOH + 3H_2O \rightarrow PH_3 + 3NaH_2PO_2$

a) P is only oxidized
b) P is only reduced
c) P is both oxidized and reduced
d) None

23. Which of the following is not a redox reaction

a) $2H_2O \rightarrow 2H_2 + O_2$
b) $2KClO_3 \rightarrow 2KCl + 3O_2$
c) $CaCO_3 \rightarrow CaO + CO_2$
d) $CuSO_4 + Zn \rightarrow Cu + ZnSO_4$

24. The number of e^- involved in the cell reaction $Al \mid Al^{3+} \mid\mid Cu^{2+} \mid Cu$ is

a) 3 b) 2 c) 5 **d) 6**

25. If 3 electrons are lost by a metal ion M^{3+}, its final oxidation number will be

a) 0 b) +6 c) +2 d) +4

26. The number of electrons and water molecules required to balance the following equation $NO_3^- + H^+ + e^- \rightarrow H_2O + NO$ is

a) 5,2 b) 4,4 c) 3,2 d) 2,2

27. One gas bleaches the color of the flower by reduction while the other by oxidation the gases are

a) Co, Cl_2 b) H_2S, Br_2 **c) SO_2, Cl_2** d) NH_3, SO_3

28. Which of the following metals do not show any action with water

a) Na b) Mg c) Fe **d) Ag**

29. Which of the following species, do not show disproportionation reaction?

a) ClO^- b) ClO_2^- c) ClO_3^- d)ClO_4^-

30. A galvanic cell, converts _____ energy into _____ energy.

a) **Chemical, Electrical**
b) Chemical, Mechanical
c) Mechanical, Chemical
d) Electrical, Chemical

31. In the titration of $KMnO_4$Vsacidified HSO_4

a) Only $FeSO_4$ is oxidized
b) Only $KMnO_4$ is oxidized
c) $FeSO_4$ is oxidized and $KMnO_4$ is reduced
d) None of the above