

## DPP

DAILY PRACTICE PROBLEMS

CLASS : XI<sup>th</sup>

DATE :

SUBJECT : CHEMISTRY

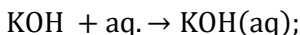
DPP No. : 3

### Topic :- THERMODYNAMICS

- $\text{H}_2(\text{g}) + \text{Cl}(\text{g}) = 2\text{HCl}(\text{g}); \Delta H(298 \text{ K}) = 22.06 \text{ kcal}$ . For this reaction,  $\Delta U$  is equal to:
  - $-22.06 + 2 \times 10^{-3} \times 298 \times 2 \text{ kcal}$
  - $-22.06 + 2 \times 298 \text{ kcal}$
  - $-22.06 - 2 \times 298 \times 4 \text{ kcal}$
  - $-22.06 \text{ kcal}$
- The heat change taking place during the reaction  $\text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{O}(\text{g})$  is: [Given,  $\Delta H_f$  of  $\text{H}_2\text{O}(\text{g}) = -57 \text{ kcal}$ ,  $\Delta H_f = \text{H}_2\text{O}(\text{l}) = -68.3 \text{ kcal}$ ]
  - + 11.3 kcal
  - 11.3 kcal
  - 115.3 kcal
  - + 115.3 kcal
- $\Delta H$  for  $\text{CaCO}_3(\text{s}) \rightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$  is  $176 \text{ kJ mol}^{-1}$  at 1240 K. The  $\Delta U$  for the change is equal to:
  - 160 kJ
  - 165.6 kJ
  - 186.3 kJ
  - 180.0 kJ
- When one mole of monoatomic ideal gas at  $T$  K undergoes adiabatic change under a constant external pressure of 1 atm changes volume from 1 L to 2 L. The final temperature in Kelvin would be
  - $\frac{T}{2^{2/3}}$
  - $T + \frac{2}{3 \times 0.0821}$
  - $T$
  - $T - \frac{2}{3 \times 0.0821}$
- $\Delta H^\circ$ , (298 K) of methanol is given by the chemical equation
  - $\text{CH}_4(\text{g}) + \frac{1}{2}\text{O}_2(\text{g}) \rightarrow \text{CH}_3\text{OH}(\text{g})$
  - $\text{C}(\text{graphite}) + \frac{1}{2}\text{O}_2(\text{g}) + 2\text{H}_2(\text{g}) \rightarrow \text{CH}_3\text{OH}(\text{l})$
  - $\text{C}(\text{diamond}) + \frac{1}{2}\text{O}_2(\text{g}) \rightarrow \text{CH}_3\text{OH}(\text{l})$
  - $\text{CO}(\text{g}) + 2\text{H}_2(\text{g}) \rightarrow \text{CH}_3\text{OH}(\text{l})$
- For the reaction,  $\text{C}_2\text{H}_4(\text{g}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{CO}_2(\text{g}) + 2\text{H}_2\text{O}$ ;  $\Delta U = -1415 \text{ kJ}$ . Then  $\Delta H$  at  $27^\circ\text{C}$  is :
  - 1410 kJ
  - 1420 kJ
  - + 1420 kJ
  - +1410 KJ
- The heat of combustion of ethanol determined by a bomb calorimeter is  $-670.48 \text{ kcal mol}^{-1}$  at  $25^\circ\text{C}$ . What is  $\Delta U$  at  $25^\circ\text{C}$  for the following reaction?
 
$$\text{C}_2\text{H}_5\text{OH}(\text{l}) + \frac{7}{2}\text{O}_2(\text{g}) \rightarrow 2\text{CO}_2(\text{g}) + 3\text{H}_2\text{O}(\text{g})$$
  - 335.24 kcal
  - 669.28 kcal
  - 670.48 kcal
  - +670.48 kcal
- Which has the least entropy?
  - Graphite
  - Diamond
  - $\text{N}_2(\text{g})$
  - $\text{N}_2\text{O}(\text{g})$
- A carnot engine operates between temperature  $T$  and 400 K ( $T > 400 \text{ K}$ ). If efficiency of engine is 25%, the temperature  $T$  is:
  - 400 K
  - 500 K
  - 533.3 K
  - 600 K
- It is a general principle that if a system has the less energy then it is:
  - More stable
  - Less stable
  - Unstable
  - More unstable
- For the reaction,  $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$ , which is true?
  - $\Delta H = \Delta U$
  - $\Delta H < \Delta U$
  - $\Delta H > \Delta U$
  - None of these
- $\text{H}_2 + \frac{1}{2}\text{O}_2 \rightarrow \text{H}_2\text{O}$ ;  
 $\Delta H = -68.39 \text{ kcal} \dots \dots (i)$



$$\Delta H = -48 \text{ kcal} \dots \dots (ii)$$



$$\Delta H = -14 \text{ kcal} \dots \dots (iii)$$

The heat of formation (in kcal) of KOH is :

a)  $-68.39 + 48 - 14$

b)  $-68.39 - 48 + 14$

c)  $68.39 - 48 + 14$

d)  $68.39 + 48 + 14$

13. Which of the following expressions represents the first law of thermodynamics?  
 a)  $\Delta E = -q + W$       b)  $\Delta E = q - W$       c)  $\Delta E = q + W$       d)  $\Delta E = -q - W$
14. A thermodynamic state function is:  
 a) One which obeys all the laws of thermodynamics  
 b) A quantity which is used to measure thermal changes  
 c) A quantity whose value is independent of the path  
 d) A quantity which is used to express pressure-volume work
15. When two atoms of hydrogen combine to form a molecule of hydrogen gas, the energy of the molecule is:  
 a) Greater than that of separate atoms  
 b) Equal to that of separate atoms  
 c) Lower than that of separate atoms  
 d) Sometimes lower and sometimes higher
16. The enthalpies of formation of  $N_2O$  and  $NO$  are 28 and 90  $\text{kJ mol}^{-1}$  respectively. The enthalpy of the reaction,  $2N_2O(g) + O_2(g) \rightarrow 4NO(g)$  is equal to :  
 a) 8 kJ      b) 88 kJ      c) -16 kJ      d) 304 kJ
17. Heat of combustion of  $CH_4$ ,  $C_2H_4$ ,  $C_2H_6$  are -890, -1411 and -1560  $\text{kJ/mol}$  respectively. Which has the lowest calorific fuel value in  $\text{kJ/g}$ ?  
 a)  $CH_4$       b)  $C_2H_4$       c)  $C_2H_6$       d) All same
18. Given that  $\Delta H_{r298K} = -54.07 \text{ kJ mol}^{-1}$  and  $\Delta S_{r298K}^\circ = 10 \text{ J mol}^{-1}$  and  $R = 8.314 \text{ JK}^{-1}\text{mol}^{-1}$ . The value of  $\log_{10} K$  for a reaction,  $A \rightleftharpoons B$  is:  
 a) 5      b) 10      c) 95      d) 100
19. Hess's law is based on  
 a) Law of conservation of mass      b) Law of conservation of energy  
 c) First law of thermodynamics      d) None of the above
20. What is the entropy change (in  $\text{JK}^{-1}\text{mol}^{-1}$ ) when one mole of ice is converted into water at  $0^\circ\text{C}$ ? (The enthalpy change for the conversion of ice to liquid water is  $6.0 \text{ kJ mol}^{-1}$  at  $0^\circ\text{C}$ )  
 a) 20.13      b) 2.013      c) 2.198      d) 21.98