**ST. LAWRENCE HIGH SCHOOL** 



A JESUIT CHRISTIAN MINORITY INSTITUTION
SOLUTION-45(CLASS-11)

**TOPIC- THERMODYNAMICS** 

SUBTOPIC-PART-1



SUBJECT – CHEMISTRY DURATION – 30 mins F.M. - 15 DATE - 06.11.20

**1**. Standard enthalpy of vapourisation D<sub>vap</sub>H<sup>Q</sup> for water at 100° C is 40.66 kJmol<sup>-1</sup>. The internal energy of vapourisation of water at 100°C (in kJmol<sup>-1</sup>) is

(Assume water vapour to behave like an ideal gas)

a) +43.76 b) +40.66 c) +37.56 d) -43.76 Answer: c) +37.56

2. The enthalpy of fusion of water is 1.435 kcal/mol. The molar entropy change for the melting of ice at 0°C is-

a) 5.260 cal/(mol K)b) 0.526 cal/(mol K)c) 0.526 cal/(mol K)d) 21.04 cal/(mol K) Answer:a) 5.260 cal/(mol K)

3. Consider the reaction :

 $4NO_{2(g)} + O_{2(g)}$ <sup>®</sup>  $2N_2O_{5(g)}$ ,  $\Delta_r H = -111kJ$ .

If  $N_2O_{5(s)}$  is formed instead of  $N_2O_{5(g)}$  in the above reaction, the  $\Delta_r H$  value will be:

(given,  $\Delta H$  of sublimation for N<sub>2</sub>O<sub>5</sub> is 54 kJ mol<sup>-1</sup>)

a) –219 kJb) –165 kJc) +54kJd) +219 kJ Answer:a) –219 kJ

4. Based on the first law of thermodynamics, which one of the following is correct?

a) For an isothermal process, q = +wb) For an isochoric process,  $\Delta U = -q$ c) For an adiabatic process,  $\Delta U = -w$  d) For a cyclic process, q = -w<u>Answer:</u>d) For a cyclic process, q = -w

5. The amount of the heat released when 20 ml 0.5 M NaOH is mixed with 100 ml 0.1 M HCl is x kJ. The heat of neutralization is-

a) – 100 x kJ/molb) – 50 x kJ/molc) + 100 x kJ/mold) +50 x kJ/mol Answer:a) – 100 x kJ/mol

6. The bond energy (in kcal mol<sup>-1</sup>) of a C—C single bond is approximately-

a) 1 b) 10c) 100d) 1000

## **Answer:**c) 100

7. The species which by definition has ZERO standard molar enthalpy of formation at 298 K is-

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a) Br_2(g)b) Cl_2(g)c) H_2O(g)d) CH_4(g)
Answer:b) Cl_2(g)
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8. The standard enthalpy of formation of NH<sub>3</sub> is –46.0 kJ mol<sup>-1</sup>. If the enthalpy of formation of H<sub>2</sub> from its atoms is –436 kJ mol<sup>-1</sup> and that of N<sub>2</sub> is –712 kJ mol<sup>-1</sup>, the average bond enthalpy of N — H bond is NH<sub>3</sub> is-

a) –1102 kJ mol<sup>-1</sup>b) –964 kJ mol<sup>-1</sup>c) +352 kJ mol<sup>-1</sup>d) +1056 kJ mol<sup>-1</sup> <u>Answer:</u>c) +352 kJ mol<sup>-1</sup>

9. The amount of heat evolved when 500 cm<sup>3</sup> of 0.1 M HCl is mixed with 200 cm<sup>3</sup> of 0.2 M NaOH is \_\_\_\_\_\_.

a) 1.292 kJb) 2.292 kJ<sup>-1</sup>c) 3.392 kJd) 0.292 kJ Answer:b) 2.292 kJ<sup>-1</sup>

10. In a constant volume calorimeter, 3.5 g of a gas with molecular weight 28 was burnt in excess oxygen at 298.0 K. The temperature of the calorimeter was found to increase from 298.0 K to 298.45 K due to the combustion process. Given that the heat capacity of the calorimeter is 2.5 kJ K<sup>-1</sup>, the numerical value for the enthalpy of combustion of the gas in kJ mol<sup>-1</sup> is-

a) 3b) 7c) 8d) 9 <u>Answer:</u>d) 9

11. If one mole of ammonia and one mole of hydrogen chloride are mixed in a closed container to form ammonium chloride gas, then-

a)  $\Delta H > \Delta ub$ )  $\Delta H = \Delta uc$ )  $\Delta H < \Delta ud$ ) there is no relationship Answer: c)  $\Delta H < \Delta u$ 

12. Which of the following is an intensive property?

a) Temperatureb) surface tensionc) viscosityd) all of these <u>Answer:</u>d) all of these

13. An ideal gas is allowed to expand both reversibly and irreversibly in an isolated system. If Ti is the initial temperature and Tf is the final temperature, which of the following statements is correct?

a)  $(T_f)_{irrev} > (T_f)_{rev}$  b)  $T_f > T_i$  for reversible process but  $T_f = T_i$  for irreversible processc)  $(T_f)_{rev} = (T_f)_{irrev}$ 

d)  $T_f = T_i$  for both reversible and irreversible processes

## Answer:

a)  $(T_f)_{irrev} > (T_f)_{rev}$  b)  $T_f > T_i$  for reversible process but  $T_f = T_i$  for irreversible process

14. The standard enthalpy of formation ( $\Delta_f H^\circ$ ) at 298 K for methane,  $CH_4(g)$ , is –74.8 kJ mol<sup>-1</sup>. The additional information required to determine the average energy for C – H bond formation would be-

a) the dissociation energy of  $H_2$  and enthalpy of sublimation of carbon b) latent heat of vaporization of methane c) the first four ionization energies of carbon and electron gain enthalpy of hydrogend) the dissociation energy of hydrogen molecule,  $H_2$ <u>Answer:</u>a) the dissociation energy of  $H_2$  and enthalpy of sublimation of carbon

15. The temperature of the system .decreases in an-

a) Adiabatic compressionb) Isothermal expansionc) Isothermal compression d) Adiabatic expansion Answer: d) Adiabatic expansion

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