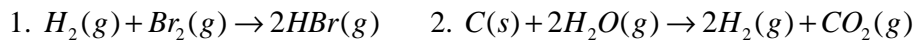


## THERMODYNAMICS

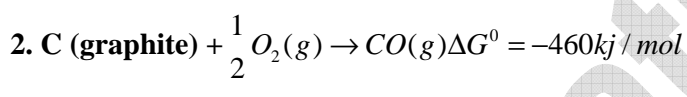
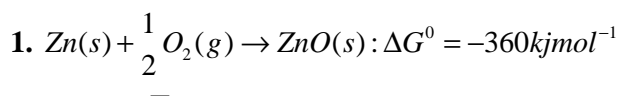
1. Assume each reaction is carried out in an open container. For which reaction will  $\Delta H = \Delta U$  ?

(CBSE (MED. 2006))



Ans; 1

2. Consider the following reactions at  $1000^\circ C$  :



Choose the correct statement at  $1000^\circ C$

(PMT (KERALA)2006)

A) zinc can be oxidized by oxidized by carbon monoxide

B) ZnO can be reduced by graphite

C) Both (a) and (b) are true

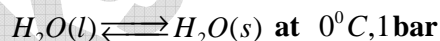
D) Both (a) and (b) are false

E) Carbon monoxide can be reduced by zinc.

Ans;B

3. For a phase change:

(AIIMS 2006)



- 1)  $\Delta G = 0$       2)  $\Delta S = 0$       3)  $\Delta H = 0$       4)  $\Delta U = 0$

Ans:1

4. A reaction is non-spontaneous when

(AMU (MEDICAL) 2006)

1)  $\Delta H$  is +ve,  $\Delta S$  is -ve

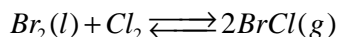
2) both  $\Delta H$  and  $\Delta S$  are -ve

3)  $\Delta H$  is -ve and  $\Delta S$  is +ve

4) none of the above

Ans;1

5. The enthalpy and entropy changes for the reaction:



are  $30 \text{ kJ mol}^{-1}$  and  $105 \text{ J K}^{-1} \text{ mol}^{-1}$  respectively. The temperature at which the reaction will be equilibrium is (CBSE(MED) 2006)

- 1) 285.57k                      2) 273.k                      3) 450k                      4) 300k

Ans;1

6. If 150kJ of energy is needed for muscular work to walk a distance of 1 km, then how much of glucose one has to consume to walk a distance of 5 km, provided only 30% of energy is available for muscular work. The enthalpy of combustion of glucose is  $3000 \text{ kJ mol}^{-1}$  (PMT (KERALA)2007)

- 1) 75 g                      2) 30g                      3) 180g                      4) 150g                      5) 45g

Ans;4

7. The enthalpy of combustion of cyclohexane, cyclohexene and  $H_2$  are resperature, are respectively -3920,-3800and -241  $\text{kJ mol}^{-1}$  The heat of hydrogenation of cyclohexene is (AIIMS2007)

- 1) -12 $\text{kJ mol}^{-1}$                       2) 121  $\text{kJ mol}^{-1}$                       3) -242  $\text{kJ mol}^{-1}$                       4) 242  $\text{kJ mol}^{-1}$

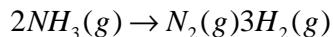
Ans;1

8. In a closed container, a liquid is stirred with a paddle to increase the temperature, which of the following is true (PMT PB.)2007)

- 1)  $\Delta U = w \neq 0, q = 0$                       2)  $\Delta U = w = 0, q \neq 0$   
3)  $\Delta U = 0, w =, q \neq 0$                       4)  $w = 0, \Delta U = q \neq 0$

Ans;1

9. The value of  $\Delta H - \Delta U$  for the following reaction at  $27^\circ\text{C}$  will be [AMU(MED. 2007)]



- 1)  $8.314 \times 273 \times (-2)$     2)  $8.314 \times 300 \times (-2)$     3)  $8.314 \times 273 \times 2$     4)  $8.314 \times 300 \times 2$

Ans;2

10. Unit of entropy is: (PMT (Punjab)2007)

- 1)  $\text{J K}^{-1} \text{mol}^{-1}$     2)  $\text{J mol}^{-1}$     3)  $\text{J}^{-1} \text{K}^{-1} \text{mol}^{-1}$     4)  $\text{J kmol}^{-1}$

Ans;1

11. For a reaction to be spontaneous in neither direction, which of the following is/ are correct regarding the closed system. (BHU (mains)2007)

- 1)  $(\Delta G)_{T, p} = 0$     2)  $(\Delta G)_{T, p} < 0$     3)  $(\Delta S)_{U, v} = 0$     4)  $(\Delta S)_{U, v} > 0$

Codes:

- a. 1,2 and 3 are correct    b. 1 and 2 are correct  
c. 2 and 4 are correct    d. 1 and 3 are correct

Ans;d

12. Given that bond energies of H-H and Cl-Cl bonds are  $430 \text{ kJ/mol}$  and  $240 \text{ kJ/mol}$  respectively  $\Delta H_f$  for HCl is  $-90 \text{ kJ/mol}$  Bond enthalpy of HCl is (CBSE (MED. 2007))

- 1)  $380 \text{ kJ mol}^{-1}$     2)  $425 \text{ KJ mol}^{-1}$     3.  $245 \text{ KJ mol}^{-1}$     4.  $290 \text{ KJ mol}^{-1}$

Ans;2

13. The amount of heat released, when  $20 \text{ mL}$  of  $0.5 \text{ M}$  NaOH is mixed with  $100 \text{ mL}$  of  $0.1 \text{ M}$  HCl, is  $x \text{ kJ}$  The heat of neutralization (in  $\text{kJ mol}^{-1}$ ) is (BHU (mains)2007)

- 1)  $-100x$     2)  $-50x$     3)  $+100x$     4)  $+50x$

Ans;1

14. for the gas phase reaction,

(CBSE PMT Pre. 2008)



Which of the following conditions are correct

- 1)  $\Delta H < 0, \Delta S < 0$                       2)  $\Delta H > 0$  and  $\Delta S < 0$   
 3)  $\Delta H = 0, \Delta S < 0$                       4)  $\Delta H > 0$  and  $\Delta S > 0$

Ans;4

15. Which of the following is correct

(BHU(screening)2008)

- 1)  $C_v = \left(\frac{\partial U}{\partial T}\right)_p$                       2)  $C_p = \left(\frac{\partial H}{\partial T}\right)_v$                       3)  $C_p - C_v = R$                       4)  $\left(\frac{\partial U}{\partial V}\right)_t = \frac{-a}{V^2}$

Ans;3

16. what will be the heat of formation of methane, if the heat of combustion of carbon is “-x” kJ, heat of formation of water is “-y” kJ and heat of combustion of methane is”-z” kJ

( AIIMS 2008)

- 1)  $(-x-y+z)$  kJ                      2)  $(-z-x+2y)$ kJ                      3)  $(-x-2y-z)$  kJ                      4)  $(-x-2y+z)$ kJ

Ans;4

17. 4.48 L of an ideal gas at S.T.P. requires 12 calories to raise its temperature by  $15^\circ C$  at constant volume The  $C_p$  of the gas is

(PMT (kerala)2009)

- 1) 3cal                      2) 4cal                      3) 7cal                      4) 6cal                      5) 9cal

Ans;2

18. For vaporisation of water at 1 atmospheric pressure the value of  $\Delta H$  and  $\Delta S$  are  $40.63 \text{ kJ mol}^{-1}$  and  $108.8 \text{ J K}^{-1} \text{ mol}^{-1}$  respectively The temperature when Gibbs free energy change ( $\Delta G$ ) for transformation will be zero, is

(CBSE (PMT)2010)

- 1) 273.4 K                      2) 393.4K                      3) 373.4 K                      4) 293.4 K

Ans;3

19. The heat liberated when 1.89 g of benzoic acid is burnt in a bomb calorimeter at  $25^{\circ}\text{C}$  increases the temperature of 18.94 kg of water by  $0.632^{\circ}\text{C}$  if the specific heat of water at  $25^{\circ}\text{C}$  is  $0.998\text{ cal g}^{-1}\text{ deg g}^{-1}$ , the specific heat of combustion of benzoic acid is

(AFMC 2010)

- 1) 88.11 kcal      2) 771.4 kcal      3) 98.11 kcal      4) 871.2 kcal

Ans;2

20. Standard entropies of  $X_2, Y_2$  and  $XY_3$  are 60, 40 and  $50\text{ JK}^{-1}\text{mol}^{-1}$  respectively. For the reaction  $\frac{1}{2}X_2 + \frac{3}{2}Y_2 \rightleftharpoons XY_3; \Delta H = -30\text{ kJ}$  To be at equilibrium, the temperature should be (CBSE (PMT)2010)

- 1) 750 K      2) 1000K      3) 1250 K      4) 500K

Ans;1