



## CHEMISTRY

### BOOKS - BITSAT GUIDE

### CHEMICAL THERMODYNAMICS

#### Exercise

1. thermodynamic is not concerned about .....

- A. energy changes involved in a chemical reaction
- B. the extent to which a chemical reaction proceeds
- C. the rate at which a reaction proceeds
- D. the feasibility of a chemical reaction

**Answer: c**



2. what is  $\Delta E$  for a system that does 500 cal of work pm surrounding and 300 cal of heat is adsorbed by the system ?

A.  $-200\text{cal}$

B.  $-300\text{cal}$

C.  $+200\text{cal}$

D.  $+300\text{cal}$

**Answer: a**



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3. flying bird is an example of

A. closed system

B. open system

C. isolated system

D. microscopic system

**Answer: b**



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4. for an adiabatic process , which of the following is correct ?

A.  $P\Delta V = 0$

B.  $q = + W$

C.  $\Delta q = 0$

D.  $\Delta E = q$

**Answer: c**



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5. A gas expands , is themally and reversibly. the work done by the gas is

- A. zero
- B. maximum
- C. minimum
- D. cannot be determined

**Answer: b**



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6. which of the following statement is correct ?

- A. the presence of reacting species in a covered beaker is an example of open system
- B. there is an exchange of energy as well as matter between the system and the surrounding in a closed system

C. the presence of reactants in a closed vessel made up of copper is an example of a closed system

D. the presence of reactants in a thermos flask or any other closed insulated vessel is an example of a closed system

**Answer: c**



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7. 1 mole of  $CO_2$  gas at 300 K is expanded under adiabatic conditions such that its volume becomes 27 times . What is work done ? (  $\gamma = 1.33$  and  $C_v = 6 \text{ cal mol}^{-1}$  for  $CO_2$ )

A. 900 cal

B. 1000 cal

C. 1200 cal

D. 1400 cal

**Answer: c**



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8. the heat of combustion of benzene determined in a bomb calorimeter is  $-870 \text{ kcal mol}^{-1}$  at  $298 \text{ K}$ . The value of  $\delta E$  for reaction is

A.  $-1740 \text{ kcal mol}^{-1}$

B.  $+870 \text{ kcal mol}^{-1}$

C.  $-32.64 \text{ kcal mol}^{-1}$

D.  $+1740 \text{ kcal mol}^{-1}$

**Answer: c**



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9. Enthalpy of combustion of  $C_6H_6(l)$  is  $-3264.64 \text{ kJ/mol}$ . The heat produced by burning  $3.9 \text{ g}$  of benzene is

A.  $-163.23\text{kJ}$

B.  $326.4\text{ kJ}$

C.  $32.64\text{kJ}$

D.  $-3.254\text{kJ}$

**Answer: a**



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**10.** A molecule with highest bond energy is

A.  $\text{Br}_4$

B.  $\text{F}_2$

C.  $\text{Cl}_2$

D.  $\text{I}_2$

**Answer: c**



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11. for the reaction  $C + O_2 \rightarrow CO_2$

A.  $\Delta H > \Delta E$

B.  $\Delta H < \Delta E$

C.  $\Delta H = \Delta E$

D. none of these

Answer: c



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12. Given that

$\Delta H_{\text{comb}}$  of  $C(s)$ ,  $H_2(g)$  and  $CH_4(g)$  are,  $-394$ ,  $-294$  and  $-829 \text{ kJ/mol}$  respectively. The heat of formation for  $CH_4$  is

A.  $70 \text{ kJ/mol}$

B.  $-71.8 \text{ kJ/mol}$



C.  $-244\text{kJ/mol}$

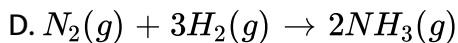
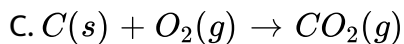
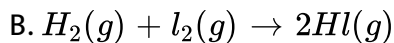
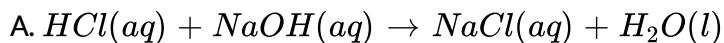
D.  $-748\text{kJ/mol}$

**Answer: a**



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**13.** for which of the following reactions  $\Delta H$  is less than  $\Delta E$ ?



**Answer: d**



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14. Enthalpy change , when 1 g water is frozen at  $0(^{\circ})C$  is (

$$\Delta H_{\text{fus}} = 1.435 \text{ kcal mol}^{-1} )$$

A. 0.0797 kcal

B.  $-0.0797 \text{ kcal}$

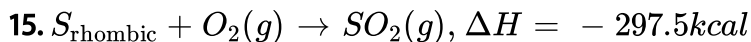
C. 1.435 kcal

D.  $-1.435 \text{ kcal}$

Answer: b



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A. rhombic sulphur is yellow in color

B. monoclinic sulphur has metallic lustre

C. monoclinic sulphur is more stable

D.  $\Delta H_{\text{translition of } S_R \text{ of } S_M}$  is endothermic

**Answer: d**



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16. when ammonium chloride is dissolved in water , the solution becomes cold. The change is

- A. endothermic
- B. exothermic
- C. supercooling
- D. none of these

**Answer: a**



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17. if a refrigerator's door is kept open, then we get a

- A. room cooled
- B. room heated
- C. more heat is passed out
- D. no effect on room

Answer: b



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18. internal energy and pressure of a gas of unit volume are related as

- A.  $P = \frac{2}{3}E$
- B.  $P = \frac{E}{2}$
- C.  $P = \frac{3}{2}E$
- D.  $P=2E$

**Answer: a**



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19. latent heat of vaporisation of a liquid at 500 K and 1 atm pressure is 10 .0 kcal/ mol . What will be the change in internal energy ( $\Delta E$ ) of 3 moles of liquid at same temperature ?

A. 30 kcal

B.  $-54kcal$

C. 27.0 kcal

D. 50 kcal

**Answer: c**



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20. water is brought to boil under a pressure of 1.0 atm. When an electric current of 0.50 A from 12 V supply is passed for 300 s through a resistance in thermal contact with it , it found that 0.798 g of water is vaporised . Calculate the molar internal energy change at boiling point (375 .15 K).

A.  $37.5 \text{ kJ mol}^{-1}$

B.  $3.75 \text{ kJ mol}^{-1}$

C.  $42.6 \text{ kJ mol}^{-1}$

D.  $4.26 \text{ kJ mol}^{-1}$

**Answer: a**



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21. Enthalpy of solution of NaOH (s) in water is  $-41.6 \text{ kJ mol}^{-1}$  .when NaOH is dissolved in water , the temperature of water

- A. increases
- B. decreases
- C. does not change
- D. fluctuates indefinitely

Answer: a



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22. the heat of combustion of carbon to  $CO_2$  is  $-393.5 \text{ kJ/mol}$ . The heat released upon formation of 35.2g of  $CO_2$  from carbon and oxygen gas is

- A.  $+315 \text{ kJ}$
- B.  $-31.5 \text{ kJ}$
- C.  $-315 \text{ kJ}$
- D.  $+31.5 \text{ kJ}$

Answer: c



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23. if the heat of neutralisation for a strong acid- base reaction is  $-57.1 \text{ kJ}$ , would be the heat released when  $350 \text{ cm}^3$  of  $0.20 \text{ M}$  of a dibasic strong acid is mixed with  $650 \text{ cm}^3$  of  $0.10 \text{ M}$  monoacidic base ?

- A.  $57.1 \text{ kJ}$
- B.  $3.71 \text{ kJ}$
- C.  $-57.1 \text{ kJ}$
- D.  $0.317 \text{ kJ}$

Answer: b



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24. if enthalpies of formation of  $C_2H_4(g)$ ,  $CO_2(g)$  and  $H_2O(l)$  at  $250^\circ$  and 1 atm pressure be 52, -394 and  $-286 kJ mol^{-1}$  respectively, the enthalpy of combustion of  $C_2H_4(g)$  will be

A.  $1412 kJ mol^{-1}$

B.  $-1412 kJ mol^{-1}$

C.  $+141.2 kJ mol^{-1}$

D.  $-141.2 kJ mol^{-1}$

Answer: b



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25. the bond dissociation energies of gaseous  $H_2$ ,  $Cl_2$  and  $HCl$  are 104.58 and 103 kcal respectively. The enthalpy of formation of  $HCl$  gas would be

A.  $-44\text{kcal}$

B.  $44\text{ kcal}$

C.  $-22\text{kcal}$

D.  $22\text{ kcal}$

Answer: c

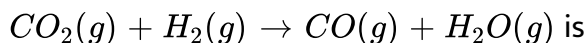


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26. \_\_\_\_\_ the

$\Delta H_t^\circ$  of  $\text{CO}_2(\text{g})$ ,  $\text{CO}(\text{g})$  and  $\text{H}_2\text{O}(\text{g})$  are  $-393.5$ ,  $-110.5$  and  $-241.8$

respectively, the standard enthalpy change ( in kJ) for the reaction



A.  $524.1$

B.  $41.2$

C.  $-262.5$

D.  $-412$

Answer: b

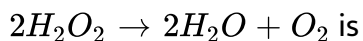


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27. heat of formation of

$H_2O$  is  $-188\text{ kJ/mol}$  and  $H_2O_2$  is  $-286\text{ kJ/mol}$ . The enthalpy change

for the reaction



A. 196 kJ

B.  $-196\text{ kJ}$

C. 984 kJ

D.  $-984\text{ kJ}$

Answer: a



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28. the enthalpy of dissolution of  $BaCl_2(s)$  and  $BaCl_2 \cdot 2H_2O(s)$  are  $-20.6$  and  $8.8 kJ/mol$  respectively. The enthalpy of hydration for  $BaCl_2(s) + 2H_2O \rightarrow BaCl_2 \cdot 2H_2O(s)$  is

- A.  $29.4 kJ$
- B.  $-29.4 kJ$
- C.  $-11.8 kJ$
- D.  $38.2 kJ$

Answer: b



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29.  $\Delta_f U^-$  of formation of  $CH_4(g)$  at certain temperature is  $-393 kJ mol^{-1}$ . The value of  $\Delta_f H^-$

- A. zero

B.  $< \Delta_f U^-$

C.  $> \Delta_f U^-$

D. equal to  $\Delta_f U^-$

**Answer: b**



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30. find the entropy change when 2 moles of ideal gas at  $27^\circ\text{C}$  temperature is expanded reversibly from 2 L to 20 L .

A. 92 . 1

B. 0

C. 4

D. 9.2

**Answer: d**



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31. when a gas expands from 1. 5L to 6.5 L against a constant pressure of 0.50 atm and during process , the gas also absorbs 100 J of heat. The change in internal energy is

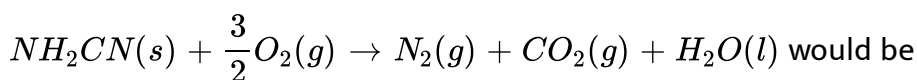
- A. 153.3 J
- B. 353.3 J
- C.  $-153.3J$
- D.  $-353.3J$

Answer: c



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32. the reaction between cyanamide  $NH_2CH(s)$  and oxygen was allowed to complete and  $\Delta U_{at 300K}$  was observed to be  $-743kJmol^{-1}$  . The value of  $\Delta H$  at 300 K for the combustion reaction



A.  $-741.75 \text{ kJ mol}^{-1}$

B.  $-743 \text{ kJ mol}^{-1}$

C.  $-744.25 \text{ kJ mol}^{-1}$

D.  $-740.5 \text{ kJ mol}^{-1}$

**Answer: a**



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**33.** the following data (s) are given as the standard enthalpies of combustion of  $C(s)$ ,  $H_2(g)$  and  $CH_4(g)$  and  $-393.5 \text{ kJ mol}^{-1}$ ,  $-285.8 \text{ kJ mol}^{-1}$  and  $-890.4 \text{ kJ mol}^{-1}$  respectively at 298 K. The standard enthalpy of formation of methane  $[CH_4(g)]$  is

A.  $+74.42 \text{ kJ mol}^{-1}$

B.  $+74.7 \text{ kJ mol}^{-1}$

C.  $-114.82 \text{ kJ mol}^{-1}$

D.  $-194.62 \text{ kJ mol}^{-1}$

**Answer: b**



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34. if for a given substance , melting point is  $T_B$  and freezing point is  $T_A$  then correct variation of entropy by graph between entropy change and temperature is

A. 

B. 

C. 

D. 

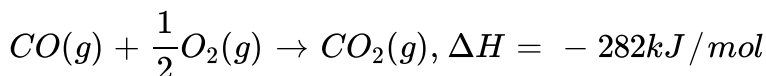
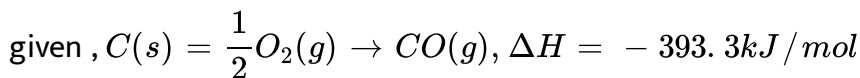
**Answer: a**



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35. mark out the enthalpy for the formation of carbon . Monoxide (CO)



A. 110.5 kJ/mol

B. 676.1 kJ / mol

C. 282.8 kJ / mol

D. 300.0 kJ/mol

Answer: a



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36. in the reaction ,  $Na(s) \rightarrow Na(g)$

the enthalpy of atomsiation is same as the

A. enthalpy of dissociation

B. enthalpy os sublimation

C. enthalpy of association

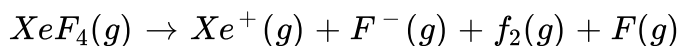
D. enthalpy of vaporisation

**Answer: b**



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**37.** calculate the bond enthalpy of Xe - F bond as given in the equation ,



$$\Delta_r H = 292 \text{ kcal mol}^{-1}$$

$$\text{Ionisation energy of } Xe = 279 \text{ kcal mol}^{-1}$$

$$\text{bond energy (F-F)} = 38 \text{ kcal / mol}$$

$$\text{Electronaffinity of F} = 85 \text{ kcal / mol}$$

A. 8.5 kcal/mol

B. 34 kcal / mol

C. 24 kcal / mol

D. none of these

Answer: b



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38. calculate the resonance energy of  $N_2O$

$$\Delta_f H^\circ \text{ of } N_2O = 82 \text{ kJ mol}^{-1}$$

$$\text{bond energy of N=O} = 607 \text{ kJ mol}^{-1}$$

$$\text{bond energy of O=O} = 498 \text{ kJ mol}^{-1}$$

$$\text{bond energy of N=N} = 418 \text{ kJ mol}^{-1}$$

$$\text{bond energy of N}\equiv\text{N} = 946 \text{ kJ mol}^{-1}$$

A.  $82 \text{ kJ mol}^{-1}$

B.  $-88 \text{ kJ mol}^{-1}$

C.  $-82 \text{ kJ mol}^{-1}$

D.  $+88 \text{ kJ mol}^{-1}$

Answer: b



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39. use the following data to calculate

$$\Delta_{\text{lattice}} H^{\circ} f \text{ or } NaBr. \Delta(\text{sub}) H^{\circ} \text{ for sodium metal} = 108.4 \text{ kJ mol}^{-1}$$

$$\text{Ionisation enthalpy of sodium} = 496 \text{ kJ mol}^{-1} \text{ but } \Delta_{\text{ion}} H^{\circ} \text{ for sodium metal} = 108.4 \text{ kJ mol}^{-1}$$

$$\text{enthalpy of bromine} = 325 \text{ kJ mol}^{-1}$$

$$\text{bond dissociation enthalpy of bromine} = 192 \text{ kJ mol}^{-1}$$

$$\Delta_f H^{\circ} \text{ for } NaBr(s) = -360.1 \text{ kJ mol}^{-1}$$

A.  $-735.5 \text{ kJ mol}^{-1}$

B.  $+735.5 \text{ kJ mol}^{-1}$

C.  $-789.89 \text{ kJ mol}^{-1}$

D.  $+735.5 \text{ kJ mol}^{-1}$

Answer: b



View Text Solution

40. find out the standard free energy change at  $60^{\circ}\text{C}$  and at 1 atm if the  $\text{N}_2\text{O}_4$  is 50 % dissociated

A.  $-800.0\text{kJmol}^{-1}$

B.  $+800.0\text{kJmol}^{-1}$

C.  $789.89\text{JK}^{-1}\text{mol}^{-1}$

D.  $+789.98\text{JK}^{-1}\text{mol}^{-1}$

Answer: c



View Text Solution

41. moles of an ideal gas expand isothermally and reversibly from pressure of 5 atm to 1 atm at 300 K . Calculate the largest mass that can be lifted through a height of 1 M by this expansion .

A. 4092.76 kg

B. 8730.9368 kg

C. 4492.76 kg

D. 8170.2344 kg

**Answer: d**



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**42.** At  $27^{\circ}C$ , one mole of an ideal gas is compressed isothermally and reversibly from a pressure of 2 atm to 10 atm. The value of  $\Delta E$  and  $q$  are ( $R = 2 \text{ cal}$ )

A.  $-965.84 \text{ cal}$

B.  $-965.84 \text{ cal}, -865.58 \text{ cal}$

C.  $865.58, -865.58 \text{ cal}$

D.  $965.84 \text{ cal}, +865.58 \text{ cal}$

**Answer: a**



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43. the enthalpy of vaspourisation of water is  $186.5 \text{ J/mol}$  .

the entropy of its vaporisation will be

A.  $0.5 \text{ JK}^{-1} \text{ mol}^{-1}$

B.  $1.0 \text{ JK}^{-1} \text{ mol}^{-1}$

C.  $1.5 \text{ JK}^{-1} \text{ mol}^{-1}$

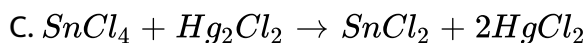
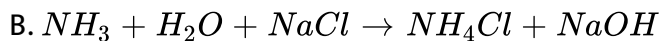
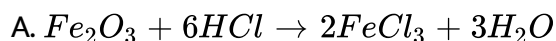
D.  $2.0 \text{ JK}^{-1} \text{ mol}^{-1}$

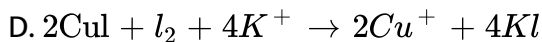
Answer: a



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44. the reaction which proceeds in the forwards direaction is





**Answer: d**



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45. Ammonium chloride, when dissolved in water, leads to a cooling sensation. The dissolution of ammonium chloride at constant temperature is accompanied by q

- A. increases in entropy
- B. decreases in entropy
- C. no change in entropy
- D. no change in enthalpy

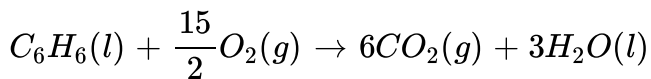
**Answer: a**



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46. at  $27^{\circ}C$  the reaction



proceeds spontaneously because of magnitude of

A.  $\Delta H = T \cdot \Delta S$

B.  $\Delta H > T \cdot \Delta S$

C.  $\Delta G < T \cdot \Delta S$

D.  $\Delta H > 0$  and  $T \cdot \Delta S < 0$

Answer: b



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47. the sign of  $\Delta G$  for the process of melting of ice at 273 K and 1 atm pressure is

A. positive

B. negative

C. neither negative nor positive

D. either negative or positive

**Answer: c**



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**48.** the initial state A has the temperature  $T_A$  and internal energy  $U_A$  as the internal energy of the system. By applying the mechanical work, new state B is achieved with the temperature  $T_B$  and having the internal energy  $U_B$ . Given that  $T_B > T_A$ . What is the correct expression for the change in internal energy ( $\Delta U$ )?

A.  $U_B = U_A$

B.  $U_B - U_A$

C.  $U_A - U_B$

D. none of these

**Answer: b**

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49. when 1.8 g of steam at the normal boiling point of water is converted into water, at the same temperature, enthalpy and entropy changes respectively will be

[given,  $\Delta H_{\text{vap}}$  of water =  $40.8 \text{ KJ mol}^{-1}$ ]

- A.  $-8.12 \text{ kJ}$ ,  $11.89 \text{ J K}^{-1}$
- B.  $10.25 \text{ kJ}$ ,  $12.95 \text{ J K}^{-1}$
- C.  $-4.08 \text{ kJ}$ ,  $-10.93 \text{ J K}^{-1}$
- D.  $10.93 \text{ kJ}$ ,  $-4.08 \text{ J K}^{-1}$

Answer: c

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50. what the heat of a reaction at constant pressure is  $-2.5 \times 10^3 \text{ cal}$  and entropy change for the reaction is  $7.4 \text{ cal deg}^{-1}$ , it is predicted that

the reaction at  $25^{\circ}\text{C}$  is

- A. reversible
- B. spontaneous
- C. non-spontaneous
- D. irreversible

**Answer: c**



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51. what will be the change of entropy  $\Delta_r S^{\circ}$  at  $298\text{K}$  for the reaction in which urea is formed from  $\text{NH}_3$  and  $\text{CO}_2$  ?



[given ,the standard entropy of  $\text{NH}_2\text{CONH}_2(aq)$  ,

$\text{CO}_2(g)$ ,  $\text{NH}_3(g)$  and  $\text{H}_2\text{O}(l)$  are  $174.0$ ,  $213.7$ ,  $192.3$  and  $69.9\text{JK}^{-1}\text{mol}^{-1}$  respectively]

- A.  $200\text{JK}^{-1}\text{mol}^{-1}$

B.  $-35.44 JK^{-1}mol^{-1}$

C.  $-354.4 JK^{-1}mol^{-1}$

D.  $425.2 JK^{-1}mol^{-1}$

**Answer: a**



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52. for an isomerisation reaction  $A \rightleftharpoons B$ , the temperature dependence of equilibrium constant is given by  $\log_e K = 4.0 - \frac{2000}{T}$ . the value of  $\Delta S^\circ$  at 300 K is therefore,

A.  $4R$

B.  $5R$

C.  $400R$

D.  $2000R$

**Answer: b**

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53.  $\Delta G$ , in process of melting of ice at  $-15^{\circ}C$ , is

A.  $\Delta G = -ve$

B.  $\Delta G = +ve$

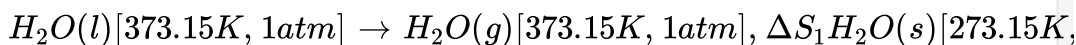
C.  $\Delta G = 0$

D. all of these

Answer: b

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54. using following data



predict which of the following is correct ?

A.  $\Delta S_1 = \Delta S_2$

B.  $\Delta S_1 > \Delta S_2$

C.  $\Delta S_1 < \Delta S_2$

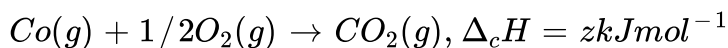
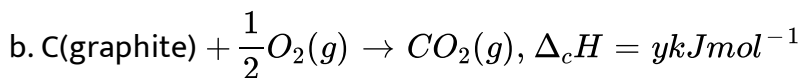
D.  $\Delta S_1$  may be greater or smaller than  $\Delta S_2$

Answer: c



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55. on the basis of thermochemical equation a,b and c, find out which of the algebraic relationships given in option a , to d . Is correct ?



A.  $z=x+y$

B.  $x= y-z$

C.  $x = y +z$

D.  $y=2z-x$

**Answer: c**



**View Text Solution**

56. the heat of atomosaton pf  $P_4H_4(g)$  and  $PH_3(g)$  are 355 kcal / mol and 228 kcal/ mol respectively . The energy of P—P bond is

A.  $102\text{kcalmol}^{-1}$

B.  $51\text{kcalmol}^{-1}$

C.  $26\text{kcalmol}^{-1}$

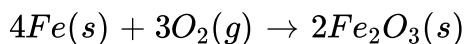
D.  $204\text{kcalmol}^{-1}$

**Answer: b**



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57. in the given equation





the entropy change is  $= -549.4 JK^{-1}mol^{-1}$  at 298 K

$(\Delta_r H^\ominus = -1648 \times 10^3 J mol^{-1})$ . the above reaction is

- A. spontaneous
- B. non-spontaneous
- C. both (a) and (b)
- D. none of these

Answer: a



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58. find out the entropy change in surroundings when 1 mole of  $H_2O(l)$

is formed under standard conditions  $\Delta_f H^\ominus = 286 kJ mol^{-1}$

- A.  $959.7 JK^{-1}mol^{-1}$
- B.  $286 JK^{-1}mol^{-1}$
- C.  $-959.7 JK^{-1}mol^{-1}$

D.  $-286 \text{ JK}^{-1} \text{ mol}^{-1}$

Answer: a



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Bitsat Archives

1. A swimmer coming out from a pool is covered with a film of water weighing about 18 g. calculate the internal energy of vaporisation at  $100^\circ$ ,

$$[\Delta_{\text{vap}} H^\circ \text{ for water at } 373\text{K} = 40.66 \text{ kJ mol}^{-1}]$$

A.  $35.67 \text{ kJ mol}^{-1}$

B.  $35.67 \text{ kJ mol}^{-1}$

C.  $36.57 \text{ kJ mol}^{-1}$

D.  $38.75 \text{ kJ mol}^{-1}$

Answer: b



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2. the heat of combustion of sucrose,  $C_{12}H_{22}O_{11}(s)$  at constant volume is  $1348.9 \text{ kcal mol}^{-1}$  at  $25^\circ$  then the heat of reaction at constant pressure when steam is produced is

A.  $-1348.9 \text{ kcal}$

B.  $-1342.34 \text{ kcal}$

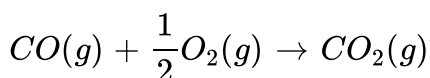
C.  $+1250 \text{ Kcal}$

D. none of these

**Answer: b**

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3. At constant temperature and pressure which one of the following statements is correct for the reaction ?



A.  $\Delta H = \Delta E$

B.  $\Delta H < \Delta E$

C.  $\Delta H > \Delta E$

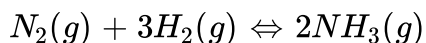
D.  $\Delta H$  is independent of physical state of reactant

Answer: b



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4. the equilibrium constant  $K_P$  for the reaction ,



$1.6 \times 10^{-4} (atm)^{-2}$  at  $400^\circ C$  if heat of the reaction in this temperature range is  $-25.14$  kcal ?

A.  $1.231 \times 10^{-4} (atm)^{-2}$

B.  $1.876 \times 10^{-7} (atm)^{-2}$

C.  $1.462 \times 10^{-5} (atm)^{-2}$

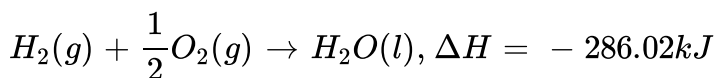
D.  $3.462 \times 10^{-5} (atm)^{-2}$

Answer: c



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5. given



then , calculate the enthalpy of formation of  $OH^-$  at  $25^\circ C$

A.  $-228.8kJ$

B.  $-343.52kJ$

C.  $+228.8kJ$

D.  $+343.52kJ$

Answer: a



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6. calculate the amount of heat evolved when  $500\text{cm}^3$  of 0.1M HCl is mixed with  $200\text{cm}^3$  of 0.2 M NaOH.

- A. 57.3 kj
- B. 2.865 kj
- C. 2.292 kj
- D. 0.573 kj

Answer: c



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7. the mutual heat of neutralisation of 40 g NaOH and 60 g  $\text{CH}_3\text{COOH}$  will be

- A. 57.1 kj
- B. less than 57.1 kj
- C. more than 57.1 kj

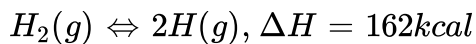
D. 13.7 kJ

**Answer: b**



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8. for the dissociation reaction ,



heat of atomisation of H is

A. 81 kcal

B. 162 kcal

C. 208 kcal

D. 218 kcal

**Answer: a**



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9. internal energy does not include

- A. vibrational energy
- B. rotational energy
- C. energy arising by gravitational pull
- D. nuclear energy

Answer: c



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10. A reaction has both  $\Delta H$  and  $\Delta S$  negative. The rate of reaction

- A. increases with increase of temperature
- B. increases with decrease of temperature
- C. remains unaffected by change of temperature
- D. cannot be predicated for change in temperature



Answer: b



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11. one mole of an anhydrous salt AB dissolves in water with the evolution of  $21.0 \text{ mol}^{-1}$  of heat. If the heat of hydration of AB is  $-29.4 \text{ J mol}^{-1}$ , then the heat of dissociation of hydrated salt AB is

A.  $50.4 \text{ J mol}^{-1}$

B.  $8.4 \text{ J mol}^{-1}$

C.  $-50.4 \text{ J mol}^{-1}$

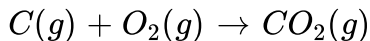
D.  $-8.4 \text{ J mol}^{-1}$

Answer: b

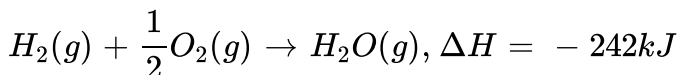
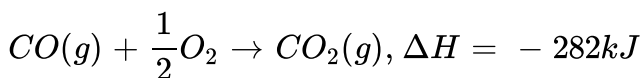
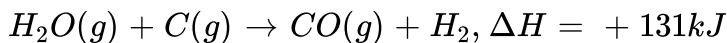


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12. calculate the  $\Delta H$  in kJ for the following reaction,



given that ,



A.  $- 393$

B.  $+ 393$

C.  $+ 655$

D.  $- 655$

**Answer: a**



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13. For a reversible reaction  $A \rightleftharpoons B$  which one of the following statements is wrong from the given energy profile diagram ?



- A. Activation energy of forward reaction is greater than backward reaction
- B. the forward reaction is endothermic
- C. the threshold energy is less than that of activation energy
- D. the energy of activation of forward reaction is equal to the sum of heat of reaction and the energy of activation of backward reaction

**Answer: c**



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**14.** A  $27^\circ$  one mole of an ideal gas is compressed isothermally and reversibly from a pressure of 2 atm to 10 atm , the value of  $\Delta E$  and  $q$  are (R = 2 cal )

A. 0,  $-965.84 \text{ cal}$

B.  $-965.58\text{cal}$ ,  $-865.58\text{cal}$

C.  $+865.58\text{cal}$ ,  $-865.58\text{cal}$

D.  $+965.84\text{cal}$ ,  $+865.58\text{cal}$

**Answer: a**



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**15.** Gibbs free energy  $G$ , enthalpy  $H$  and entropy  $S$  are interrelated as in

A.  $G = H + TS$

B.  $G = H - TS$

C.  $G = TS - H$

D.  $G = S = H$

**Answer: b**



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