CHEMISTRY

BOOKS - PATHFINDER CHEMISTRY (BENGALI ENGLISH)

THERMODYNAMICS

Question Bank

1. Which of the following statement is incorrect?

A. thermodynamics deals with the relationship between heat and work

B. thermodynamics deals with the energy changes associated with all physical and chemical processes.

C. thermodynamics helps us to predict the direction in which a process or a chemical reaction would proceed and to what extent?

D. thermodynamics helps us to calculate the rate of reaction

Answer: D

Watch Video Solution

2. A system is said to be an isolated system when it is

A. incapable of exchanging energy with the surroundings

B. incapable of exchanging matter with the surroundings

C. incapable of exchanging both matter and energy with the surroundings

D. none of these

Answer: C

Watch Video Solution

3. Some reactions are given which of the following reaction refers enthalpy of hydration.

A. $CuSO_4(s) + 5H_2O(l) \rightarrow CuSO_{4.5}H_2O$

B. $CuSO_4(s) + NH_2O(l) \rightarrow CuSO_4(aq)$

C. $C(s) + O_2(g) \rightarrow CO_2(g)$

D. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

Answer: A

Watch Video Solution

4. For reaction $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$ which of the following is valid

A. $\Delta H = \Delta U$

B. $\Delta h > \Delta U$

C. $\Delta H < \Delta U$

D. none of these

Answer: C

Watch Video Solution

5. Calorific values of food and fuel are determined by

A. Bunsen's calorimeter

B. bomb calori

C. beckmann's thermometer

D. none of these

Answer: B

Watch Video Solution

6. ΔH for the combustion of a compound is

A. positive

B. zero

C. negative

D. may be positive or negative

Answer: C

Watch Video Solution

7. Which of the following statement is true: A system is said to be in a state of thermodynamic equilibrium when

A. its composition remains fixed and definite

B. the temperature at all parts of the system is the same and also identical with that of surroundings

C. there is no unbalanced force between different parts of the system or between the system and the surroundings

D. all are correct

Answer: D

Watch Video Solution

8. What happens when sodium cyanide solution is added to silver nitrate solution in excess?

Watch Video Solution

9. The water from the slopes of himalayas flows down the ganges into the indian ocean such natural flow of a liquid downward is

A. non spontaneous and reversible

B. spontaneous and reversible

C. spontaneous and irreversible

D. non spontaneous and irreversible

Answer: C

Watch Video Solution

10. For the combustion of heptane ,Δn will be

A. (-4)

B. (-3)

C. (-2)

D. (-1)

Answer: A

Watch Video Solution

11. At 298K in a constant volume calorimeter 0.01 mole of X was detonated when 8180 calories of heat was released ΔU per mole of 'X'exploded is

A. (-808)cal/mol

B. 880 kcal/mole

C. (-818)kcal/mole

D. (-8180)kcal/mole

Answer: C

Watch Video Solution

12. $2C_6H_6(l) + 15O_2 = 12CO_2 + 6H_2O(l)$

$2C_6H_6(g) + 15O_2 = 12CO_2 + 6H_2O(l)$ for the two reactions ΔH will be

A. different

B. same

C. almost equal

D. none of these

Answer: A

Watch Video Solution

13. Which of the following is correct one:

A. isothermal reversible work 'lt'isothermal irreversible work

B. isothermal reversible work=isothermal irreversible work

C. isothermal reversible work 'gt'isothermal irreversible work

D. none of these

Answer: C

Watch Video Solution

14. Which of the following is incorrect one:

A. Work done by the system

IUPAC (-ve)

Non IUPAC (+ve)

B. Work done on the system

IUPAC (+ve)

Non-IUPAC (-ve)

C. Heat absorbed by the system

IUPAC (+ve)

Non IUPAC (-ve)

D. Heat lost from the system

IUPAC (+ve)

Non IUPAC (-ve)

Answer: C

Watch Video Solution

15. In a reversible adiabatic change the entropy change is

A. (+ve)

B. (-ve)

C. zero

D. may be (+ve) or(-ve)

Answer: C

Watch Video Solution

16. If $H^+ + OH^- \rightarrow H_2O + 13.7kcal$ then heat of complete neutralisation of one gram mole ofH_2SO_4 with a base will be

A. 13.7 k cal

B. 27.4 k cal

C. 6.85 k cal

D. 3.425 k cal

Answer: C

Watch Video Solution

17. Which of the following is an intensive property?

A. volume

B. mass

C. density

D. energy

Answer: B

Watch Video Solution

18. The unit of entropy is

A. $JK^{-}mol^{-}$

B. Jg^{-}

C. $Jmol^{-1}$

D. `k^(-1)mol

Answer: C

Watch Video Solution

19. Which of the following has highest entropy?

A. water

B. graphite

C. mercury

D. hydrogen

Answer: A

Watch Video Solution

20. For the reaction between CO_2 and graphite $CO_2(g) + C(s) \rightarrow 2CO(g), \Delta H = +170KJ$ and $\Delta S = 170JK^{-1}$ the reaction is spontaneous at

A. 298K

B. 500K

C. 900K

D. 1200K

Answer: D

Watch Video Solution

---

21. $H_2O(l) \rightarrow H_2O(g), \Delta H = +43.7KJ$

$H_2O(s) \rightarrow H_2O(l), \Delta h = +6.05KJ$ the value of $\Delta H_{vap \text{ or } isation}$ of ice is

A. $49.75kJmol^{-1}$

B. $43.7KJmol^{-1}$

C. $37.56KJmol^{-1}$

D. none of these

Answer: D

Watch Video Solution

22. The enthalpy of formation of ammonia is $xKJmol^{-1}$. The enthalpy of the reaction $2N_2(g) + 6H_2(g) \rightarrow 4NH_3(g)$

A. (-x)KJ

B. x KJ

C. 4x KJ

D. (-4x)KJ

Answer: A

Watch Video Solution

23. In which of the following neutralization the heat of neutralization will be highest?

A. NH_4OH and H_2SO_4

B. HCl and NaOH

C. CH_3COOH and NH_4OH

D. $H_2C_2O_4$ and KOH

Answer: D

Watch Video Solution

24. Which of the following units represents largest amount of energy?

A. electron volt

B. caloric

C. joule

D. erg

Answer: B

Watch Video Solution

25. The value of ΔH for the process $NH_4OH(aq) \rightarrow NH_4^+ + Cl^-$ is

A. negative

B. positive

C. zero

D. unpredictable

Answer: B

Watch Video Solution

26. The heats of combustion of methane,carbon and hydrogen are a,b and c calories respectively what will be heat of formation of CH_4?

A. (a+c)-(a+b)

B. (b+c)+(c-a)

C. a+b+c

D. ((a+b)/2)-c

Answer: B

Watch Video Solution

27. If an endothermic reaction is non spontaneous at freezing point of water and becomes feasible at its boiling point then

A. $\Delta H = (-ve), \Delta S = (+ve)$

B. $\Delta H = (+ve), \Delta S = (+ve)$

C. $\Delta H = (-ve), \Delta S = (-ve)$

D. $\Delta H = (+ve), \Delta S = (-ve)$

Answer: B

View Text Solution

28. To determine the enthalpy of neutralisation of HCl with NaOH we use

A. $0.3NHNO_3$,0.3(N) NaOH

B. $0.4(N)HNO_3, 0.4(N)NaOH$

C. $1(N)HNO_3, 1(N)NaOH$

D. any of these

Answer: B

Watch Video Solution

29. Using the data provided calculate the multiple bond energy $(KJmol^{-})$ of a C-=C bond in c_2H_2 consider the bond energy of a C-H bond is $350KJmol^{-1}$

$2C(s) + H_2(g) \rightarrow C_2H_2(g), \Delta H = 225KJmol^{-1}$

$2C(s) \rightarrow 2C(g), \Delta H = 1410KJmol^{-1}$

$H_2(g) \rightarrow 2H(g), \Delta H = 330KJmol^{-1}$

A. 1165

B. 837

C. 865

D. 815

Answer: D

Watch Video Solution

30. Which of the following for the given transformation is incorrect?

$P(white, solid) \rightarrow P(red, solid)$

A. Allotropic change

B. ΔH is positive

C. ΔS is negative

D. ΔS is positive

Answer: D

Watch Video Solution

31. For the following reaction occuring in an automobile $2C_8H_{18}(g)+25O_2(g) \rightarrow 16CO_2(g)+18H_2O(g)$ the sign of ΔH ,Delta S and Delta G` would be

A. (-),(+),(+)

B. (+),(+),(-)

C. (+),(-),(+)

D. (-),(+),(-)

Answer: D

Watch Video Solution

32. The energy for molecular motion appears in the form of

A. friction

B. potential energy

C. heat

D. temperature

Answer: D

Watch Video Solution

33. Four grams of helium gas is expanded from 1 atm to one tenth of its original pressure at 30° change in entropy assuming ideal gas behaviour is:

A. $38.3JK^{-1}$

B. $76.6JK^{-1}$

C. $19.15JK^{-1}$

D. $100JK^{-1}$

Answer: C

Watch Video Solution

34. The enthalpy of neutralisation of HCl by NaOH is -57.1 KJ and that of HCN by NaOH is $-12.1 KJmol^{-1}$ the enthalpy of ionization of HCN is

A. (-69.2)KJ

B. (-45)KJ

C. (-69.2)KJ

D. 45 KJ

Answer: C

Watch Video Solution

35. Whenever an acid is neutralised by a base the net reaction is $H^{+}(aq) + OH^{-}(aq) \rightarrow H_2O(l) + 57.1 KJ$ calculate the heat evolved in the following experiment:

0.25 mol of HCl solution is neutralised by 0.25 mol of NaOH solution amount of heat liberated for the reaction is

A. (+57.1)KJ

B. (-57.1)KJ

C. (+14.3)KJ

D. (-14.3)KJ

Answer: D

Watch Video Solution

36. The bond dissociation energies of two O-H bond in water are: $H_2O(g) \rightarrow H(g) + OH(g), \Delta H = 497.8 KJmol^{-1}$ $OH(g) \rightarrow H(g) + O(g), \Delta H = 428.5 KJmol^{-1}$ bond energy of O-H bond is

A. $463.15 KJmol^{-1}$

B. $926.30 KJmol^{-1}$

C. $231.05 KJmol^{-1}$

D. $1390.45 KJmol^{-1}$

Answer: C

Watch Video Solution

37. System performed pressure volume work when in between system and surrounding there is

A. difference in temperature

B. difference in volume

C. difference in pressure

D. difference in internal energy

Answer: A

Watch Video Solution

38. Change in internal energy of a system is

A. heat absorbed by the system+work is done by the system

B. heat liberated by the system+work is done by the system

C. heat absorbed by the system +work is done on the system

D. heat liberated by the system+work is done on the system

Answer: C

▶ Watch Video Solution

39. Which of the following statement is correct?

A. q-is a state function

B. w-is a state function

C. q and w are not state function together

D. q and w are state function together

Answer: C

▶ Watch Video Solution

40. For endothermic reaction which is correct?

A. $H_p > H_r$

B. $H_p < H_r$

C. H_p=H_r

D. sign of ΔH is negative

Answer: D

Watch Video Solution

41. Which of the following element standard enthalpy is not to be equal to zero?

A. C(diamond)

B. C(graphite)

C. liquid mercury

D. rhombic sulphur

Answer: B

Watch Video Solution

42. When the bond of $CH_4(g)$ is dissociated then

A. the bond energy of all four C-H bonds is same

B. the bond energy of two C-H bonds is same

C. the bond energy of all four C-H bonds are different from each other

D. the bond energy of three C-H bonds is same

Answer: A

Watch Video Solution

43. When a liquid substance is converted to solid substance its entropy

A. increases

B. decreases

C. remains same

D. any one of the above

Answer: C

Watch Video Solution

44. When ozone is converted to oxygen then entropy

A. decreases

B. increases

C. equal to zero

D. remains same

Answer: B

Watch Video Solution

45. A reaction occurs spontaneously if

A. $\Delta H > T\Delta S$ and both ΔH and ΔS are positive

B. $\Delta H < T\Delta S$ and ΔH is (+ve) and $DelatS$ is (-ve)

C. $\Delta H < TDelatS$ and both ΔH and ΔS are positive

D. $\Delta H = T\Delta S$ and both ΔH and ΔS are positive

Answer: B

Watch Video Solution

46. Assume the reaction is carried out in an open system for which reaction will $\Delta H = \Delta U$?

A. $C(S) + 2H_2O(g) \rightarrow 2H_2(g) + CO_2(g)$

B. $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$

C. $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$

D. $H_2(g) + Br_2(g) \rightarrow 2HBr(g)$

Answer: C

Watch Video Solution

47. Which of the following reaction does not define standard enthalpy of formation $\left(\Delta H_f^\circ\right)$?

A. $C(\diamond) + O_2(g) \rightarrow CO_2(g)$

B. $\frac{1}{2}H_2(g) + \frac{1}{2}F_2(g) \rightarrow HF(g)$

C. $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

D. $CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g)$

Answer: D

Watch Video Solution

48. Which of the following is correct ?

A. evaporation of water causes an increase in disorder of the system

B. melting of ice causes a decrease in randomness of the system

C. condensation of steam causes an increase of disorder of the system

D. there is practically no change in the randomness of the system when water is evaporated

Answer: A

▶ Watch Video Solution

49. Write true or false of the following statements:

Molar mass is an extensive property of a system

▶ Watch Video Solution

50. Write true or false of the following statements:

Degree of randomness increases during ice formation

Watch Video Solution

51. Write true or false of the following statements:

The internal energy of 1 mole carbon dioxide will be different from the internal energy of 1 mole sulphur dioxide even under similar conditions of temperature and pressure.

Watch Video Solution

52. Write true or false of the following statements:

No work is done during free expansion of an ideal gas under reversible or irreversible condition.

Watch Video Solution

53. Write true or false of the following statements:

A beaker containing boiling water is an example of open system.

Watch Video Solution

54. Fill in the blanks:

The two important modes of transference of energy are_____and_____.

Watch Video Solution

55. Fill in the blanks:

For an ideal gas undergoing an____change the internal energy of the system does not change.

Watch Video Solution

56. Fill in the blanks:

At equilibrium the change of entropy is______.

Watch Video Solution

57. Fill in the blanks:

At the melting point of ice ΔG is________.

Watch Video Solution

58. Fill in the blanks:

The decrease in ______is equal to the useful work done by the system.

Watch Video Solution

59. For a reaction both ΔH and ΔS are positive,under what condition will the reaction occur spontaneously?

Watch Video Solution

60. Write chemical equation for the enthalpy of combustion of ethanol.

Watch Video Solution

61. Name two thermodynamic properties which are addictive.

Watch Video Solution

62. Ammonia is prepared as $3H_2(g) + N_2(g) \rightarrow 2NH_3(g)$ what should be the sign of ΔS for this reaction?

Watch Video Solution

63. What are the units of entropy and free energy?

Watch Video Solution

64. How is free energy change related to equilibrium constant for the reaction?

Watch Video Solution

65. If standard free energy change for a reaction is found to be zero what is its equilibrium constant?

Watch Video Solution

66. $Cl_2(g) \rightarrow 2Cl(g) \Delta H^\circ = 242 KJmol^{-1}$ what is its enthalpy of atomization?

Watch Video Solution

67. Write down the statement of second law of thermodynamics.

Watch Video Solution

68. which of the following has greater fuel efficiency? Hydrogen,methane,LPG

Watch Video Solution

69. Write the mathematical formulation of the first law of thermodynamics.

Watch Video Solution

70. Give an example of a process where q=0

Watch Video Solution

71. under what condition heat of reaction of a chemical reaction becomes equal to internal energy change?

Watch Video Solution

72. Among the enthalpy of solution and enthalpy of hydration .which is always an exothermic process?

Watch Video Solution

73. Give an example of a spontaneous process where the randomness of the system decreases.

Watch Video Solution

74. Which has the more entropy?

1 moleH_2gas(T=300K, V=5mL)

1 moleH_2gas(T=300K, V=10mL)

Watch Video Solution

75. Which has the more entropy?

1 mole H_2 gas (T=300K ,V=10L)

1 mole H_2 gas (T=300K ,V=30L)

Watch Video Solution

76. When $\Delta G = 0$ the process will be at_____

Watch Video Solution

77. At what temperature entropy of a perfect crystalline substance is taken as zero?

Watch Video Solution

78. For the reaction $x + y \to p + q$ the value of ΔH is +a K cal what is the value of ΔH for the reaction $p + qradarx + y$?

Watch Video Solution

79. What happens when Mercuric iodide reacts with potassium iodide?

Watch Video Solution

80. When both ΔH and ΔS become (-ve) the process will be spontaneous at_____temprat ures.

Watch Video Solution

81. Which factor does remain constant in an isobaric process?

Watch Video Solution

82. Write the expression of Gibbs Helmholtz equation

Watch Video Solution

83. When is $\Delta S = \frac{\Delta}{T}$

Watch Video Solution

84. State first law of thermodynamics.

Watch Video Solution

85. A system absorbs 115J heat from the surroundings and 290 J work is done on the system calculate the change in internal energy of the system.

Watch Video Solution

86. Define system and surrounding.

Watch Video Solution

87. A gas absorbs 120J of heat and expands against the external pressure of 1.10 atm from a volume of 0.5 L to 2L what is the change in internal energy?(1 L atm=101.3J)

Watch Video Solution

88. What is enthalpy of a system?

Watch Video Solution

89. Show that at constant volume $\Delta U = q_v$

Watch Video Solution

90. Write one limitation of the first law of thermodynamics .

Watch Video Solution

91. The latent heat of evaporation of Bromine at $59^{\circ}C$ at 1 atm is 29.2 KJ/mol what are ΔH and ΔU of this process?

Watch Video Solution

92. Explain the term state function of a system

Watch Video Solution

93. for the reaction $2Cl(g) \rightarrow Cl_2(g)$ What are the signs of ΔH and ΔS ?

Watch Video Solution

94. To increase the temperature of 31.75 mm of Cu from $23^{\circ}C$ to $28^{\circ}C$,50 calorie of heat is required find

heat capacity of copper

Watch Video Solution

95. To increase the temperature of 31.75 mm of Cu from $23^\circ C$ to $28^\circ C$

,50 calorie of heat is required find

heat capacity of copper

▶ Watch Video Solution

96. To increase the temperature of 31.75 mm of Cu from $23^\circ C$ to $28^\circ C$

,50 calorie of heat is required find

heat capacity of copper

▶ Watch Video Solution

97. Which of the following are not state function?

Entropy,temperature,heat,enthalpy,internal energy,work

▶ Watch Video Solution

98. At $25^{\circ}C$ What is the difference between ΔH and ΔS for the following reaction? $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$

Watch Video Solution

99. Establish the relation between ΔH and ΔU for a gaseous system at constant temperature and pressure

Watch Video Solution

100. $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)\Delta H_r^{\circ} = -92.4KJ$

What is the standard enthalpy of formation of NH_3?

Watch Video Solution

101. Write Hess's law.

Watch Video Solution

102. Using the datas given calculate the heat of formation of ethylene.

$C(s)+O_2(g)\rightarrow CO_2(g), \Delta H=-97300 cal$

$H_2(g)+\frac{1}{2}O_2(g)\rightarrow H_2O(l), \Delta H=-68400 cal,$

C_2H_4(g)+3O_2(g)rarr 2CO_2(g)+2H_2O(l), Delta H=-333000 cal`

Watch Video Solution

103. Write the thermodynamic relation generally used to predict a reaction is spontaneous or not

Watch Video Solution

104. The heats of oxidation of Mg and Fe are given:

$Mg+\frac{1}{2}O_2\rightarrow MgO, \Delta H=-145700 cal$

$2Fe+\frac{3}{2}O_2\rightarrow Fe_2O_3, \Delta H=-193500 cal$ calculate the heat produced in the reaction $3Mg+Fe_2O_3=3MgO+2Fe$

Watch Video Solution

105. For the reaction at 298 k,2A +B rarr C, Delta H=$400 KJmol^{-1}$ and `Delta S=0.2 KJ k^(-1) mol^(-1). At what temperature will the reaction become spontaneous ?

Watch Video Solution

106. The equilibrium constant for a reaction is 10 what will be the value of ΔG°? [R=$8.314 JK^{-1} mol^{-1}$,T=300K]

Watch Video Solution

107. Diamond is an elementary substance.yet its standard heat of formation is not taken as zero why?

Watch Video Solution

108. The enthalpy change for the transition of liquid water to steam is $40.8 KJmol^{-1}$ at 373 K calculate the entropy of evaporation of water.

Watch Video Solution

109. 10 gm argon is compressed isothermally and reversibly at $27^{\circ} C$ from 10 L to 5L calculate q,w and ΔU for the process [R=2 cal K^(-1) mol^(-1)` At wt.of Ar=40]

Watch Video Solution

110. Enthalpy of neutralisation of any strong acid with a strong base is always constant.why so?

Watch Video Solution

111. Write down the dimension of entropy.

Watch Video Solution

112. Write the mathematical form of first law of thermodynamics for the following processes Adiabatic

Watch Video Solution

113. Write the mathematical form of first law of thermodynamics for the following processes isothermal

Watch Video Solution

114. Latent heat of fusion of tin is 14 cal/g calculate the change in entropy when 10 gm of tin is melted at $232^\circ C$,

Watch Video Solution

115. Enthalpies of solution of $(BaCl_2).(2H_2O)$ and $BaCl_2$ are 8.8 and $(-20.6)Kjmol^{-1}$ respectively calculate the heat of hydration of for conversion of $BaCl_2$ to $(BaCl_2).(2H_2O)$

Watch Video Solution

116. Which of the following state of bromine will have standard heat of formation to be equal to zero liquid bromine,solid bromine,gaseous bromine molecules.

Watch Video Solution

117. Calculate ΔH_r° for the reaction $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$ the average bond enthalpies of various bonds are

Bond $C-HO=OC=OO-HC=CBondenthalpy$KJ mol^(-1)`

414,499,724,460,619

Watch Video Solution

118. Heat of neutralisation of reaction between weak acid and weak base is less than that of reaction between strong base.explain why?

Watch Video Solution

119. Calculate the enthalpy of sublimation of Na metal from the following data given $\Delta H_fus^\circ = 2.6KJmol^{-1}$

$\Delta H_vap^\circ = 98KJmol^{-1}$

Watch Video Solution

120. Enthalpies of formation of CO(g),$CO_2(g)$, $N_2O(g)$ and $N_2O_4(g)$ are -110,-393,81 and $9.7KJmol^{-1}$ respectively calculate ΔH_r for the reaction :$N_2O_4(g) + 3CO(g) \rightarrow N_2O(g) + 3CO_2(g)$

Watch Video Solution

121. The ΔH_r° for the reaction $4S(s) + 6O_2(g) \rightarrow 4SO_3(g)$ is -1583.2 KJ calculate ΔH_f° of sulphur trioxide.

Watch Video Solution

122. Standard entropy of X_2, Y_2 and XY_3 are 60,40, and $50jk^{-1}mol^{-1}$ respectively for the reaction $\frac{1}{2}X_2 + \frac{3}{2}Y_2 \rightarrow XY_3, \Delta H = -30KJ$ what will be the temperature at equilibrium?

Watch Video Solution

123. What happens when phenol reacts with zinc dust?

Watch Video Solution

124. For a spontaneous reaction $\Delta H = (-ve)$,$k > 1$ and $E^\circ_{cell} = +ve$ are these informations correct or not?

Watch Video Solution

125. The bond dissociation energies of XY,X_2 and Y_2 (all diatomic molecules) are in the reaction 1:1:0:5 and $\Delta H_r$for the formation of XY is $-200KJmol^{-1}$ what will be the bond dissociation energy of X_2?

Watch Video Solution

126. Calculate the free energy change and entropy change per mole when liquid water boils at 1 atmosphere latent heat of vaporization of water= $2.0723KJmol^{-1}$

Watch Video Solution

127. What is the entropy change for dissolving 1 mole of NaCl at 298 K lattice energy = $+777.8KJmol^{-1}\Delta H_{Hydration}ofNaCl = -774.1KJmol^{-1}, \Delta G_{dissolution}o$

Watch Video Solution

128. Calculate the entropy change involved in the isothermal expansion of 5 mol of ideal gas from a volume of 10 L to 100 L at 300 k

Watch Video Solution

129. What is internal energy?

Watch Video Solution

130. if the internal energy of the system is decreased by 100 joule and heat released by the system is 80 joule then calculate work done by the system.

Watch Video Solution

131. Standard heat of formation of $C_2H_6(g), CO_2(g)$ and $H_2O(l)$ are -21.1,-94.1 and$-68.3Kcalmol^{-1}$ respectively calculate standard heat of combustion of $C_2H_6(g)$

Watch Video Solution

132. Define enthalpy of transition.

Watch Video Solution

133. Heat of combustion of rhombic and monoclinic sulphur be $-295.1KJmol^{-1}$ and $-297.4KJmol^{-1}$ respectively calculate the enthalpy of transition from monoclinic sulphur to rhombic sulphur

Watch Video Solution

134. Which is correct? (i) $H^{\circ}_{charcoal}=0$ (ii) $H^{\circ}_{gra\phi te}=0$

Watch Video Solution

135. From the following data calculate the heat of formation of caustic soda (NaOH)

$$Na(s) + H_2O + aq = NaOH(aq) + \frac{1}{2}H_2 + 98000cal$$

Watch Video Solution

136. Explain how Bakelite is formed from phenol?

Watch Video Solution

137. What is the monomer of $Nylon - 6$?

Watch Video Solution

138. Define Bond energy

Watch Video Solution

Watch Video Solution

139. The bond energy of $C-C, C=C$,H-H and C-H bond are 350 ,600,400 and $410KJmol^{-1}$ respectively calculate the change in enthalpy of the hydrogenation reaction of ethylene.

Watch Video Solution

140. Give example of the processes where the change in entropy will be equal to zero.

Watch Video Solution

141. under what condition an adiabatic process may become isentropic?

Watch Video Solution

142. Write down the statement of third law of thermodynamics.

Watch Video Solution

143. Calculate the standard entropy change of the following reaction at $25^{\circ}C : SO_2(g) + \frac{1}{2}O_2(g) \rightarrow SO_3(g)$ at $25^{\circ}C$ tempr.and 1 atm pressure the standard entropy of $SO_2(g)$, $O_2(g)$ and $SO_3(g)$ are 248.5,205.0 and $256.2JK^{-1}mol^{-1}$ respectively

Watch Video Solution

144. Predict the sign of entropy change is the following reactions

$O_2(g) + 2SO_2(g) \rightarrow 2SO_3(g)$

Watch Video Solution

145. Predict the sign of entropy change is the following reactions

$CaC_2O_4(s) \rightarrow CaCO_3(s) + CO(g)$

Watch Video Solution

146. Predict the sign of entropy change is the following reactions

$2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$

Watch Video Solution

147. Heat capacity (C_p) is an extensive property but specific heat (C) is an intensive property. What will be the relation between C_p and C for 1 mole of water ?

Watch Video Solution

148. Calculate $\triangle q, W, \triangle E$ for the isothermal reversible expansion of one mole of an ideal gas from an initial pressure of 1.0 bar to final pressure of 0.1 bar at a constant temperature of 273 K.

Watch Video Solution

149. 1 mol of an ideal gas undergoes reversible isothermal expansion from an initial volume V_1 to final volume 10 V_1 and does 10 kJ of work. The initial pressure was 1×10^7 Pa, Calculate the value of V_1.

Watch Video Solution

150. Calculate the amount of work done during the process when one mote of an ideal gas is allowed to expand freely into vacuum.

Watch Video Solution

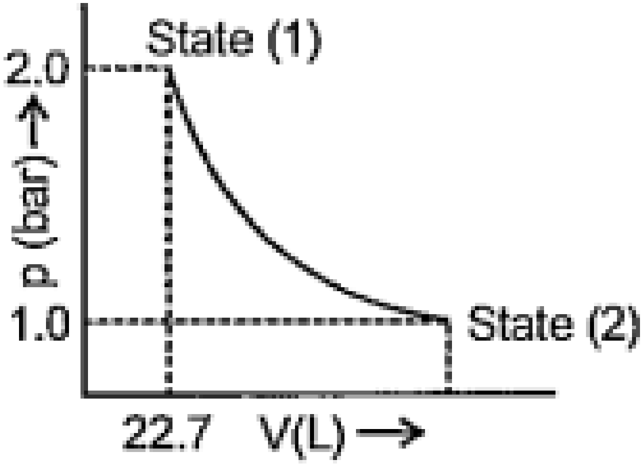
151. Two litres of an ideal gas at a pressure of 10 atm expands isothermally into a vacuum untill its total volume is 10 litres. How much heat is absorbed $\&$ how much work is done in the expansion ?

Watch Video Solution

152. Two litres of an ideal gas at a pressure of 10 atm expands isothermally into a vaccum until final volume is of 10 litres conducted reversibly. How much heat is absorbed ?

Watch Video Solution

153. 1.0 mole of a monoatomic ideal gas is expanded from state (1) to state (2) as shown in figure. Calculate the work done for the expansion of gas from state (1) to state (2) at 298 K



Watch Video Solution

154. One mole of an ideal gas at STP is heated to $27^\circ C$ and compressed to 1.5 atm. Calculate $\triangle E$ and $\triangle H$ for the change in state. Assume $C_v = \frac{3}{2}R$ for the ideal gas.

Watch Video Solution

155. Calculate heat of the following reaction at constant pressure, $F_2O(g) + H_2O(g) \rightarrow O_2(g) + 2HF(g)$ The heats of formation (in Kcal mol^{-1}) of $F_2O(g)$, $H_2O(g)$ and HF(g) are 5.5, -57.8and -64.2 respectively.

Watch Video Solution

156. If water vapour is assumed to be a perfect gas and molar enthalpy change for vapourisation of 1 mole of water at 1 bar $\&100^\circ C$ is 41 kJ mol^{-1}, calculate the intenal energy change when 1 mol of water is vapourised at 1 bar pressure $\&100^\circ C$

Watch Video Solution

157. If water vapour is assumed to be a perfect gas and molar enthalpy change for vapourisation of 1 mole of water at 1 bar $\&100^{\circ}C$ is 41 kJ mol^{-1}, calculate the intenal energy change when 1 mol of water is converted into ice.

Watch Video Solution

158. The enthalpy of combustion of methane, graphite & dihydrogen at 298 K are, $-890.3kJmol^{-1}$, $393.5kJmol^{-1}\&285.8kJmol^{-1}$' respectively. Enthalpy of formation of $CH_4(g)$ will be :

Watch Video Solution

159. Heat of reaction for,

$C_6H_{12}(s)+6O_2(g)\rightarrow 6CO_2(g)+6H_2O(l)$

at constant pressure is -651 kcal at $17^{\circ}C$. Calculate the heat of reaction at constant volume at $17^{\circ}C$.

Watch Video Solution

Watch Video Solution

160. Calculate the number of kJ of heat necessary to raise the temperature of 60.0 g of aluminium from $35^\circ C$ to $55^\circ C$. Molar heat capacity of Al is $24 J mol^{-1} K^{-1}$. Molar mass of $Al = 27 g mol^{-1}$.

Watch Video Solution

161. Enthalpies of formation of CO(g),$CO_2(g)$, $N_2O(g)$ and $N_2O_4(g)$ are -110,-393,81 and $9.7 KJ mol^{-1}$ respectively calculate ΔH_r for the reaction :$N_2O_4(g) + 3CO(g) \rightarrow N_2O(g) + 3CO_2(g)$

Watch Video Solution

162. Calculate the enthalpy change on freezing of 1.0 mole of water at $10^\circ C$ to ice at $-10^\circ C$, $\triangle_{fus} H = 6.03 kJ mol^{-1}$ at $0^\circ C$,

$C_p[H_2O(l)] = 75.3 J mol^{-1} K^{-1}$

$C_p[H_2O(s)] = 36.8 J mol^{-1} K^{-1}$

Watch Video Solution

163. Calculate the enthaply change for the process :

CCl_4(g) $\rightarrow$ C(g)+$4Cl(g)$ and calculate the bond enthalpy of $C-Cl$ in $CCl_4(g)$

$\triangle\ (vap))H^\circ(CCl_4)$= 30.5 kJ mol^{-1}

$\triangle\ fH^\circ(CCl_4)$ = -135.5 kJ mol^{-1}

$\triangle_a\ H^\circ(C) = 715.0 kJ\ mol^{-1}$

$\triangle_a\ H^\circ(Cl_2)(\text{atomisation}) = 242 kJ mol^{-1}$

Watch Video Solution

164. For an isolated system, $\triangle U=0$, what will be $\triangle S$?

Watch Video Solution

165. Calculate the entropy change in surroundings when 1.00 mole of $H_2O(l)$ is formed under standard conditions.

$\triangle_f H^\circ = 286 kJmol^{-1}$.

Watch Video Solution

166. For the reaction

$2A(g) + B(g) \rightarrow 2D(g), \; \triangle U^\circ = -10.5 kJ$ and

$\triangle S^\circ = -44.1 JK^{-1}$

Calculate $\triangle G^\circ$ for the reaction, and predict whetehr the reaction may occur spontaneously.

$(R = 8.314 \times 10^{-3} kJK^{-1}mol^{-1}, T = 298K)$

Watch Video Solution

167. Predict in the given question, entropy increases/ decreases

A liquid crystalizes into a solid

Watch Video Solution

168. Predict in the given question, entropy increases/ decreases

$2NaHCO_3(s) \rightarrow Na_2CO_3(s) + CO_2(g) + H_2O(g)$

Watch Video Solution

169. Predict in the given question, entropy increases/ decreases

$H_2(g) \rightarrow 2H(g)$

Watch Video Solution

170. For oxidation of Fe

$4Fe(s) + 3O_2(g) \rightarrow 2Fe_2O_3(s)$

entropy change is $-549.4 JK^{-1} mol^{-1}$ at 298K. Inspite of negative entropy change of this reaction, why is the reaction spontaneous ?

$\triangle H^\circ = -1648 \times 10^3 J mol^{-1}$

Watch Video Solution

171. For the reaction at 298K

$2A + B \rightarrow C$

$\triangle H = 400 kJ mol^{-1}, \triangle S = 0.2 kJK^{-1} mol^{-1}$

At what temperature will the reaction become spontaneous considering $\triangle H \& \triangle S$ to be constant over the temperature range.

Watch Video Solution

172. If the internal energy of an ideal gas decreases by the same amount as the work done by the system, the process is

A. cyclic

B. isothermal

C. adiabatic

D. isolated

Answer: C

Watch Video Solution

173. In which of the following pairs, both properties are intensive ?

A. Pressure, temperature

B. Density, volume

C. Temperature, density

D. Pressure, volume

Answer: C

Watch Video Solution

174. Which among the following represents the reaction of formation of the product ?

A. $C_{\diamond} + O_2(g) \rightarrow CO_2(g)$

B. $S_{monocl \in ic} + O_2(g) \rightarrow SO_2(g)$

C. $2N_2(g) + O_2(g) \rightarrow 2N_2O(g)$

D. None of the above

Answer: D

Watch Video Solution

175. The bond dissociation energies of two O-H bond in water are: $H_2O(g) \rightarrow H(g) + OH(g), \Delta H = 497.8 KJmol^{-1}$

$OH(g) \rightarrow H(g) + O(g), \Delta H = 428.5 KJmol^{-1}$ bond energy of O-H bond is

A. $498 kJmol^{-1}$

B. $463 kJmol^{-1}$

C. $428 kJmol^{-1}$

D. $70 kJmol^{-1}$

Answer: B

Watch Video Solution

176. For an ideal gas, the Joule Thomson coefficient is

A. zero

B. positive

C. negative

D. depends on atomicity of gas

Answer: A

Watch Video Solution

177. If 150 kJ 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 $3000 kJ mol^{-1}$

A. 75 g

B. 30 g

C. 180 g

D. 150 g

Answer: D

Watch Video Solution

178. For a particular reaction, $\triangle H^{\circ} = -38.3kJmol^{-1}$ and $\triangle S^{\circ} = -113JK^{-1}mol^{-1}$. This reaction is

A. spontaneous at all temperatures

B. non-spontaneous at all temperatures

C. spontaneous at temperature below $66^{\circ}C$

D. spontaneotis at temperature above $66^{\circ}C$

Answer: C

Watch Video Solution

179. For a process-to be in equilibrium, it is necessary that

A. $\triangle S_{system} = \triangle S_{surr}$

B. $\triangle S_{system} = - \triangle S_{surr}$

C. $\triangle S_{system} = 0$

D. $\triangle S_{surr} = 0$

Answer: B

Watch Video Solution

180. Which of the following statement(s) must be true for the entropy of a pure solid to be zero ?

I. The temperature must be zero kelvin

II. The solid must be perfectly crystalline

III. The solid must be an element

IV. The solid must be ionic

A. I

B. I AND II

C. I, II AND III

D. ALL ARE CORRECT

Answer: B

Watch Video Solution

181. Which of the following conditions may lead to a non-spontaneous change ?

A. $\triangle H = +ve, \ \triangle S = -ve$

B. $\triangle H = -ve, \ \triangle S = +ve$

C. $\triangle H = -ve, \ \triangle S = -ve$

D. $\triangle H = +ve, \ \triangle S = +ve$

Answer: A

Watch Video Solution

182. For the process, $NH_3(g) + HCl(g) \rightarrow NH_4Cl(s)$

A. $\triangle H = \ + ve, \ \triangle S = ve+$

B. $\triangle H = \ - ve, \ \triangle S = \ + ve$

C. $\triangle H = \ + ve, \ \triangle S = \ - ve$

D. $\triangle H = \ - ve, \ \triangle S = \ - ve$

Answer: D

Watch Video Solution

183. Which of the following statements Is false ?

A. Work is a state function

B. Temperature is a state function

C. Change in the state is completely defined when the initial and final states are specified

D. Work appears at the boundary of the system

Answer: A

Watch Video Solution

184. In thermodynamics, a process is called reversible when

A. the surroundings and system change into each other

B. there is no boundary between system and surroundings

C. the surroundings are always in equilibrium with the system

D. the system chariges into the surroundings spontaneously

Answer: C

Watch Video Solution

185. Which of the following is not correct for adiabatic process ?

A. $TV^{\gamma-1} = k$

B. $PV^{\gamma} = K$

C. $\gamma = \frac{C_v}{C_p}$

D. $PT^{\frac{\gamma}{1-\gamma}=K}$

Answer: C

Watch Video Solution

186. A piston filled with 0.04mole of an ideal gas expa nds teversibly from 50.0mL to 375mL at a constant temperature of $37.0^{\circ} C$. As It does so, it absorbs 208J of heat. The values of q and W for the process will be (R = 8.314J/mol K, In 7.5 = 2.01)

A. $q = -208J, w = +208J$

B. $q = +208J, w = +208J$

C. $q = +208J, w = -208J$

D. $q = -208J, w = -208J$

Answer: C

Watch Video Solution

187. Temperature of an ideal gas increases in

A. adiabatic expansion

B. adiabatic compression

C. isothermal expansion

D. isobaric expansion

Answer: B

Watch Video Solution

188. Which of the following statements is incorrect

A. The specific heat capacity of substance is greater in the solid state than in fiquid state.

B. The specific heat capacity of a substance is greater in gaseous state than in the liquid state

C. The latent heat of vaporization of a substance is greater than that of fusion.

D. The internal energy of an ideal gas is a function of its temparature.

Answer: B

Watch Video Solution

189. Which is equal to total work done ?

A. $P \triangle V$

B. $\triangle G$

C. $\triangle H$

D. $\triangle E$

Answer: A

Watch Video Solution

190. $\left(\frac{\delta \Delta H}{\delta P}\right)_T$ for an ideal gas is equal to

A. $\Delta V \frac{RT}{P}$

B. $T \Delta V \frac{R}{P}$

C. zero

D. $\left[\left(\delta \frac{\Delta V}{\delta T}\right.\right]$

Answer: C

Watch Video Solution

191. The standard enthalpy of formation of $H_2O(g)$ at 298 K is $-241.82kJmol^{-1}$, Calculate ΔH° at 373 K. Assume that C_p, is independent of temperature

$C_p^o of H_2O(g) = 33.58JK^{-1}mol^{-1}$

$C_p^o of H_2(g) = 28.84JK^{-1}mol^{-1}$

$C_p^o of O_2(g) = 29.37JK^{-1}mol^{-1}$

A. -242 kJ

B. $+242.6kJ$

C. $+24.26kJ$

D. -242.6 J

Answer: A

Watch Video Solution

192. Which of the following compounds has a positive enthalpy of solution?

A. LiF

B. LiCl

C. LiBr

D. LiI

Answer: D

Watch Video Solution

193. When a bomb calorimeter is used to determine the heat of reaction, which property of the system under investigation is most likely to remain constant ?

A. Number of molecules

B. Pressure

C. Temperature

D. Volume

Answer: D

Watch Video Solution

194. The heat of combustion of benzoic acid at constant volume is -321.3 kJ at $27^{\circ} C$. The heat of combustion at constant pressure is

A. -321.3 kJ

B. -317.54 kJ

C. $+322.54kJ$

D. $+321.3kJ$

Answer: B

Watch Video Solution

195. The molar heats of combustion of $C_2H_2(g), C(gra\phi te)$ and $H_2(g)$ are -310.62, -94.05, -68.32 kcal respectively. The heat of formation of acetylene Is

A. 54.2 kcal

B. -54.2 kcal

C. -68.32 kcal

D. $+68.32kcal$

Answer: B

Watch Video Solution

196. The standard molar heat of formation of ethane, CO_2 and `H_2O(l) are respectively -21.1, -94.1 and -68,3 kcal. The standard molar heat of combustion (in kcal) of ethane will be

A. -372

B. 162

C. -240

D. 183.5

Answer: A

Watch Video Solution

197. The standard enthalpies of formation of $CO_2(g), H_2O(l)$ and glucose (s) at $25^\circ C$ are -400 kJ/mol, -300 kJ/mol and -1300 kJ/mol, respectively. The standard enthalpy of combustion per gram of glucose at $25^\circ C$ Is

A. $+2900kJ$

B. -2900 kJ

C. -16.11 kJ

D. $+16.11kJ$

Answer: C

Watch Video Solution

198. When 1g of anhydrous oxalic acid is burnt at $25^\circ C$, the amount of heat liberated is 2.835 kJ. ΔH_{comb} is

A. 255.15 kJ

B. 445.65 kJ

C. -255.15 kJ

D. 155.16 kJ

Answer: C

Watch Video Solution

199. Calculate the enthalpy change when 50 mL of 0.01 M $Ca(OH)_2$ reacts with 25 mL of 0.01 M HCl. Given that ΔH_N°, of a strong acid and strong base Is 57.1 kJ.

A. 14.275 kJ

B. 14.275 J

C. $14.275 \times 10^3 kJ$

D. $14.375 \times 10^3 J$

Answer: B

Watch Video Solution

---

200. The enthalpy of neutralization of a strong acid by a strong base Is $-57.32 kJ eqv^{-1}$. The enthalpy of formation of waterts $-285.84 kJ eqv^{-1}$. The enthalpy of formation of hydroxyl ion is

A. $+228.52 kJ mol^{-1}$

B. -114.26 kJ mol^-1`

C. -288.52 kJ mol^-1`

D. $+114.2 kJ mol^{-1}$

Answer: C

Watch Video Solution

201. The enthalpy of solution of $BaCl_2(s)$ and $BaCl_{2.2}H_2O(s)$ are $-20.6kJmol^{-1}$ and $8.8kJmol^{-1}$. The enthalpy change for the formation of hydrated salt is

A. 29.8 kJ

B. -11.8 kJ

C. -20.6 kJ

D. -29.4 kJ

Answer: D

Watch Video Solution

202. The heat of solution of anhydrous $CuSO_4$ is -15.9 kcal and that of $CuSO_{4.5}H_2O$ is 2.8 kcal. the heat of hydration of $CuSO_4$ is

A. $+18.7kcal$

B. -18.7 kcal

C. -15.9 kcal

D. -2.8 kcal

Answer: B

Watch Video Solution

203. The heat of atomisation of $PH_3(g)$ is $228kcalmol^{-1}$ and that of $P_2H_4(g)$ is $355kcalmol^{-1}$ '. The energy of P-P bond is

A. 62 kcal

B. 51 kcal

C. 52 kcal

D. 53 kcal

Answer: B

Watch Video Solution

204. The enthalpy of vapourisation of liquid water using the data:

(i) $H_2(g) + \left(\frac{1}{2}\right)O_2(g) \rightarrow H_2O(l), \Delta H = -285.77k\frac{J}{m}ol,$

(ii) $H_2(g) + \left(\frac{1}{2}\right)O_2(g) \rightarrow H_2O(l), \Delta H = -241.84k\frac{J}{m}ol,$

A. $+43.93$

B. -43.93

C. $+527.61$

D. -527.61

Answer: A

Watch Video Solution

205. In reversible adiabatic process ΔS is

A. infinity

B. zero

C. equal to $C_v dT$

D. equal to $nR\frac{\ln V_2}{V_1}$

Answer: B

Watch Video Solution

206. For which of these processes is the value of ΔS negative

I. Sugar is dissolved in water.

II. Steam condenses on a surface

III. $CaCO_3$ is decomposed into CaO and CO_2

A. I ONLY

B. II ONLY

C. I AND III ONLY

D. II AND III ONLY

Answer: B

Watch Video Solution

207. The entropy change accompanying the heating of one mole of helium gas, assuming ideal behaviour from a temperature of 300 K to a temperature of 1000 K at constant pressure.

A. $25.17JK^{-1}mol^{-1}$

B. $20kJK^{-1}$

C. $2.517JK^{-1}mol^{-1}$

D. $0.2517JK^{-1}mol^{-1}$

Answer: A

Watch Video Solution

208. A reaction forwhich $\Delta H = -11.7 \times 10^3 Jmol^{-1}$ and $\Delta S = 105JK^{-1}mol^{-1}$ would be spontaneous when temperature is

A. equal to $111.4^\circ C$

B. equal to 111.4 K

C. $> 111.4K$

D. $< 111.4K$

Answer: D

Watch Video Solution

209. A gas expands adiabatically at constant pressure such that:

$$T \propto \frac{1}{\sqrt{V}}$$

The value of γ, i.e., $\left(\frac{C_p}{C_v}\right)$ of the gas will be

A. 1.3

B. 1.5

C. 1.7

D. 2

Answer: B

Watch Video Solution

210. One mole of an ideal gas expands reversibly and adiabatically from a temperature of $27^{\circ}C$. If the work done during the process is 3 kJ, then final temperature of the gas is ($C_V = 20\frac{J}{K}$)

A. 100K

B. 150K

C. 195K

D. 255K

Answer: B

Watch Video Solution

211. Enthalpy of formation of HF and HCl are -161 kJ mol^-1 and -92kJ mol^-1` respectively. Which of the following statements is incorrect?

A. HCl is more stable than HF

B. HF and HCl are exothermic compounds.

C. HF is more stable than HCl.

D. The affinity of fluorine to hydrogen is greater than the affinity of chlorine to hydrogen

Answer: A

Watch Video Solution

212. The standard enthalpy of fornation of NH_3 is $46 kJ mol^{-1}$.If the enthalpy of formation of H_2 from its atoms is $-436 kJ mol^{-1}$ and that of nitrogen is $-712 kJ mol^{1}$,the average bond enthalpy of N-H bond in NH_3 is

A. $+1056 kJ mol^{-1}$

B. $-1102 kJ mol^{-1}$

C. $-964 kJ mol^{-1}$

D. $+352kJmol^{-1}$

Answer: D

Watch Video Solution

213. The heat liberated when 1.89 g of benzoic acid is burnt in a bomb calorimeter at $25^\circ C$ increase the temperature of 18.94 kg of water by $0.632^\circ C$. If the specific heat of water at $25^\circ C$ is 0.998 cal/g-deg, the value of the heat of combustion of benzoic acid is

A. 881.1 cal

B. 771.4 cal

C. 981.1 cal

D. 871.2 cal

Answer: B

Watch Video Solution

214. Which of the following thermodynamic relation is conect ?

A. dG = VdP-SdT

B. $dU = PdV + TdS$

C. dH = TdS - VdP

D. $dG = VdP + SdT$

Answer: A

Watch Video Solution

215. Standard entropy of X_2, Y_2 and XY_3 are 60,40, and $50jk^{-1}mol^{-1}$ respectively for the reaction $\frac{1}{2}X_2 + \frac{3}{2}Y_2 \rightarrow XY_3, \Delta H = -30KJ$ what will be the temperature at equilibrium?

A. 750 K

B. 1000 K

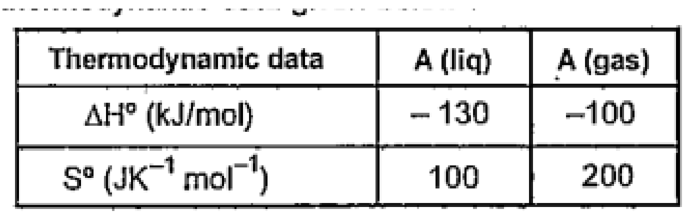
C. 1250 K

D. 500 K

Answer: A

Watch Video Solution

216. Assuming ΔH° and S° do not change with temperature, calculate the boiling point of liquid 'A' using the thermodynamic data given below :



Thermodynamic data	A (liq)	A (gas)
ΔH° (kJ/mol)	-130	-100
S° (JK^{-1} mol^{-1})	100	200

A. 300 K

B. 130 K

C. 150 K

D. 50 K

Answer: A

Watch Video Solution

217. The Haber's process for production of NH_3 involves the reaction :

$N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

Assuming ΔH o and ΔS o for the reaction do not change with temperature, which of the statements is true? (ΔH o =−95kJ and ΔS o =−190JK −1)

A. Ammonia dissociates spontaneously below 500 K

B. Ammonia dissociates spontaneously above 500 K

C. Ammonia disscciates at all temperatures

D. Ammonia does not dissociate at any temperature

Answer: B

Watch Video Solution

218. Which is/are the correct relationship(s) ?

A. $\left[\frac{dE}{dT}\right]_v \neq 0$ (for ideal gas)

B. $\left[\frac{dE}{dT}\right]_T = 0$ (for ideal gas)

C. $\left[\frac{dV}{dT}\right]_P = \frac{nR}{P}$ (for ideal gas)

D. $\left(\frac{\delta G}{\delta T}\right) = P$

Answer: B::C

Watch Video Solution

219. For the two equations given below :

$$H_2(g) + \frac{1}{2}O_2(g) \to H_2O(l) + x_1kJ$$
$$H_2(g) + \frac{1}{2}O_2(g) \to H_2O(g) + x_2kJ$$

Select the correct answer(s)

A. $x_1 > x_2$

B. $x_1 - x_2 > 0$

C. $x_1 = x_2$

D. $x_1 + x_2 = 0$

Answer: A::B

Watch Video Solution

220. $\Delta E = 0$, for which process(s)?

A. Cyclic process

B. Isothermal expansion

C. Isochoric process

D. Adiabatic process

Answer: A::B

Watch Video Solution

221. For a reaction to be spontaneous in neither direction, which of the following is/are correct regarding the closed system ?

$(\Delta G)_{T,P} = 0$

$(\Delta G)_{T,P} < 0$

$(\Delta S)_{U,V} = 0$

$(\Delta S)_{U,V} > 0$

A. A,B AND C ARE CORRECT

B. A IS CORRECT

C. B AND D ARE CORRECT

D. A and C IS CORRECT

Answer: B::D

Watch Video Solution

222. The standard enthalpies of formation of $CO_2(g)$ and HCOOH(l) are $-393.7kJmol^{-1}$ and $-409.2kJmol^{-1}$ respectively. Which of the following statements are correct?

A. $-393.7kJmol^{-1}$ is the enthalpy change for the reaction,

$C(s) + O_2(g) \rightarrow CO_2(g)$

B. The enthalpy change for the reaction,

$CO_2(g) + H_2(g) \rightarrow HCOOH(l)$, would be $-15.5 kJmol^{-1}$

C. The enthalpy change for the reaction,

$H_2O + CO \rightarrow HCOOH$, Is $-409.2 kJmol^{-1}$

D. The enthalpy change for the reaction,

$H_2(g) + CO_2(g) \rightarrow H_2O(l) + CO(g)$, is $-409.2 kJmol^{-1}$

Answer: A::B

Watch Video Solution

223. Which of the following is a state function as well as an extensive property ?

A. Temperature

B. Internal energy

C. Entropy

D. Heat capacity

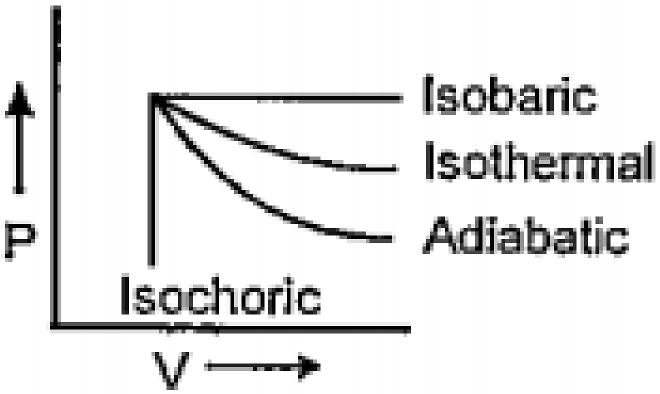
Answer: B::C::D

Watch Video Solution

224. If the system involves gaseous substance, then pressure volume work

$W_{pv} = -P_{ext}\Delta V$. It has been observed that,

$W_{rev} > W_{ir}$.



Also the work of isothermal & adiabatic processes are different from each

other :

$$W_{isothermalreversib\leq} = 2.303nRT\log\left(\frac{v_2}{v_1}\right)$$

$W_{adiabaticreversib\le} = -C_v(T_2 - T_1)$

If W_1, W_2, W_3, W_4 are work done in isothermal, adiabatic, isobaric & isochoric reversible processes, then correct sequence would be

A. $W_1 > W_2 > W_3 > W_4$

B. $W_3 > W_2 > W_1 > W_4$

C. `W_3 gt W_2 gt W_4 gt W_1

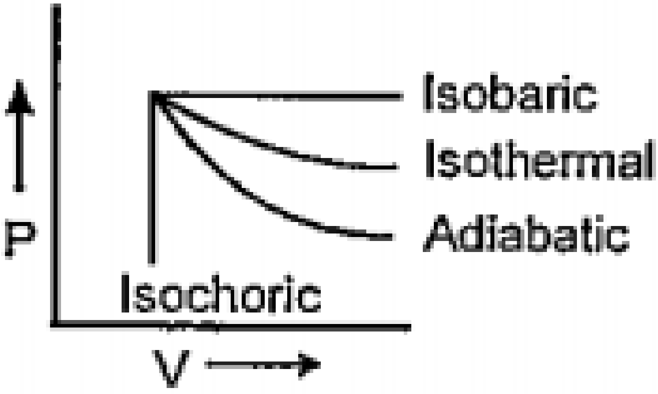
D. $W_3 > W_1 > W_2 > W_4$

Answer: D

Watch Video Solution

225. If the system involves gaseous substance, then pressure volume work $W_{pv} = -P_{ext}\Delta V$. It has been observed that,

$W_{rev} > W_{ir}$.

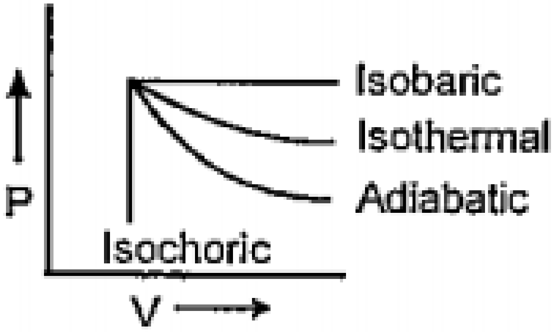


Also the work of isothermal $\&$ adiabatic processes are different from each other :

$$W_{isothermalreversib\le} = 2.303nRT\log\left(\frac{v_2}{v_1}\right)$$

$$W_{adiabaticreversib\le} = -C_v(T_2 - T_1)$$

P-V plot for two gases during adiabatic processes are given as follows :



Curves $A\&B$ should correspond to respectively

A. $He \& O_2$

B. $He \& Ar$

C. $O_2 \& He$

D. $O_2 \& F_2$

Answer: C

View Text Solution

226. ΔG of the system alone provides a criterion for the spontaneity of a process at constant temperature $\&$ pressure,

ΔG system < 0 (spontaneous)

$\Delta G system = 0 (equilibrium)$DeltaG$system$gt 0

$\{(non - spon \tan eous) Aga \in$ DeltaG^@

$isrelated \to theequilibriumcons \tan tas follows :$ DeltaG^@ =- 2.303 RT log K_eF or $aspon \tan eousreaction$Delta G and K_e` .... will be respectively

A. $-ve, +ve$

B. $+ve, \ -ve$

C. zero, zero

D. -ve, -ve

Answer: A

Watch Video Solution

---

227. ΔG of the system alone provides a criterion for the spontaneity of a process at constant temperature $\&$ pressure,

ΔG system < 0 (spontaneous)

ΔG system = 0 (equilibrium)

ΔG system > 0 {(non-spontaneous)

Again ΔG° is related to the equilibrium constant as follows :

$\Delta G^\circ = 2.303 RT \log K_e$

If both $\Delta H \text{ and } \Delta S$ are negative, the reaction will be spontaneous

A. at high T

B. at low T

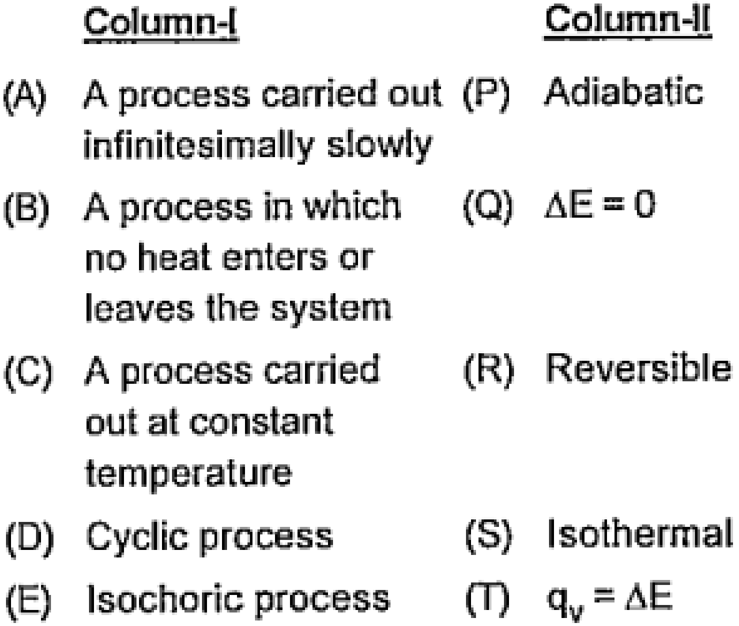
C. at all T

D. at absolute zero

Answer: B

Watch Video Solution

228. Match the Column-I with Column-II



	Column-I		Column-II
(A)	A process carried out infinitesimally slowly	(P)	Adiabatic
(B)	A process in which no heat enters or leaves the system	(Q)	$\Delta E = 0$
(C)	A process carried out at constant temperature	(R)	Reversible
(D)	Cyclic process	(S)	Isothermal
(E)	Isochoric process	(T)	$q_v = \Delta E$

Watch Video Solution

229. Match the Column-I with Column-II

	Column-I		Column-II
(A)	$H_2\ (g) + Cl_2(g) \rightleftharpoons 2\ HCl\ (g)$	(P)	$\Delta H = \Delta U + RT$
(B)	$N_2\ (g) + O_2\ (g) \rightleftharpoons 2NO\ (g)$	(Q)	$\Delta H = \Delta U$
(C)	$H_2(g) + I_2\ (s) \rightleftharpoons 2HI\ (g)$	(R)	$\Delta H = \Delta U - 2RT$
(D)	$N_2\ (g) + 3H_2\ (g) \rightleftharpoons 2NH_3\ (g)$	(S)	$\Delta H < \Delta U$
(E)	Perfectly crystalline solid	(T)	$\lim\limits_{T \to 0} S \to 0$

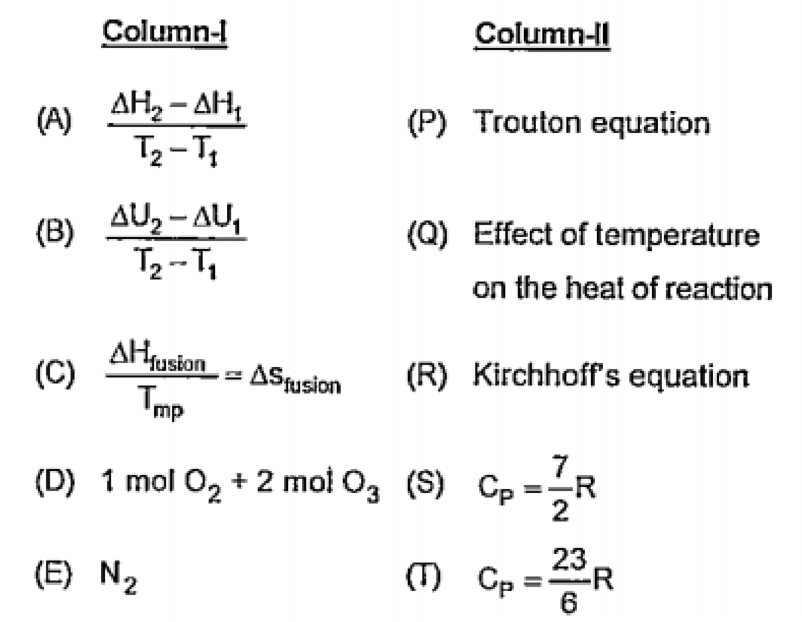
Watch Video Solution

230. Match the Column-I with Column-II

	Column-I		Column-II
(A)	$\Delta S_{Total} > 0$	(P)	W_{useful} done by system
(B)	$\Delta S_{Total} < 0$	(Q)	Second law of thermodynamics
(C)	ΔH	(R)	Non-spontaneous
(D)	$-\Delta G$	(S)	$\Delta U + \Delta nRT$

Watch Video Solution

231. Match the Column-I with Column-II



	Column-I		Column-II
(A)	$\frac{\Delta H_2 - \Delta H_1}{T_2 - T_1}$	(P)	Trouton equation
(B)	$\frac{\Delta U_2 - \Delta U_1}{T_2 - T_1}$	(Q)	Effect of temperature on the heat of reaction
(C)	$\frac{\Delta H_{fusion}}{T_{mp}} = \Delta S_{fusion}$	(R)	Kirchhoff's equation
(D)	1 mol O_2 + 2 mol O_3	(S)	$C_P = \frac{7}{2}R$
(E)	N_2	(T)	$C_P = \frac{23}{6}R$

Watch Video Solution

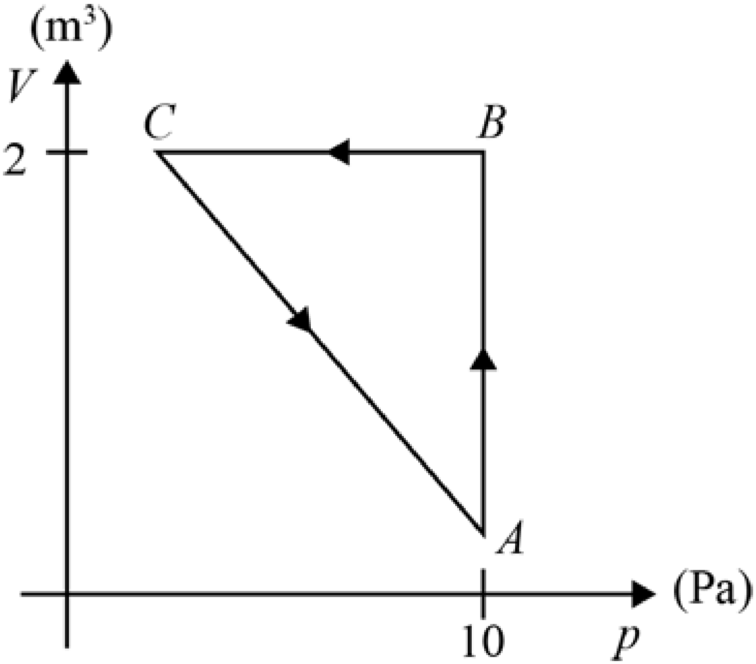
232. The enthalpy of neutralisation of oxalic acid by a strong base is -25.4 kcal/mol. The enthalpy of neutralisation of strong acid and strong base is $-13.7kcaleq^{-1}$. What is the enthalpy of dissociation (in kcat moL^{-1}) of oxalic acid ?

Watch Video Solution

233. 4.48 L of an ideal gas at STP requires 12 calories to taise its temperature by $15^{\circ} C$ at constant volume. What is the C_p (in cal) of the gas ?

Watch Video Solution

234. An ideal gas is taken through the cycle $A \rightarrow B \rightarrow C \rightarrow A$ as shown in figure. If net heat supplied to the gas in the cycle is + 5 J, what is the work done (in J) by the gas in the process $C \rightarrow A$?



Watch Video Solution

235. One mole of an ideal gas at 300 K is expanded ' isothermally from an Initial volume of (litre to 10 litre. What is the value of AE for this process ?

Watch Video Solution

236. 1 mole of an ideal gas is allowed to expand isothermally at $27^{\circ} C$ until its volume is tripted. What is the value of ΔS of universe when the expansion is carried out reversibly ?

Watch Video Solution

237. 1 mol of an ideal gas undergoes reversible isothermal expansion from an initial volume V_1 to final volume 10 V_1 and does 10 kJ of work. The initial pressure was 1×10^7 Pa, Calculate the value of V_1.

Watch Video Solution

238. 1 mole of an ideal gas undergoes reversible isothermal expansion from an initial volume V_1 to a final volume $10V_1$, and does 10 kJ of work. The initial pressure was 1 $\times$ 10^7 Pa.

If there were 2 mole of gas, what must its temperature would have been ?

Watch Video Solution

239. Two litre of N_2 at $0^\circ C$ and 5 atm pressure are expanded isothermally against a constant external pressure of 1 atm until the pressure of gas reaches 1 atm. Assuming gas to be ideai, calculate work of expansion.

Watch Video Solution

240. A 1.0 mol of ideal gas, initially at 10 atm and 300 K Is allowed to expand isothermally to 1.0 aim. as follows :

Inversible expansion against 1.0 atm

Determine the net work done by the system and describe the whole processes on p-V diagram.

Watch Video Solution

241. A 1.0 mol of ideal gas, initially at 10 atm and 300 K Is allowed to expand isothermally to 1.0 aim. as follows :

Inversible expansion against 1.0 atm

Determine the net work done by the system and describe the whole processes on p-V diagram.

Watch Video Solution

242. A sample of argon gas at 1 atm pressure and $27^{\circ}C$ expands reversibly and adiabatically from $1.25dm^{3}$ to $2.50dm^{3}$, Calculate the enthalpy change in this process, $C_{v,m}$, for argon is $12.48JK^{-1}mol^{-1}$,

Watch Video Solution

243. One mole of diatomic ideal gas undergoes a cyclic process ABC as shown in figure. The process BC is adiabatic. The temperatures at A, B and C are 400K, 800K and 600K respectively.Choose the correct statement: https://haygot.s3.amazonaws.com/questions/117871.png

A. The Change in the Internal energy in the process AB is -350R

B. The Change in the Internal energy in the process BC is -500R

C. The Change in the Internal energy in the whole cyclin process is 250R

D. The Change in the Internal energy in the process CA is 700R

Answer:

Watch Video Solution

244. Calculate, the ΔH at 85° for the reaction :

$Fe_2O_3(s) + 3H_2 \rightarrow 2Fe(s) + 3H_2O(l)$

The data are : $\Delta(298)^{\circ}$ = -33.29 kJ/mol and

Substance	$Fe_2O_3(s)$	Fe(s)	$H_2O(l)$	$H_2(g)$
C_p^{o} J/K mol	103.8	25.1	75.3	28.8

Watch Video Solution

245. The standard heats of formation at 298 K for $CCI_4(g)$,H_2O (g), CO_2 (g) and $HCI(g) are -25.5, -57.8, -94.1$ and $-22.1 kcal mol^{-1}$ respectively,calculate ΔH°_{298K}, for the reaction :

CCl_4 (g) + $2H_2O$ (g) to $CO_2(g)$ + $4HCI(g)$

Watch Video Solution

246. Show that the reaction $CO(g)+\frac{1}{2}O_2(g)\rightarrow CO_2(g)$ at 300 K is spontaneous and exothermic, when the standard entropy change is $-0.094 kJ mol^{-1}K^{-1}$. The standard Gibbs free energies of formation for CO_2 and CO are -394.4 and $-137 kJ mol^{-1}$, respectively.

Watch Video Solution

247. An isolated system is that system in which

A. there is no exchange of energy with the surroundings

B. there is exchange of mass and energy with the surroundings

C. there is no exchange of energy and mass with the surroundings

D. there is exchange of mass with the surroundings

Answer: C

Watch Video Solution

---

248. For a cycile process the condition(s) is/are

A. $\Delta U = 0$

B. $\Delta H = 0$

C. $\Delta U > 0$ and $\Delta H > 0$

D. Both $\Delta U = 0$ and $\Delta H = 0$

Answer: D

Watch Video Solution

249. Identify the intensive property from the following

A. enthalpy and temperature

B. volume and temperature

C. enthalpy and volume

D. temperature and refractive index

Answer: D

Watch Video Solution

250. The mathemeatical form of the first law of thermodynamics when q is the heat supplied and w the work done by the system is

A. $\Delta U = q + w$

B. $\Delta U = q - w$

C. $\Delta U = w - q$

D. $\Delta U = \; - q - w$

Answer: B

Watch Video Solution

251. Which one of the following is a state function?

A. Heat

B. Work

C. Internal energy

D. Potential energy

Answer: C,D

Watch Video Solution

252. Calculate the maximum work done by an ideal gas when pressure on 10 g of H_2 is reduced from 20 to 2 atm at a constant temperature 300 K.

A. -28.72 kJ

B. -28.72 J

C. -2.872 kJ

D. -2.872 J

Answer: A

Watch Video Solution

253. The work done when one mole of an ideal gas expands irreversibly under adiabatic condition can be given by the expression is

A. $-P_{ext}(V_2 - V_1)$

B. $-2.303RT\log\left(\frac{V_2}{V_1}\right)$

C. $-2.303RT\log\left(\frac{P_2}{P_1}\right)$

D. γ

Answer: A

Watch Video Solution

254. Two mole of an ideal gas is expanded isothermally and reversibly from 1 litre to 10 litre at 300 K. The enthapy change (in kJ) for the process is

A. 11.4 kJ

B. -11.4 kJ

C. 0 kJ

D. 4.8 kJ

Answer: C

Watch Video Solution

255. When a monoatomic gas undergoes an adiabatic process, its tempreature and volume are related by the equation TV^n= contant, the value of n will be

A. 1.33

B. 0.66

C. 2.33

D. 1

Answer: B

Watch Video Solution

256. A monoatomic gas X and a diatomic gas Y, both initially at the same temperature and pressure are compressed adiabatically (separately) from a volume V to V/2, which gas will be at higher temperature?

A. X

B. Y

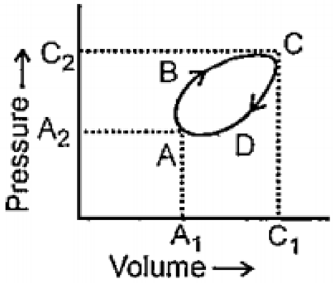
C. both are same

D. can't say

Answer: A

Watch Video Solution

257. A thermodynamic system undergoes a cyclic change as represented in the following P-V diagram



The net work done during the complete cycle is given by the area

A. Cycle ABCDA

B. AA_1C_1CDA

C. AA_2C_2C

D. half of area bounded by the curve

Answer: A

Watch Video Solution

258. If w_1, w_2, w_3 and w_4 are work done in isothermalm, adiabatic, isobaric and isochoric reversible processes, then the correct sequence (for expansion) would be

A. $w_1 > w_2 > w_3 > w_4$

B. $w_3 > w_1 > w_2 > w_4$

C. $w_3 > w_2 > w_1 > w_4$

D. $w_3 > w_2 > w_4 > w_1$

Answer: B

Watch Video Solution

259. Calculate ΔH for this reaction,

$H_2(g) + O_2(g) \rightarrow H_2O_2(g)$

$B_{H-H} = 436kJ, B_{O-O} = 142kJ, B_{O=O} = 499kJ, B_{O-H} = 460kJ$

A. -127 kJ

B. -209 kJ

C. -484 kJ

D. -841 kJ

Answer: A

Watch Video Solution

260. How much heat is absorbed in complete reaction of 3.00 g of SiO_2 with excess of carbon in the reaction given below?

$SiO_2(g) + 3C(s) \rightarrow SiC(s) + 2CO(g), \Delta H = 624.7kJ$

A. $1.33 \times 10^4 kJ$

B. $1.13 \times 10^5 kJ$

C. 5.06 kJ

D. 31.2 kJ

Answer: D

Watch Video Solution

261. Standard enthalpies of formation of O_3, CO_2, NH_3 and HI are 142.2, -393.2, -46.2 and $+25.9kJmol^{-1}$ respectively. The order of their increasing stabilities will be

A. O_3, CO_2, NH_3, HI

B. CO_2, NH_3, HI, O_3

C. O_3, HI, NH_3, CO_2

D. NH_3, HI, CO_2, O_3

Answer: C

Watch Video Solution

262. What should be the amount of heat released when an aqueous solution containing 0.5 mole of NHO_3 is mixed with 0.3 mole of OH^{-1} ? (enthalpy of neutralisation is -57.1 kJ)

A. 28.5 kJ

B. 17.1 kJ

C. 45.7 kJ

D. 1.7 kJ

Answer: B

Watch Video Solution

263. The difference between the heats of reaction at constant pressure and a constant volume for the reaction $2C_6H_6(l) + 15O_2(g) \rightarrow 12CO_2(g) + 6H_2O(l)$ at $25^\circ C$ in kJ is

A. -7.43

B. $+3.72$

C. -3.72

D. $+7.43$

Answer: A

Watch Video Solution

264. The value of ΔH_{comb} of four gases $C_2H_6, C_2H_4, C_2H_{10}, CH_4$ are given to be -1560, -1411, -2877 and $-890.4kJmol^{-1}$ respectively. Which of these is the best fuel?

A. C_2H_6

B. C_2H_4

C. C_2H_{10}

D. CH_4

Answer: D

Watch Video Solution

265. A solution of 500 mL of 0.2 M KOH and 500 mL of 0.2 M HCl are mixed and stirred, the rise in temperature is T_1. The experiment is repeated using 250 mL of each of the solution, the temperature rise is T_2. Which of the following is true?

A. $T_1 = T_2$

B. $T_1 = 2T_2$

C. $T_1 = 4T_2$

D. $T_2 = 9T_1$

Answer: A

Watch Video Solution

266. The standard heat of formation of $NO_2(g)$ and $N_2O_4(g)$ are 8.0 and $2.0 kcal mol^{-1}$ respectively. The heat of dimarization of NO_2 in kcal is:

A. 10

B. -6

C. -12

D. -14

Answer: D

Watch Video Solution

267. Given enthalpy of formation of $CO_2(g)$ and $CaO(s)$ are -94.0 kJ and -152 kJ respectively and the enthalpy of the reaction, $CaCO_3(s) \rightarrow CaS(s) + CO_2(g)$ is 42 kJ. The enthalpy of formation of $CaCO_3(s)$ is

A. -42 kJ

B. -202 kJ

C. $+202kJ$

D. -288 kJ

Answer: D

Watch Video Solution

268. $H_2(g) \rightarrow 2H(g), \Delta H = 104.2kcal$. The bond energy of H-H bond is

A. 104.2 kcal

B. 208.4 kcal

C. 52.1 kcal

D. zero

Answer: A

Watch Video Solution

269. Which compound will absorb the maximum amount of heat when dissolved in the same amount of water? (Integral heats of solution at $25^\circ C$ in kcal/mol of each solute are given in brackets)

A. $HCl(\Delta H = -17.74)$

B. $HHO_3(\Delta H = -7.85)$

C. $NH_4NO_3(\Delta H = +16.08)$

D. $NaCl(\Delta H = +1.02)$

Answer: C

Watch Video Solution

270. Heat evolved in the reaction, $H_2 + Cl_2 \rightarrow 2HCl$ is 182 kJ. Bond energies of H-H and Cl-Cl are 430 and 242 kJ/mol respectively. The H-Cl bond energy is

A. $245 kJmol^{-1}$

B. $427kJmol^{-1}$

C. $336kJmol^{-1}$

D. $154kJmol^{-1}$

Answer: B

Watch Video Solution

---

271. For which change $\Delta H \neq \Delta U$?

A. $H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$

B. $HCl(aq) + NaOH(aq) \rightarrow NaCl(aq) + H_2O(l)$

C. $C(s) + O_2(g) \Leftrightarrow CO_2(g)$

D. $N_2(g) + 3H_2(g) \rightarrow 2HN_3(g)$

Answer: D

Watch Video Solution

272. The enthalpies of combustion of carbon and carbon monoxide are -393.5 and $-283kJmol^{-1}$ respectively. The enthalpy of formation of carbon monoxide per mole is

A. -110.5 kJ

B. 676.5 kJ

C. -676.5 kJ

D. 110.5 kJ

Answer: A

Watch Video Solution

273. A particular reaction has $\Delta H = +250kJmol^{-1}$, which of the following statements is/are true?

I. Heat is given to the surroundings.

II. The reaction is endothermic.

III. Products are more stable than the reactants.

A. all are true

B. only II and III are true

C. only I, III are true

D. only II is true

Answer: D

Watch Video Solution

274. Combustion of octand takes place in an automobile engine. The homogeneous equation of combustion is:

$$C_8H_{18}(g) + \frac{25}{2}O_2(g) \rightarrow 8CO_2(g) + 9H_2O(g)$$

The signs of ΔH, ΔS and ΔG for the reaction will be

A. $+ve, \ -ve, \ +ve$

B. $-ve, \ +ve, \ -ve$

C. $-ve, \ +ve, \ +ve$

D. $+ve, \ +ve, \ -ve$

Answer: B

Watch Video Solution

275. Estimate the minimum temperature above which the raction will be spontaneous when $\Delta H = -176 kJ$ and $\Delta S = -284.5 JK^{-1}$

A. 582 K

B. 834 K

C. 634 K

D. 619 K

Answer: D

Watch Video Solution

276. ΔH and ΔS for a reaction are $+30.558 kJ mol^{-1}$ and $0.066 kJK^{-1} mol^{-1}$ at 1 atm pressure. The temperature at which free energy change is zero and the nature of the reaction below this temperature is

A. 483 K, spontaneous

B. 443 K, non-spontaneous

C. 443 K, spontaneous

D. 463 K, non-spontaneous

Answer: D

Watch Video Solution

277. For which of these processes is the value of ΔS negative

I. Sugar is dissolved in water.

II. Steam condenses on a surface

III. $CaCO_3$ is decomposed into CaO and CO_2

A. I only

B. II only

C. I and II only

D. II and III only

Answer: B

Watch Video Solution

278. The direct conversion of A to B is difficult, hence it is carried out by the following shown path:

$A \rightarrow C \rightarrow D \rightarrow B$, Given $\Delta S_{A \rightarrow C} = 50 unit$,

$\Delta S_{C \rightarrow D} = 30 unit$ and $\Delta S_{B \rightarrow D} = 20 unit$,

Therefore, total entropy change $\Delta S_{A \rightarrow B}$ is

A. $+100 unit$

B. $+60 unit$

C. $-100 unit$

D. $-60 unit$

Answer: B

Watch Video Solution

279. Identify the correct statement regarding a spontaneous process

A. For a spontaneous process in an isolated system, the change in entropy is positive

B. Endothermic processes are never spontaneous

C. Exothermic process are always spontaneous

D. Lowering of energy in the reaction process is the only criterion for spontaneity

Answer: A

Watch Video Solution

280. Given,

$$NH_3(g) + 3Cl_2(g) \Leftrightarrow NCl_3(g) + 3HCl(g), \ -\Delta H_1$$

$N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g), \ -\Delta H_2$

$H_2(g) + Cl_2(g) \Leftrightarrow 2HCl(g), \ -\Delta H_3$

The heat of formation of $NCl_3(g)$ in terms of ΔH_1, DeltaH_2 and DeltaH_3` is

A. $\Delta H_f = \Delta H_1 + \frac{\Delta H_2}{2} - \frac{3}{2}\Delta H_3$

B. $\Delta H_f = -\Delta H_1 + \frac{\Delta H_2}{2} - \frac{3}{2}\Delta H_3$

C. $\Delta H_f = -\Delta H_1 - \frac{\Delta H_2}{2} - \frac{3}{2}\Delta H_3$

D. None of the above

Answer: D

Watch Video Solution

281. C_V value of He is always 3/2 R. C_V value for hydrogen at low temperature is also 3R/2. C_V value of hydrogen gas at moderate temperature is

A. 3/2 R

B. 5/2 R

C. $> \frac{5}{2}R$

D. none

Answer: B

Watch Video Solution

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

A. $(T_f)_{irr.} > (T_f)_{rev.}$

B. $T_f > T_i$ for reversible process and $T_f = T_i$ for irreversible process

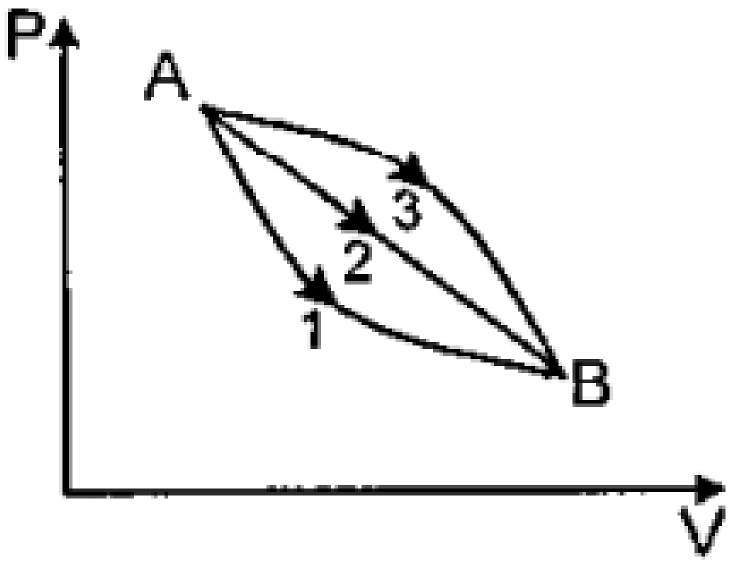
C. $(T_f)_{rev.} > (T_f)_{irr.}$

D. $T_f = T_i$ for both reversible and irreversible process

Answer: A

Watch Video Solution

283. A given mass of gas expands from the state A to state B by three paths 1, 2 and 3 as shown in the figure. If w_1, w_2 and w_3 respectively be the work done by the gas along three paths then



A. $w_1 > w_2 > w_3$

B. $w_1 < w_2 < w_3$

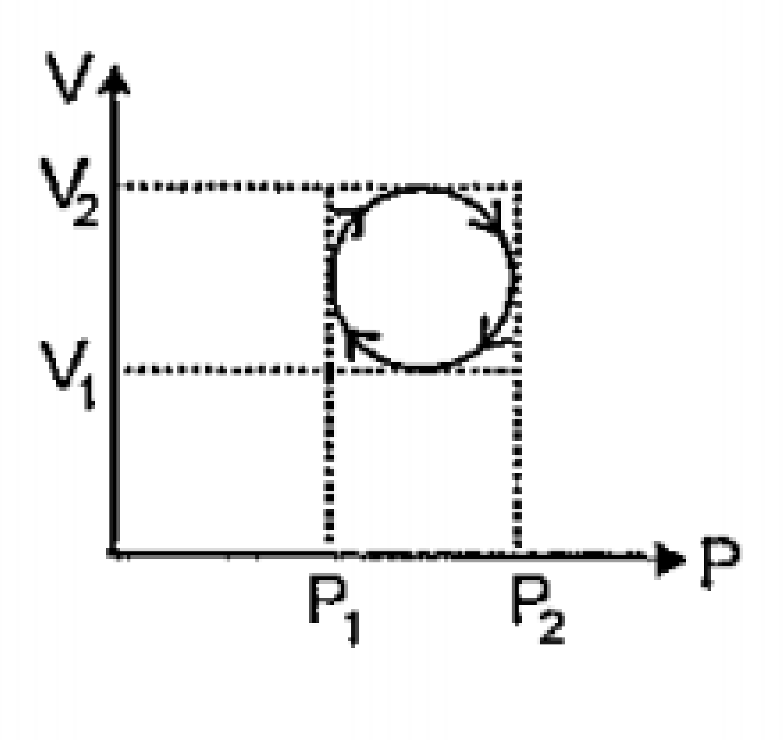
C. $w_1 = w_2 = w_3$

D. $w_2 < w_3 < w_1$

Answer: B

Watch Video Solution

284. In the cyclic process shown in P-V diagram, the magnitude of the work done is:



A. $\pi\left(\frac{P_2 - P_1}{2}\right)$

B. $\pi\left(\frac{V_2 - V_1}{2}\right)$

C. $\frac{\pi}{4}(P_2 - P_1)(V_2 - V_1)$

D. $\pi(V_2 - V_1)$

Answer: C

Watch Video Solution

285. The heat liberated when 1.89 g of benzoic acid is burnt in a bomb calorimeter at $25^\circ C$ increase the temperature of 18.94 kg of water by $0.632^\circ C$. If the specific heat of water at $25^\circ C$ is 0.998 cal/g-deg, the value of the heat of combustion of benzoic acid is

A. 881.1 kcal

B. 771.4 kcal

C. 981.1 kcal

D. 871.2 kcal

Answer: B

Watch Video Solution

286. 1 mole of NH_3 gas at $27^\circ C$ is expanded in reversible adiabatic condition to make volume 8 times $(\gamma = 1.33)$. Fimal temperature and work done respectively are

A. 150 K, 900 cal

B. 150 K, 400 cal

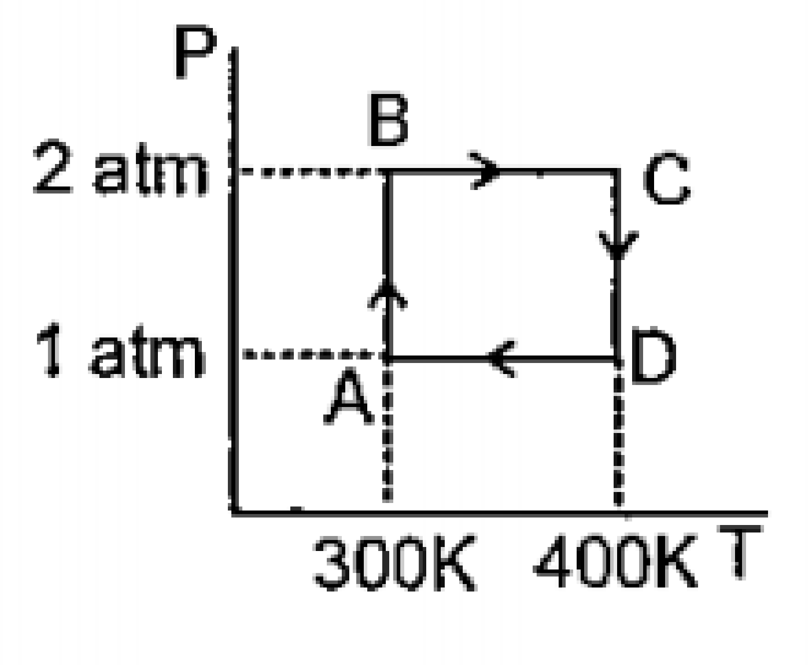
C. 250 K, 1000 cal

D. 200 K, 800 cal

Answer: A

Watch Video Solution

287. Two moles of Helium gas undergos a cyclic process as shown in figure. Assuming gas to be ideal, what is the net work involved in the cyclic process?



A. $-138 R \ln 2$

B. $+150 R \ln 2$

C. $+200 R \ln 2$

D. $-200 R \ln 2$

Answer: A

Watch Video Solution

288. Under the same conditions how many mL of 1 M KOH and $0.5 M H_2SO_4$ solution, respectively when mixed for a total volume of 100 mL produce the highest rise in temperature?

A. 67 and 33

B. 33 and 67

C. 40 and 60

D. 50 and 50

Answer: D

Watch Video Solution

289. Heat of neutralisation of oxalic acid is $-106.7 kJ mol^{-1}$ using NaOH. Hence ΔH of $H_2C_2O_4 \Leftrightarrow C_2O_4^{2-} + 2H^+$ is

A. 5.88 kJ

B. -5.88 kJ

C. -13.7 kJ

D. 7.5 kJ

Answer: D

Watch Video Solution

290. If a and b are arbitrary extensive variables then

A. (a+b) is an extensive variable

B. (a+b) is an intensive variable

C. a/b is an intensive variable

D. da/db is an intensive variable

Answer:

Watch Video Solution

291. During an adiabatic reversible expansion of an ideal gas

A. internal energy of the system decreases

B. temperature of the system decreases

C. The value of γ changes

D. pressure increases

Answer:

Watch Video Solution

292. Which is/are irreversible process(es)?

A. Mixing of two gases by diffusion

B. Evaporation of water at 373 K and 1 atm in a closed system

C. Dissolution of NaCl in water

D.

Answer:

Watch Video Solution

293. Which of the following is/are thermodynamically stable?

A. C (diamond)

B. C (graphite)

C. P_4 (white)

D. P_4 (black)

Answer:

Watch Video Solution

294. Which of the following expressions represent(s) work done by the isothermal reversible expansion of the ideal gas?

A. $-2.303nRT\log\left(\frac{V_2}{V_1}\right)$

B. $-2.303nRT\log\left(\frac{P_1}{P_2}\right)$

C. $-2.303nRT\log\left(\frac{V_1}{V_2}\right)$

D. $-2.303nRT\frac{dP}{dT}=\frac{\Delta V}{\Delta S}$

Answer:

Watch Video Solution

---

295. For the adiabatic expansion of an ideal gas

A. PV^{γ}= constant

B. $TV^{\gamma-1}$= constant

C. $TP^{1-\gamma}$= constant

D. none of the above

Answer:

Watch Video Solution

296. Which of the following is/are correct?

A. $\Delta H = \Delta U + \Delta(PV)$ when P and V both change

B. $\Delta H = \Delta U + P\Delta V$ When pressure is constant

C. $\Delta H = \Delta U + V\Delta P$ When volume is constant

D. $\Delta H = \Delta U + P\Delta V + V\Delta P$ when P and V both change

Answer:

Watch Video Solution

297. Which of the following statement(s) is/are correct?

A. The reaction between strong acid and strong base tekes place with evolution of energy.

B. $|\Delta H_N|$ of weak acid/strong base is less than $|\Delta H_N|$ of strong acid/strong base.

C. ΔH_N of strong acid/strong base is equal to the ΔH of formation of $H_2O(l)$ from its ions in aqueous medium.

D. ΔH_{net} (weak acid/strong base) - ΔH_{net} (strong acid/strong base) = $\Delta H_{ionization}$ (weak acid)

Answer:

Watch Video Solution

298. Which of the following reactions do(es)n't represent the standard state enthalpy of formation reaction?

A. $\frac{1}{2}H_2(g) + \frac{1}{2}Cl_2(g) \rightarrow HCl(g)$

B. $CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g)$

C. $N_2(g) + \frac{1}{2}O_2(g) \rightarrow N_2O(g)$

D. $Na^{+}(g) + Cl^{-}(aq) \rightarrow NaCl(s)$

Answer:

Watch Video Solution

299. In a reaction ΔH and ΔS both are more than zero. In which of the following cases, the reaction would not be spontaneous?

A. $\Delta H > T\Delta S$

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

C. $\Delta H = T\Delta S$

D. $\Delta G < 0$

Answer:

Watch Video Solution

300. This question has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I : Heat and work are "definite quantities".

Statements-II : Heat and work are not properties of a system, their values depend on the path of the process and vary accordingly.

A. Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I

C. Statement-I is true, Statement-II is false.

D. Statement-I is false, Statement-II is true.

Answer: D

Watch Video Solution

301. This question has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I : There is no change in inernal energy for an ideal gas at constant temperature.

Statement-II : Internal energy of an ideal gas is a function of temperature only.

A. Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I

C. Statement-I is true, Statement-II is false.

D. Statement-I is false, Statement-II is true.

Answer: A

Watch Video Solution

302. This question has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I : The heat absorbed during the isothermal expansion of an ideal gas against vacuum is zero.

Statement-II : The volume occupied by the molecules of an ideal gas is zero.

A. Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I

C. Statement-I is true, Statement-II is false.

D. Statement-I is false, Statement-II is true.

Answer: B

Watch Video Solution

303. This question has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I : The magnitude of the work involved in an isothermal expansion is greater than that involved in an adiabatic expansion.

Statement-II : P-V curve (P on y-axis and V on x-axis) decrease more rapidly for reversible adiabatic expansion compared to reversible isothermal expansion starting from same initial state.

A. Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I

C. Statement-I is true, Statement-II is false.

D. Statement-I is false, Statement-II is true.

Answer: A

Watch Video Solution

304. This question has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I : Entropy change in reversible adiabatic expansion of an ideal is zero.

Statement-II : The increase in entropy due to volume increase just compensate the decrease in entropy due to fall in temperature.

A. Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I

C. Statement-I is true, Statement-II is false.

D. Statement-I is false, Statement-II is true.

Answer: A

Watch Video Solution

305. This question has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I : The standard free energy changes of all spontaneously occuring reactions are negative.

Statement-II : The standard free energies of the elements in their standard states at 1 bar and 298 K are taken as zero.

A. Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I

C. Statement-I is true, Statement-II is false.

D. Statement-I is false, Statement-II is true.

Answer: B

Watch Video Solution

306. This question has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I : Enthalpy and entropy of any elementary substance in the standard states are taken as zero.

Statement-II : At absolute zero, particles of the perfectly crystalline substance become completely motionless.

A. Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I

C. Statement-I is true, Statement-II is false.

D. Statement-I is false, Statement-II is true.

Answer: D

Watch Video Solution

307. This question has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I : A reaction which is spontaneous and accompanied by decrease of randomness must be exothermic.

Statement-II : All exothermic reactions are accompanied by decrease of randomness.

A. Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I

C. Statement-I is true, Statement-II is false.

D. Statement-I is false, Statement-II is true.

Answer: C

Watch Video Solution

308. This question has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I : $|\Delta_f H|$ of $H_2O(l) > |\Delta_f H|$ of $H_2O(g)$

Statement-II : $\Delta H_{condensation}$ is negative.

A. Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I

C. Statement-I is true, Statement-II is false.

D. Statement-I is false, Statement-II is true.

Answer: A

View Text Solution

309. This question has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I : All combustion reactions are exothermic.

Statement-II : Enthalpies of products are greater than enthalpies of reactants $\left(\sum V_P \Delta_f H(P) > \sum V_R \Delta_f H(R)\right)$

A. Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I

C. Statement-I is true, Statement-II is false.

D. Statement-I is false, Statement-II is true.

Answer: C

Watch Video Solution

310. This question has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I : Enthalpy of neutralization of CH_3COOH by NaOH is less than that of HCl by NaOH.

Statement-II : Enthalpy of neutralization of CH_3COOH is less because of the absorption of heat in the ionization process.

A. Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I

C. Statement-I is true, Statement-II is false.

D. Statement-I is false, Statement-II is true.

Answer: A

Watch Video Solution

311. This question has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I : Internal energy of a real gas may change during expansion at constant temperature.

Statement-II : Internal energy of a real gas is a function of temperature and volume.

A. Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I

C. Statement-I is true, Statement-II is false.

D. Statement-I is false, Statement-II is true.

Answer: A

Watch Video Solution

312. This question has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I : Work is a state function which is expressed in joule.

Statement-II : Work appears only at the boundary of the system.

A. Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true, Statement-II is not a correct explanation of Statement-I

C. Statement-I is true, Statement-II is false.

D. Statement-I is false, Statement-II is true.

Answer: D

Watch Video Solution

313.

C_P for monoatomic gas is

A. 5R/2

B. 3R/2

C. 7R/2

D. R

Answer: A

Watch Video Solution

314. Molar heat capacity is heat required to raise the temperature of one mole of material by one degree, since heat is not a state function, the amount of heat required to produce a given change in its state depends on the path followed.

$C_P = \text{specific heat} \times \text{Molecular weight}.$ It is measured at constant pressure

$C_V = \text{specific heat} \times \text{Molecular weight.}$ It is measured at constant volume

Answer the following questions based on above passage:

The specific heat of a gas at constant volume is 0.075 cal/g. Predict the atomicity of the gas. Molar mass of gas is $40 gmol^{-1}$

A. 1

B. 2

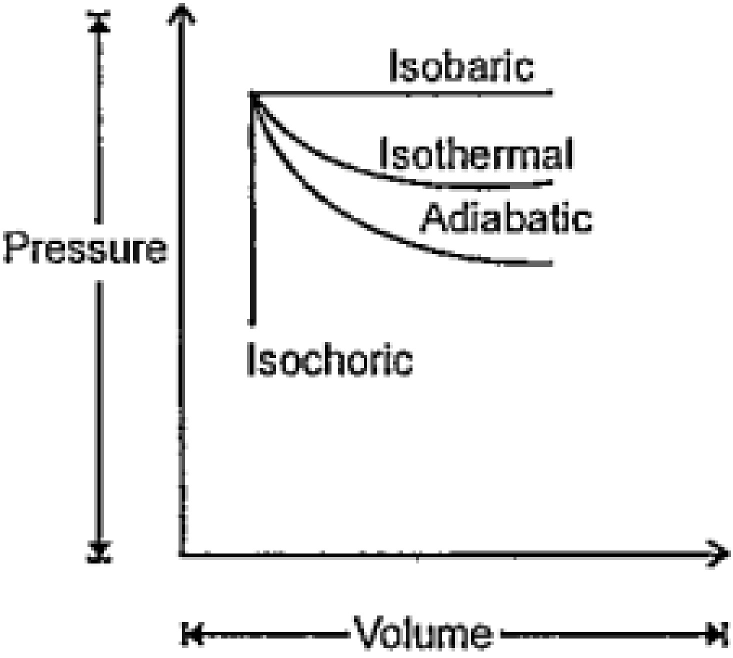
C. 3

D. none of the above

Answer: A

Watch Video Solution

315. Observe the following graphic representation of four basic thermodynamic processes.



Answer the following questions based on above passage:

Which of the following is true isochoric process?

A. $\Delta V = 0$

B. $\Delta E = dq + P\Delta V$

C. $\Delta E = q_v$

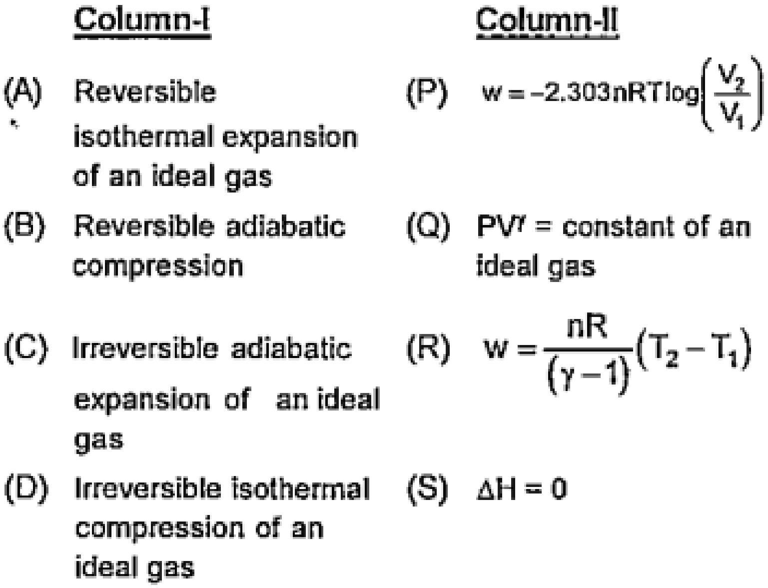
D. All of these

Answer: D

Watch Video Solution

Watch Video Solution

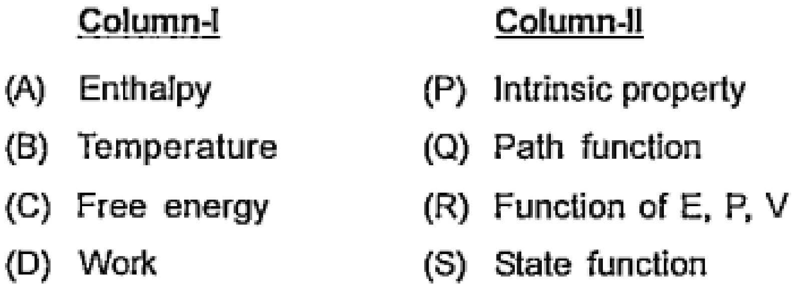
316. Match Column-I with Column-II



	Column-I		Column-II
(A)	Reversible isothermal expansion of an ideal gas	(P)	$w=-2.303nRT\log\left(\frac{V_2}{V_1}\right)$
(B)	Reversible adiabatic compression	(Q)	PV^{γ} = constant of an ideal gas
(C)	Irreversible adiabatic expansion of an ideal gas	(R)	$w=\frac{nR}{(\gamma-1)}(T_2-T_1)$
(D)	Irreversible isothermal compression of an ideal gas	(S)	$\Delta H=0$

Watch Video Solution

317. Match Column-I with Column-II



	Column-I		Column-II
(A)	Enthalpy	(P)	Intrinsic property
(B)	Temperature	(Q)	Path function
(C)	Free energy	(R)	Function of E, P, V
(D)	Work	(S)	State function

Watch Video Solution

318. 2 g of an organic compound is burnt completely in a bomb calorimeter at 289 K. The final temperature of calorimeter was found to be 298.5 K. Calorimeter constant is $400 JK^{-1}$ and molar mass of the compound is 50 g. What is the enthalpy of combustion per mol of the compound in kJ unit?

Watch Video Solution

319. When a current of x ampere from a 20.9 V battery is used for 4.0 s to heat 100 g water, its temperature increased by $1^{\circ}C$. Heat capacity of water is $4.18JK^{-1}$. If all the electrical energy is converted into thermal energy, what is x ?

Watch Video Solution

320. When 5.0 ml of 0.1 M HCl solution is mixed with 5.0 ml of a 0.1 M NaOH solution, the temperature of solution increases by 2 o C. Which of the following can be predicted accurately from this observation?

A. If 10ml of same HCl is mixed with 10ml of same NaOH, the temparature will be 4oC

B. If 10ml of 0.5M HCl is mixed with 10ml of 0.5M NaOH, the temparature will be 2oC

C. If 5 ml of 0.1 M HCl is mixed with 5 ml, 0.1 M NH 3 solution, the temperature rise will be less than 2 o C

D. If 5 ml, 0.1 M CH 3 COOH solution is mixed with 5 ml, 0.1 M NaOH solution, the temperature rise will be less than 2 o C

Answer:

Watch Video Solution

321. Calculate the work done by the reaction (in L. atm)

$Fe(s) + H_2SO_4(aq) \rightarrow FeSO_4(aq) + H_2(g)$

when 0.3125 mole of H_2 gas is collected at 273K at 1.0 atm.

Watch Video Solution

322. Calculate entropy change when 10 moles of an ideal gas expands reversibly and isothermally from an initial volume of 10 litre to 100 litre at 300K.

Watch Video Solution

323. A gas present in a cylinder filled with a frictionless piston expands aganist a constant pressure of 1 atm from a volume of 2 litre to a volume of 6 litre. In doing so, it absorbs 800 J heat from surroundings. Determine increase in internal energy of precess.

Watch Video Solution

324. Work done in expansion of an ideal gas from 4 litre to 6 litre against a constant external pressure of 2.5 atm was used to heat up 1 mole of water at 293K. If specific heat of water is $4.184Jg^{-1}K^{-1}$, what is the final temperature of water?

Watch Video Solution

325. Calculate the maximum work done in expanding 16 g of oxygen at 300K and occupying a volume of $5dm^5$ isothermally until the volume becomes $25dm^5$.

Watch Video Solution

326. One mole of an ideal monoatomic gas is heated at constant pressure from $0^{\circ} C$ to $100^{\circ} C$.

Calculate work done.

Watch Video Solution

327. One mole of an ideal gas is heated at constant pressure from 0 o C to 100 o C. (a) Calculate work done. (b) If the gas is expanded isothermally and reversibly at 0 o C from 1 atm to some other pressure P 1 . what must be the final pessure if the maximum work is equal to the work involved in (a)?

Watch Video Solution

328. Calculate ΔH° for $2Al + Fe_2O_3 \rightarrow 2Fe + Al_2O_3$ given that standard heat enthalpy of Fe_2O_3 and Al_2O_3 are -196.5 and

$-399.1kcalmol^{-1}$

Watch Video Solution

329. The heat liberated on complete combustion of 7.8 g benzene is 327 kJ. Calculate heat of combustion measured at constant volume and at $27^{\circ}C.$

Watch Video Solution

330. Calculate heat of combustion of benzene at constant pressure at $27^{\circ}C. \left(R=8.3Jmol^{-1}K^{-1}\right)$

Watch Video Solution

331. The enthalpy change involved in the oxidation of glucose is $-2880kJmol^{-1}$. Twenty five percent of this energy is available for muscular work. If 100 kJ of muscular work is needed to walk one kilomtere, what is the maximum distance that a person will be able to walk after eating 120 g of glucose?

Watch Video Solution

332. The heat of formation of ethane is -20.3 kcal. Calculate the bond energy of C–C bond in ethane if the heats of atomisation of carbon and hydrogen are respectively 170.9 and 52.1 kcal per mole and bond energy of C–H bond is 99.0 kcal.

Watch Video Solution

333. Calculate the resonance energy ofN_2O from the following data $\Delta_1H^0 of N_2O = 82kJmol^{-1}$ for the reaction $N_2(g) + \frac{1}{2}O_2(g) \rightarrow N_2O(g)$ Bond energy of $N = N, N = N, O = O$ and $N = 0$ bonds are 946,418,498 and $607kJmol^{-1}$ respectively.

Watch Video Solution

334. The following reaction is performed at 298 K.

$2NO(g) + O_2(g) \rightarrow 2NO_2(g)$

The standard free energy of formation of NO(g) is 86.6 kJ/mol at 298 K. What is the standard free energy of formation of $NO_2(g)$ at 298 K?(K_p= 1.6×10^{12})

A. $86600 + R(298)\ln(1.6 \times 10^{12})$

B. 86600 - $\left(\frac{\ln(1.6 \times 10^{12})}{R(298)}\right)$

C. $0.5[2 \times 86, 600 - R(298)\ln(1.6 \times 10^{12}]$

D. $R(298)\ln(1.6 \times 10^{12}) - 86600$

Answer: C

Watch Video Solution

335. The standard Gibbs energy change at 300 K for the reaction $2A \Leftrightarrow B + C$ is 2494.2 J. At a given time, the composition of the reaction mixture is [A] =1/2, [B] = 2 and [C] = 1/2. The reaction proceeds in the:[R = 8.314 JK/mol,e = 2.718]

A. reverse direction because $Q > K_c$

B. forward direction because $Q < K_c$

C. reverse direction because $Q < K_c$

D. forward direction because $Q > K_c$

Answer: A

Watch Video Solution

336. For the reaction $X_2Y_4(l) \rightarrow 2XY_2(g)$ at 300 K the values of ΔU and ΔS are 2 kCal and $20 Cal K^{-1}$ respectively. The value of ΔG for the reaction is

A. -3400 cal

B. 3400 cal

C. -2800 cal

D. 2000 cal

Answer: C

Watch Video Solution

337. The values of ΔH and ΔS of a certain reaction are $-400kJmol^{-1}$ and $-20kJmol^{-1}$ respectively. The temperature below which the reaction is spontaneous is

A. $100^{\circ}K$

B. $20^{\circ}C$

C. $20^{\circ}K$

D. $120^{\circ}C$

Answer: C

Watch Video Solution

338. The enthalpy of vaporization of a certain liquid at its boiling point of $35^\circ C$ is $24.64 kJ mol^{-1}$. The value of change in entropy for the process is

A. $704 J K^{-1} mol^{-1}$

B. $80 J K^{-1} mol^{-1}$

C. $24.64 J K^{-1} mol^{-1}$

D. $7.04 J K^{-1} mol^{-1}$

Answer: B

Watch Video Solution

339. Given that

$C + O_2 \rightarrow CO_2$; $\Delta H^\circ = -x$ kJ

$2CO + O_2 \rightarrow 2CO_2$; $\Delta H^\circ = -y$ kJ

The heat of formation of carbon monoxide will be

A. (y-2x)/2

B. y+2x

C. 2x-y

D. (2x-y)/2

Answer: A

Watch Video Solution

340. The value of ΔH for cooling 2 mole of an ideal monoatomic gas from $225^{\circ} C$ to $125^{\circ} C$ at constant pressure will be $C_P = \frac{5}{2} R]$

A. 250 R

B. -500 R

C. 500 R

D. -250 R

Answer: B

Watch Video Solution

341. For a spontaneous process, the correct statement(s) is (are)

A. $\left(\Delta G_{system}\right)_{T,P} > 0$

B. $\left(\Delta S_{system}\right) + \left(\Delta S_{surround \in gs}\right) > 0$

C. $\left(\Delta G_{system}\right)_{T,P} < 0$

D. $\left(\Delta U_{system}\right)_{T,V} > 0$

Answer: B::C

Watch Video Solution

342. Which of the following statements is correct for the spontaneous absorption of a gas?

A. ΔS is negative and therefore, ΔH should be highly positive

B. ΔS is negative and therefore, ΔH should be highly negative

C. ΔS is negative and therefore, ΔH should be negative

D. ΔS is positive are therefore, ΔH should also be highly positive

Answer: B

Watch Video Solution

343. For the reaction $X_2O_4(l) \rightarrow 2XO_2(g)$,DeltaU = 2.1 kcal, DeltaS = 20 cal K^{-1} at 300k

Hence, ΔG is

A. 2.7 kcal

B. -2.7 kca,

C. 9.3 kcal

D. -9.3 kcal

Answer: B

Watch Video Solution

344. The ratio of heats liberated at 298K from the combustion of one kg of coke and byburning water gas obtained from 1kg of coke Is (Assume coke to be 100% carbon). (Given : enthalpies of combustion of CO_2, CO and H_2 are 393.5 kJ, 285 kJ, 285 kJ respectively all at 298K)

A. 0.79:1

B. 0.69:1

C. 0.80:1

D. 0.96:1

Answer: B

Watch Video Solution

345. Conversion of oxygen into ozone is non-spontaneous at

A. all temperature

B. high temperature

C. room temperature

D. low temperature

Answer: A

Watch Video Solution

346. For an ideal binary liquid mixture

A. $\Delta S_{mix} = 0, \Delta G_{mix} = 0$

B. $\Delta H_{mix} = 0, \Delta S_{mix} < 0$

C. $\Delta V_{mix} = 0, \Delta G_{mix} > 0$

D. $\Delta S_{mix} > 0, \Delta G_{mix} < 0$

Answer: D

Watch Video Solution

347. The work done when one mole of an idea! gas is compressed form a volume of $5m^3$ to $1dm^3$ at 300 K, under a pressure of 100 kPa is

A. 499.8 kJ

B. -499.9 kJ

C. -99.5 kJ

D. 42495 kJ

Answer: A

Watch Video Solution

348. Assuming enthalpy of combustion of hydrogen at 273K is -286 kJ/mol and enthalpy of fusion of ice at the same temperature to be +6.0 kJ/mole, calculate enthalpy change during formation of 100g of ice.

A. $+1622kJ$

B. -1622 kJ

C. $+292kJ$

D. -292 kJ

Answer: B

Watch Video Solution

349. A piston filled with 0.04mole of an ideal gas expa nds teversibly from 50.0mL to 375mL at a constant temperature of $37.0^{\circ}C$. As It does so, it absorbs 208J of heat. The values of q and W for the process will be (R = 8.314J/mol K, In 7.5 = 2.01)

A. $q = +208J, W = -208J$

B. q = -208 J, W = -208 J

C. $q = -208J, W = +208J$

D. $q = +208J, W = +208J$

Answer: A

Watch Video Solution

350. If ΔG for a reaction is negative, you infer that the change is

(1)spontaneous

(2) non-spontaneous

(3) reversible

(4) irreversible

(5) equilibrium

Watch Video Solution

351. In order to decompose 9g water 142.5 kJ heat is required. Hence, the enthalpy of formation of water is

A. -142.5 kJ/mole

B. +142.5 kJ/mole

C. -285 kJ/mole

D. +285 kJ/mole

Answer: C

Watch Video Solution

352. The enthalpy of combustion of $C_6H_6(l)$ is -3250 kJ. When 0.39 g of benzene Is burnt in excess of oxygen in an open vessel, the amount of heat liberated is

A. 16.25 J

B. 16. 25 kJ

C. 32.5 J

D. 32.5 J

Answer: B

Watch Video Solution

353. The intensive property among these quantities is

A. enthalpy

B. mass/volume

C. mass

D. volume

Answer: B

Watch Video Solution

---

354. Hess's law states that

A. the standard enthalpy of an overall reaction is the sum of the enthalpy changes in individual reactions

B. enthalpy of formation of a compound is same as the enthalpy of decomposition of the compound into constituent elements, but with opposite sign

C. at constant temperature the pressure of a gas is inversely proportional to its volume

D. the mass of a gas dissolved per litre of a solvent is proportional to the pressure of the gas in equilibrium with the solution

Answer: A

Watch Video Solution

355. A gas can expand from 100 mL to 250 mL. under a constant pressure of 2 atm. The work done by the gas is

A. 30.38 J

B. 25 J

C. 5 kJ

D. 16 J

Answer: A

Watch Video Solution

356. For a Process to be spontaneous

A. ΔG must be -ve

B. ΔG should be $+ve$

C. ΔH must be -ve

D. ΔS must be -ve

Answer: A

Watch Video Solution

357. Assertion ΔH and ΔE are almost the same for the reaction,

$N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$

Reason All reactants and products are gases.

A. If both Assertion and Reason are true and reason is correct explanation of Assertion

B. If both Assertion and Reason are true but reason is not the correct explanation of Assertion

C. If Assertion is true but Reason is false

D. If both Assertion and Reason are false

Answer: B

Watch Video Solution

358. Assertion The increase in internal energy (ΔE) for the vaporisation of one mole of water at 1 atm and 373 Kis zero.

Reason For all isothermal processes $\Delta E = 0$.

A. if both Assertion and Reason are true and Reason is the correct explanation of Assertion

B. if both Assertion and Reason are true but Reason is not the correct explanation of Assertion

C. If Assertion is true but Reason is false

D. If both Assertion and Reason are false

Answer: A

Watch Video Solution

---

359. Which of the following has ΔS° greater than zero?

A. $CaO(s) + CO_2(g) \Leftrightarrow CaCO_3(s)$

B. $NaCl(aq) \Leftrightarrow NaCl(s)$

C. $NaNO_3(s) \Leftrightarrow Na^+(aq) + NO_3^{-(aq)}$

D. $N_2(s) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

Answer:

Watch Video Solution

360. The heat of reaction for

$C_{10}H_8(s)$ + $12O_2$,(g) $\rightarrow$ $10CO_2$,(g) +$4H_2O(l)$ at constant volume is -1228.2 kcal at $25^{\circ}C$. The heat of reaction at constant pressure and same temperature Is

A. -1228.2 kcal

B. -1229.3 kcal

C. -1232.9 kcal

D. -1242.6 kcal

Answer: C

Watch Video Solution

361. Which law states entropy of all pure crystalline solids is zero at absolute zero ?

A. First law of thermodynamics

B. Second law of thermodynamics

C. Third law of thermodynamics

D. Hess's law

Answer: B

Watch Video Solution

362. The enthalpies of formation of $C_2H_2(g)$ and $C_6H_6(g)$ at 298 K are 230 and 85 kJ/mol respectively. The enthalpy change for the reaction $3C_2H_2(g) \rightarrow C_6H_6(g)$ is

A. 605 kJ/mol

B. 865 kJ/mol

C. -605 kJ/mol

D. -865 kJ/mol

Answer: C

Watch Video Solution

363. For an ideal gas, the Joule Thomson coefficient is

A. Zero

B. negative

C. positive

D. depend on molecular weight

Answer: C

Watch Video Solution

364. The relation of ΔH and ΔE is represented as

A. $\Delta H = \Delta E - P\Delta V$

B. $\Delta E = \Delta H - P\Delta V$

C. $\Delta H = \Delta E + \Delta n_g RT$

D. $\Delta E = \Delta V + \Delta H$

Answer: A

Watch Video Solution

365. Calculate the temperature at which $\Delta G = -5.2 kJmol^{-1}, \Delta H = 145.6 kJmol^{-1}$ and $\Delta S = 216 JK^{-1}mol^{-1}$ for a chemical reaction

A. $698.1^\circ C$

B. 698.1K

C. 130 K

D. $130^\circ C$

Answer: C

Watch Video Solution

366. When ice melts into water entropy

A. becomes zero

B. decreases

C. increase

D. remains the same

Answer: C

Watch Video Solution

367. Which of the following Is not the extensive property?

A. Gibbs free energy

B. Enthalpy

C. Entropy

D. Viscosity

Answer: C

Watch Video Solution

368. $C(s)+O_2(g)\vec{C}O_2(g)\Delta H=-94kcal$

$CO+\frac{1}{2}O_2(g)\vec{C}O_2(g)\Delta H=135.2kcal$

The heat of formation of CO(g) is ?

Watch Video Solution

369. In order to decompose 9g water 142.5 kJ heat is required. Hence, the enthalpy of formation of water is

A. -142.5 kJ

B. $+142.5kJ$

C. -285 kJ

D. `+285 kJ

Answer: A

Watch Video Solution

370. The enthalpy of combustion of $C_6H_6(l)$ is -3250 kJ. When 0.39 g of benzene Is burnt in excess of oxygen in an open vessel, the amount of heat liberated is

A. 16.26 J

B. -16.25 J

C. 32.5 J

D. 32.5 kJ

Answer: C

Watch Video Solution

371. For the reaction $H_2O(s) \Leftrightarrow H_2O(l)$ at $0^\circ C$ and normal pressure

A. $\Delta H > T\Delta S$

B. $\Delta H = T\Delta S$

C. $\Delta H = \Delta G$

D. $\Delta H < T\Delta S$

Answer: B

Watch Video Solution

372. $H_2 + Cl_2 \overrightarrow{2} HCl, \Delta H = 194 kJ$ In this reaction heat of formation of HCl in kJ is

A. $+914 kJ$

B. $+97 kJ$

C. $-97 kJ$

D. -194 kJ

Answer: B

Watch Video Solution

373. $N_2(g)+6H_2(g)\overrightarrow{4}NH_3(g)$ What is the enthalpy of the above reaction when the enthalpy formation of ammonia is $-46kJmol^{-1}$?

A. 184 kJ

B. -184 kJ

C. 46 kJ

D. -46 kJ

Answer: B

Watch Video Solution

374. $N_2(g)+3H_2(g)\rightarrow 2NH_3(g)$. For the above reaction the correct statement is

A. $\Delta H < \Delta E$

B. $\Delta H = \Delta E$

C. $\Delta H > \Delta E$

D. None of these

Answer: A

Watch Video Solution

375. A chemical process is carried out in a thermostat maintained at $25^\circ C$, it is known as

A. isothermal

B. isobaric

C. adiabatic

D. isoentropic

Answer: A

Watch Video Solution

376. Identify the correct statement from the following in a chemical reaction.

A. The entropy always increases

B. The change in entropy along with suitable change in enthaply decides the rate of reaction

C. The enthalpy always decreases

D. Both the enthalpy and the entropy remain constant

Answer: B

Watch Video Solution

377. The incorrect expression among the following is

A. $\frac{\Delta G_{system}}{(\Delta S_{\rightarrow tal}) = T}$

B. In isothermal process, $W_{reversib\le} = -nRtIn\frac{V_f}{V_i}$

C. In $K = \frac{\Delta H^\circ - T\Delta S^\circ}{RT}$

D. $K = e^{\frac{-\Delta G}{RT}}$

Answer: C

Watch Video Solution

378. A sample of liquid in a thermally insulated container is stirred for 1h by a mechanical attachment to a motor in the surroundings, which of the following thermodynamic quantity for the system is zero ?

A. Work (W)

B. Change in internal energy (ΔE)

C. Change in enthalpy (ΔH)

D. None of the above

Answer: D

Watch Video Solution

379. For an isolated system, $\Delta U = 0$, then

A. $\Delta S = 0$

B. $\Delta S < 0$

C. $\Delta S > 0$

D. The value of ΔS cannot be predicted

Answer: A

Watch Video Solution

380. A gas undergoes a thermodynamical process but the volume of the gas does not change. What is the nature of this process?

A. Isothermal

B. Adiabatic

C. Isobaric

D. Isochoric

Answer: D

Watch Video Solution

381. Among the following for spontaneity of chemical reaction there should be

A. decrease in entropy and increase in free energy

B. decrease in entropy and free energy both

C. increase in entropy and decrease in free energy

D. increase in entropy and free energy both

Answer: C

Watch Video Solution

382. Which of the following processes is associated with decrease in entropy ?

A. Vaporisation of a mole of water into steam at its b.p

B. Dissociation of a mole of commion salt in water at 300K

C. Mixing of two partially miscible liquids

D. Crystallisation of a salt from its saturated solution

Answer: D

Watch Video Solution

383. Which of the following statements is true?

A. The total entropy of the universe is continuously decreasing.

B. The total energy of the universe is continuously decreasing.

C. The total energy of the universe rémains constant.

D. The total entropy of the universe remains constant.

Answer: C

Watch Video Solution

384. A coffee cup calorimeter initially contains 125g of water at a temperature of $24.2^{\circ}C$. After adding 10.59 of KBr, the temperature becomes $21.1^{\circ}C$. The heat of solution is

A. 40 J/g

B. 167 J/g

C. 155 J/g

D. 420.05 J/g

Answer: B

Watch Video Solution

385. One mole of ice is converted into water at 273K. The entropies of $H_2O(s)$ and $H_2O(/)$ are 38.20 and $60.01 Jmol^{-1}K^{-1}$ respectively. The enthalpy change for the conversion is .

A. $3kJmol^{-1}$

B. $4kJmol^{-1}$

C. $5kJmol^{-1}$

D. $6kJmol^{-1}$

Answer: D

Watch Video Solution

---

386. Given that

$H_2O(l) \rightarrow H^+$(aq) + OH^- (aq), ΔH= 57.32 kJ

H_2(g) + $\frac{1}{2}O_2(g) \rightarrow H_2O(l), \Delta H$ = -286.02 kJ

Then calculate the enthalpy of formation of OH^- at $25^\circ C$.

A. -228.8 kJ

B. -343.53 kJ

C. $+228.8kJ$

D. $+343.52kJ$

Answer: A

Watch Video Solution

387. Calculate the amount of heat evolved when $500cm^3$ of 0.1 M HCl is mixed with $200cm^3$ of 0.2 M NaOH.

A. 57.3 kJ

B. 2.865 kJ

C. 2.292 kJ

D. 0.573 kJ

Answer: C

Watch Video Solution

388. In which of the following reactions, standard reaction entropy changes (ΔS°) is positive and standard Gibb's energy change (ΔG°) decreases sharply with increasing temperature?

A. $C(\text{graphite}) + \frac{1}{2}O_2(g) \rightarrow CO(g)$

B. $CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g)$

C. $Mg(s) + \frac{1}{2}O_2(g) \rightarrow MgO(s)$

D. $\frac{1}{2}C \quad (\text{graphite}) + \frac{1}{2}O_2(g) \rightarrow \frac{1}{2}CO_2(g)$

Answer: A

Watch Video Solution

389. The enthalpy of fusion of ice Is 1.435 kcal/mol. The molar entropy change for the melting of ice at $0^{\circ}C$ is

A. 10.52 cal/(mol K)

B. 21.04 cal/(mol K)

C. 5.260 cal/(mol K)

D. 0.526 cal/(mol K)

Answer: C

Watch Video Solution

390. Standard enthalpy of vaporisation, $\Delta_{vap}H^{\theta}$ for water at $100^{\circ}C$ Is $40.66kJmol^{-1}$. The internal energy of vaporisation of water at $100^{\circ}C$ (in kJ mol^{-1})is (Assume water vapour to behave like an ideal gas).

A. $+37.56$

B. -43.76

C. $+43.76$

D. $+40.66$

Answer: A

Watch Video Solution

391. Equal volumes of two monoatomic gases, A and B, at same temperature and pressure are mixed. The ratio of specific heals $\left(\frac{C_p}{C_v}\right)$ of the mixture will be

A. 0.83

B. 1.5

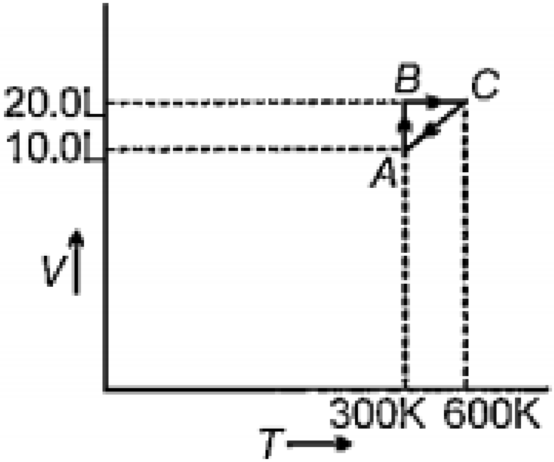
C. 3.3

D. 1.67

Answer: D

Watch Video Solution

392. This graph expresses the various steps of the system containing 1 mol of gas. Which type af process system has when it moves from C to A?



A. Isochoric

B. Isobaric

C. Isothermal

D. Cyclic

Answer: B

Watch Video Solution

393. Which of the following is correct ?

A. Evaporation of water causes an increase in disorder of the system

B. Melting of ice causes a decrease in randomness of the system

C. Condensation of steam causes an increase in disorder to the system

D. There is practically no change in the randomness of the system when water is evaporated

Answer: A

Watch Video Solution

---

394. On passing C ampere of current for time 't' sec through 1L of 2 (M) $CuSO_4$ solution (atomic weight of Cu 63.5), the amount 'm' of Cu (in g) deposited on cathode will be cathode will be

A. $m = C\frac{t}{63.5 \times 96500}$

B. $m = C\frac{t}{31.75 \times 96500}$

C. $m = \frac{C \times 96500}{31.75 \times t}$

D. `m = 31.75 xx C xx t)/(96500))

Answer: D

Watch Video Solution

395. Entropy of the universe is

A. constant

B. zero

C. continuously decreasing

D. continuously increasing

Answer: D

Watch Video Solution

396. The equilibrium constant of a reaction is 0.008 at 298 K. The standard free energy change of the reaction at the same temperature is

A. -11.96 kJ

B. -5.43 kJ

C. -8.46 kJ

D. $+11.96kJ$

Answer: D

Watch Video Solution

397. A gas undergoes a thermodynamical process but the volume of the gas does not change. What is the nature of this process?

A. Isothermal

B. Adiabatic

C. Isobaric

D. Isochoric

Answer: D

Watch Video Solution

398. The occurence of reaction is impossible if

A. ΔH is $+ve$, ΔS is also $+ve$

B. ΔH is $-ve$, ΔS is also -ve

C. ΔH is $-ve$, ΔS is $+ve$

D. ΔH is $+ve$, ΔS is also -ve

Answer: D

Watch Video Solution

399. The bond dissociation energies of XY,X_2 and Y_2 (all diatomic molecules) are in the reaction 1:1:0:5 and $\Delta H_r$for the formation of XY is $-200KJmol^{-1}$ what will be the bond dissociation energy of X_2?

A. $400kJmol^{-1}$

B. $300kJmol^{-1}$

C. $200kJmol^{-1}$

D. $800kJmol^{-1}$

Answer: D

Watch Video Solution

400. Work done during isothermal expension of one mole of an ideal gas from 10 atm to 1 atm at 300 K is

A. 4938.8J

B. 4138.8 J

C. 5744.1 J

D. 6257.2 J

Answer: C

Watch Video Solution

401. The amount of the heat released when 20 ml 0.5M NaOH is mixed with 100 mL 0.1 MHClis x kJ. The heat of neutralisation is

A. -100 x kJ/mol

B. -50 x kJ/mol

C. $+100xk\frac{J}{m}ol$

D. `+50x kJ/mol

Answer: A

Watch Video Solution

402. A plot of In k against 1/T (abscissa) is expected to be a straight line with intercept on coordinate axis equal to

A. $\frac{\Delta S^{\circ}}{2.303R}$

B. $\Delta\frac{S}{R}$

C. $-\frac{\Delta S}{R}$

D. $R \times \Delta S^{\circ}$

Answer: B

Watch Video Solution

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

A. For an isochoirc process $\Delta E = -Q$

B. For an adiabatic process $\Delta E = -W$

C. For an isothermal process Q = -W

D.

Answer: D

Watch Video Solution

404. The value of enthalpy change (ΔH) for the reaction $C_2H_5OH(l) + 3O_2(g) \rightarrow 2CO_2(g) + 3H_2O(l),$ at 27°C is `-1366.5 kJ . The value of internal energy change for the above reaction at this temperature will be

A. -1371.5 kJ

B. -1369.0 kJ

C. -1364.0 kJ

D. -1361.5 kJ

Answer: C

Watch Video Solution

405. Consider the reaction, $4NO_2(g)+O_2(g)\overrightarrow{2}N_2O_5$,(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, ΔH of sublimation for N_2O_5 is $54kJmol^{-1}$)

A. -165 kJ

B. $+54kJ$

C. $+219kJ$

D. -219 kJ

Answer: D

Watch Video Solution

406. Molar heat capacity of aluminum is $25JK^{-1}mol^{-1}$. The heat necessary to raise the temperature of 54g of aluminium (Atomic mass 27g mol^{-1}) from $30^\circ C$ to $50^\circ C$ is

(1) 1.5 kJ

(2) 0.5 kJ

(3) 1.0 kJ

(4) 2.5 kJ

(5) 2.0 kJ

Watch Video Solution

407. The entropy change involed in the isothermal reversible expansion of 2 moles of an ideal gas from a volume of $10dm^3$ to a volume of $100dm^3$ at $27^\circ C$ is

A. $38.3Jmol^{-1}K^{-1}$

B. $38.8Jmol^{-1}K^{-1}$

C. $32.3Jmol^{-1}K^{-1}$

D. $42.3Jmol^{-1}K^{-1}$

Answer: A

Watch Video Solution

408. In view of the signs of $\triangle_r G^\circ$ for the following reactions $PbO_2 + Pb \rightarrow 2PbO, \triangle_r G^\circ < 0$, $SnO_2 + Sn \rightarrow 2SnO, \triangle G^\circ > 0$ Which oxidation states are more characteristic for lead and tin?

A. For lead $+4$, for tin $+2$

B. For lead $+2$, for tin $+2$

C. For lead $+4$, for tin $+4$

D. For lead $+2$, for tin $+4$

Answer: D

Watch Video Solution

---

409. For the reversible reaction, $A(s) + B(g) \Leftrightarrow C(g) + D(g), \Delta G^\circ = -350kJ$, which one of the following statements Is true ?

A. The reaction is thermodynamically non feasible.

B. The entropy change is negative.

C. Equilibrium constant is greater than one.

D. The reaction should be instantaneous.

Answer: C

Watch Video Solution

410. Carbon cannot reduce Fe_2O_3 to Fe at a temperature below 983 K because

A. free energy change for fhe formation of CO is more negative than that of Fe_2O_3,

B. CO is thermodynamically more stable than Fe_2O_3,

C. carbon has higher affinity towards oxygen than iron

D. iron has higher affinity towards oxygen than carbon

Answer: C

411. The enthalpy of vaporisation of benzene is +35.3 kJ/mol at its boiling point of $80^\circ C$. The entropy change in the transition of vapour to liquid at its boiling point is .... (in J $mol^{-1}K^{-1}$).

A. -100

B. $+100$

C. $+342$

D. -342

Answer: A

412. Acontainer of 1.0 L capacity filled with 1.0 mole of ideat gas is connected to an evacuated vessel of 9.0L. Calculate change in entropy. (R = 1.987 cal.)

A. 0.188 cal. $K^{-1}mol^{-1}$

B. 0.4576 cal. $K^{-1}mol^{-1}$

C. 4.576 cal. $K^{-1}mol^{-1}$

D. 4.366 cal. $K^{-1}mol^{-1}$

Answer: D

Watch Video Solution

413. Which of the following is the correct option for free expansion of an ideal gas under adiabatic condition ?

A. $q = 0, \Delta T < 0, w \neq 0$

B. $q = 0, \Delta T \neq 0, w = 0$

C. $q \neq 0, \Delta T = 0, w = 0$

D. $q = 0, \Delta T = 0, w = 0$

Answer: D

Watch Video Solution

414. Enthalpy change for the reaction, $4H(g)\overrightarrow{2}H_2(g)$ is -869.5 kJ. The dissociation energy of H-H bond is

A. $+217.4kJ$

B. -434.8 kJ

C. -868.6 kJ

D. $+434.8kJ$

Answer: D

Watch Video Solution

415. If the enthalpy change for the transition of liquid water to steam is $300kJmol^{-1}$ at $27^{\circ}C$, the entropy change for the process would be

A. $1000JK^{-1}mol^{-1}$

B. $10JK^{-1}mol^{-1}$

C. $1.0JK^{-1}mol^{-1}$

D. $0.1JK^{-1}mol^{-1}$

Answer: A

Watch Video Solution

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

A. For an isothermal process,q = $+w$

B. For an isochoric process, $\Delta U = -q$

C. For an adiabatic process, $\Delta U = -w$

D. For a cyclic process, q = -w

Answer: D

Watch Video Solution

417. The enthalpy of solution of sodium chloride is $4kjmol^{-1}$ and its enthalpy of hydration of ions is $-784kJmol^{-1}$ .Then the lattice enthalpy of NaCl (in kJ mol^{-1}) is

(1) $+788$

(2) $+4$

(3) $+398$

(4) $+780$

$+394$

Watch Video Solution

418. Four grams of graphite is burnt in a bomb calorimeter of heat capacity $60kJK^{-1}$ in excess of oxygen at 1 atm pressure. The temperature rises from 300 to 304 K, What is the enthalpy of combustion of graphite (in kJ mol^{-1})

(1) 360

(2) 1440

(3) -720

(4) -1440

(5) -520

Watch Video Solution

419. Which reaction, with the following values of $\Delta H, \Delta S$ at 400K is spontaneous and endothermic ?

A. $\Delta H = -48kJ, \Delta S = +135\frac{J}{K}$

B. $\Delta H = -48kJ, \Delta S = -135\frac{J}{K}$

C. $\Delta H = +48kJ, \Delta S = +135\frac{J}{K}$

D. $\Delta H = +48kJ, \Delta S = -135\frac{J}{K}$

Answer: C

Watch Video Solution

420. The enthalpy of vaporisation of benzene is +35.3 kJ/mol at its boiling point of $80^\circ C$. The entropy change in the transition of vapour to liquid at its boiling point is .... (in J $mol^{-1}K^{-1}$).

A. -100

B. $+100$

C. $+342$

D. -342

Answer: A

Watch Video Solution

421. For the reversible reaction, $A(s)+B(g) \Leftrightarrow C(g)+D(g), \Delta G^\circ = -350kJ$, which one of the following statment is true ?

A. The reaction is thermodynamically non feasible.

B. The entropy change is negative.

C. Equlibirium constant is greater than one.

D. The The reaction should be instantaneous.

Answer: C

Watch Video Solution

422. A reaction is spontaneous at low temperature but non spontaneous at high temperature. Which of the following

(1) $\Delta H > 0, \Delta S > 0$

(2) $\Delta H < 0, \Delta S < 0$

(3) $\Delta H > 0, \Delta S = 0$

(4) $\Delta H < 0, \Delta S < 0$

(5) $\Delta H = 0, \Delta S < 0$

Watch Video Solution

423. At the sublimition temperture, for the process $CO_2(s) \Leftrightarrow CO_2(g)$

(1) ΔH, ΔS and ΔG are all positive (2) $\Delta H > 0$, $\Delta S > 0$ and $\Delta G < 0$

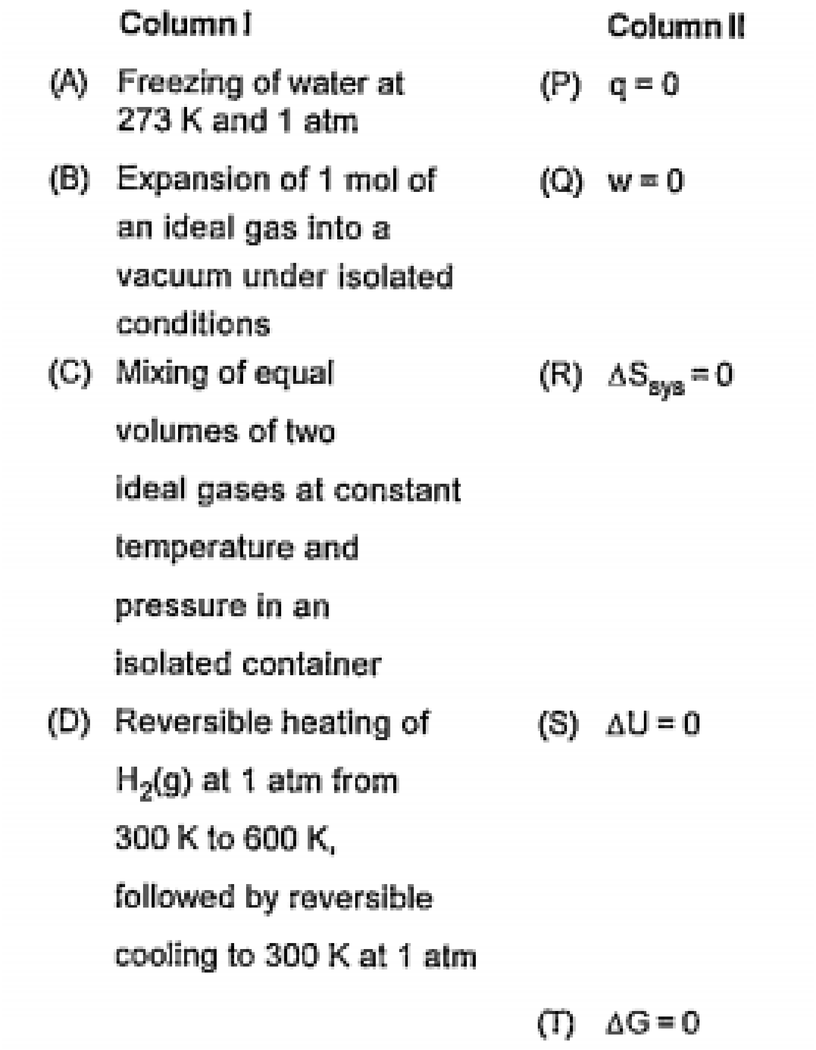
(3) $\Delta H < 0$, $\Delta S > 0$ and $\Delta G < 0$

(4) $\Delta H > 0$, $\Delta S > 0$ and $\Delta G > 0$

(5) $\Delta H > 0$, $\Delta S > 0$ and $\Delta G = 0$

Watch Video Solution

424. Match the thermodynamic processes given under Column I with the expression given under Column II.



	Column I		Column II
(A)	Freezing of water at 273 K and 1 atm	(P)	$q = 0$
(B)	Expansion of 1 mol of an ideal gas into a vacuum under isolated conditions	(Q)	$w = 0$
(C)	Mixing of equal volumes of two ideal gases at constant temperature and pressure in an isolated container	(R)	$\Delta S_{sys} = 0$
(D)	Reversible heating of $H_2(g)$ at 1 atm from 300 K to 600 K, followed by reversible cooling to 300 K at 1 atm	(S)	$\Delta U = 0$
		(T)	$\Delta G = 0$

View Text Solution

425. For the process $H_2O(i) \rightarrow H_2O(g)$ at $T = 100^\circ C$ and 1 atmospere pressure, the correct choice is

A. $\Delta S_{system} > 0$ and ΔS (surroundings) > 0

B. $\Delta S_{system} > 0$ and ΔS (surroundings) < 0

C. $\Delta S_{system} < 0$ and ΔS (surroundings) > 0

D. $\Delta S_{system} < 0$ and ΔS (surroundings) < 0

Answer: B

Watch Video Solution

426. For complete combustion of ethanol, $C_2H_5OH(l), + 3O_2(g) \rightarrow 2CO_2(g) + 3H_2O(l)$, the amount of heat produced as measured in bomb calorimeter, is $1364.47kJmol^{-1}25^\circ C$. Assuming ideality the Entalpy of combustion, $\Delta_c H$, for the reaction will be:

$(R = 8.314mol^{-1})$

A. $-1366.95kJmol^{-1}$

B. $-1361.95kJmol^{-1}$

C. $-1460.95 kJmol^{-1}$

D. $-1350.95 kJmol^{-1}$

Answer: A

Watch Video Solution

427. The standard enthalpies of formation of $CO_2(g), H_2O(l)$ and glucose (s) at $25^\circ C$ are -400 kJ/mol, -300 kJ/mol and -1300 kJ/mol, respectively. The standard enthalpy of combustion per gram of glucose at $25^\circ C$ Is

A. $+2900 kJ$

B. -2900 kJ

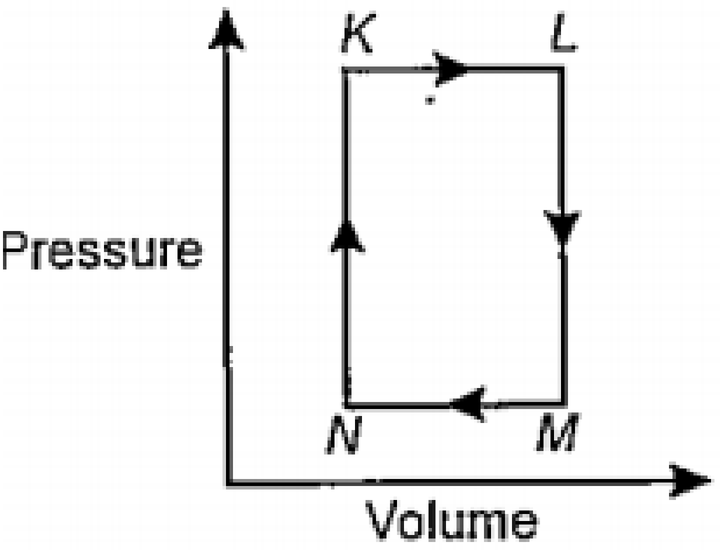
C. -16.11 kJ

D. $+16.11 kJ$

Answer: C

Watch Video Solution

428. A fixed mass m of a gas is subjected to transformation of states from K to L to M to N and back to K as shown in the figure.



The pair of Isochoric processes among the transformation of states is

A. heating, cooling, heating, cooling

B. cooling, heating, cooling, heating

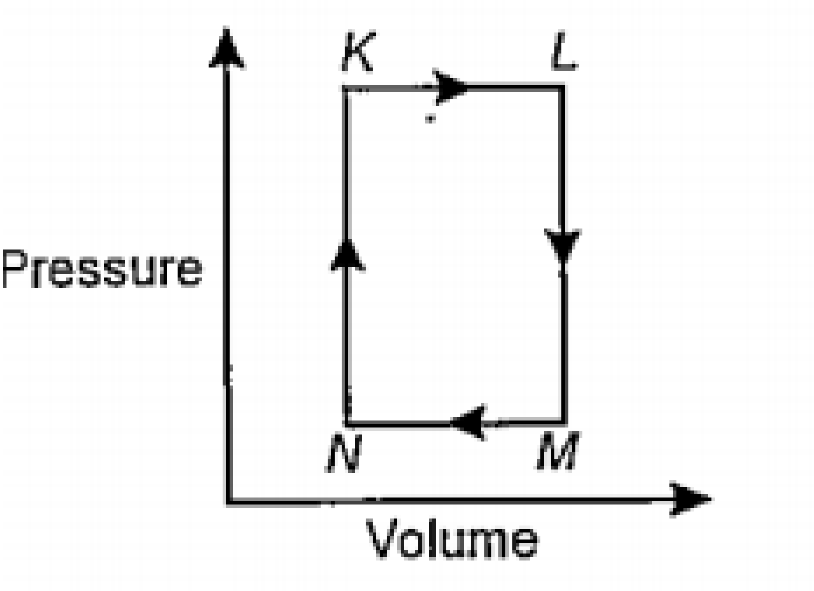
C. heating, cooling, cooling, heating

D. cooling, heating, heating, cooling

Answer: C

Watch Video Solution

429. A fixed mass m of a gas is subjected to transformation of states from K to L to M to N and back to K as shown in the figure.



The pair of Isochoric processes among the transformation of states is

A. K to L and L to M

B. L to M and N to K

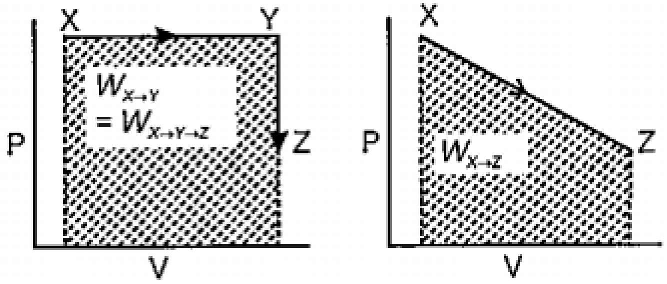
C. L to M and M to N

D. M to N and N to K

Answer: B

Watch Video Solution

430. For an ideal gas, consider only p-V work in going from an initial state X to the final state Z. The final state Z can be reached by either of the two paths shown in the figure. Which of the following choice(s) is (are) correct ?



[Take ΔS as change in entropy and W as work done].

A. $\Delta S_{X\to Z} = \Delta S_{X\to Y} + \Delta S_{Y\to Z}$

B. $W_{X\to Z} = W_{X\to Y} + W_{Y\to Z}$

C. $W_{X\to Y\to Z} = W_{X\to Y}$

D. $\Delta S_{X \to Y \to Z} = \Delta S_{X \to Y}$

Answer: A::C

Watch Video Solution

431. Using the data provided calculate the multiple bond energy $(KJmol^{-})$ of a C-=C bond in c_2H_2 consider the bond energy of a C-H bond is $350KJmol^{-1}$

$2C(s) + H_2(g) \to C_2H_2(g), \Delta H = 225KJmol^{-1}$

$2C(s) \to 2C(g), \Delta H = 1410KJmol^{-1}$

$H_2(g) \to 2H(g), \Delta H = 330KJmol^{-1}$

A. 1165

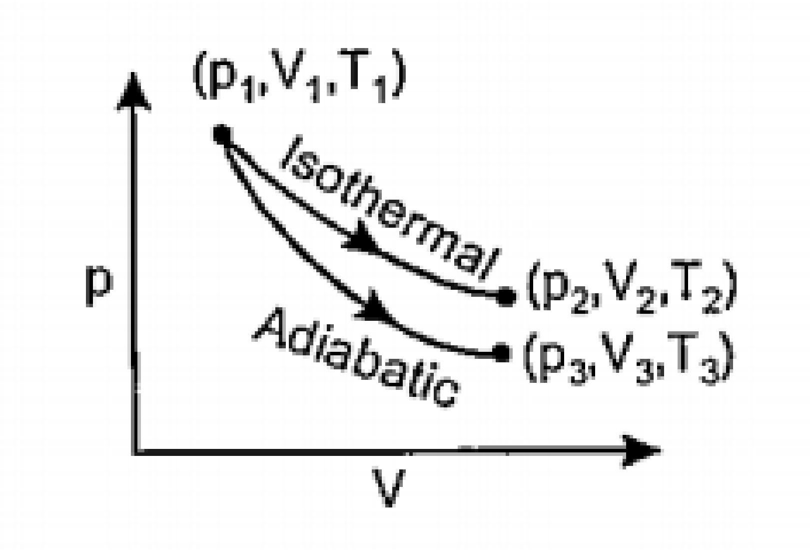
B. 837

C. 865

D. 815

Answer: D

432. The reversible expansion of an ideal gas under adiabatic and isothermal conditions is shown in the figure. Which of the following statement(s) is (are) correct ?



A. $T_1 = T_2$

B. $T_3 > T_1$

C. $W_{isothermal} > W_{adiabatic}$

D. $\Delta U_{isothermal} > \Delta U_{adiabatic}$

Answer: A::C::D

Watch Video Solution

433. A gas expands from a volume of $1m^3$ to a volume of $2m^3$ against an external pressure of $10^5 Nm^{-2}$. the work done by the gas will be

A. $10^4 J$

B. $10^2 J$

C. $10^3 J$

D. $10^5 J$

Answer: D

Watch Video Solution