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## CHEMISTRY

## BOOKS - A2Z CHEMISTRY (HINGLISH)

## CHEMICAL THERMODYNAMICS

## Basic Terms Of Thermodynamic Processes

1. In thermodynamics, a process is called reversible when
A. surrounding is no boundary between syatem and
surrounding
B. there is no boundary between system and surrounings
C. the surrounding are always in equilibrium with the

system

D. the system change into the surroundings spontaneous

## Answer: C

## D Watch Video Solution

2. Calculate the work done during the process, when one mole of gas is allowed to expand freely into vacuum.
A. 0
B. $+v e$
C. $-v e$
D. any of there

Answer: A

## (D) Watch Video Solution

3. The work done in erge for the reversible expansion of 1 mole of an ideal gas from a volume of 10 litres to 20 litres at $25^{\circ} \mathrm{C}$ is
A. $-2.303 \times 298 \times 0.082 \log 2$
B. $-298 \times 10^{7} \times 8.31 \times 2.3031 \log 2$
C. $2.303 \times 298 \times 0.082 \log 0.5$
D. $-8.31 \times 10^{7} \times 298 \times 2.303 \log 0.5$

## Answer: B

4. In an isochoric process the increase in internal energy is
A. Equal to the heat absorbed
B. Equal to the heat evolved
C. Equal to the work done
D. Equal to the sum of the heat absorbed and work done

Answer: A

## D Watch Video Solution

5. Which one is not a state function ?
A. Internal energy ( $E$ )
B. Volume
C. Heat $(q)$
D. Enthalpy

## Answer: C

## D Watch Video Solution

6. When no heat energy is allowed to enter or leave the system, it is called
A. Isothermal proecess
B. Reversible process
C. Adiabatic process
D. Irreversible process

Answer: C

## (D) Watch Video Solution

7. Which of the following is the intensive property?
A. Temperature
B. Viscosity
C. Density
D. All of these

Answer: D

D Watch Video Solution
8. For the following process, $H_{2}(g) \rightarrow 2 H(g)$. It absorbs $438 \mathrm{kJmol}^{-1}$. Thus,
A. change in internal energy of the system is $219 \mathrm{KJmol}^{-1}$
B. internal energy of the system is $438 \mathrm{KJmol}^{-1}$
C. change in internal energy if $438 \mathrm{KJmol}^{-1}$
D. internal energy of the system is $219 \mathrm{KJmol}^{-1}$

## Answer: C

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9. A system is changed from state $A$ to state $B$ by one path and from $B$ to $A$ by another path. If $\Delta E_{1}$ and $\Delta E_{2}$ are the
corresponding changes in internal energy, then
A. $\Delta E_{2}+E_{2}=+v e$
B. $\Delta E_{1}+\Delta E_{2}=-v e$
C. $\Delta E_{1}+\Delta E_{2}=0$
D. none of these

## Answer: C

## (D) Watch Video Solution

10. Which one of the following statement is false?
A. work is a state function
B. temperature is a state function
C. change in the state is completely defined when the intial and final state are specified
D. work appears at the boundary of the systam

## Answer: C

## D Watch Video Solution

11. Which of the following is the intensive property?
A. boiling point
B. molarity
C. freezing point
D. all of these

Answer: D

## D Watch Video Solution

12. Warming ammonium chloride with sodium hydroxide in a test tube is an example of :
A. Closed system
B. Isolated system
C. Open system
D. None of these

## Answer: C

13. A well stoppered thermo flask containing some ice cubse is an example of
A. Closed system
B. Open system
C. Isolated system
D. None of these

## Answer: C

## (D) Watch Video Solution

14. In which process net work done is zero ?
A. Cyclic
B. Isochoric
C. Free expansion
D. Adiabatic

## Answer: C

## D Watch Video Solution

15. For the real gases reaction $2 \mathrm{CO}(g)+\mathrm{O}_{2}(g) \rightarrow 2 \mathrm{CO}_{2}(g)$
$: \Delta H=-560 k J$. In a 10 litre rigid vesel at $500 K$, the initial pressure is 70 bar and after the reaction it becomes 40 bar. The change in internal energy is:
A. $-557 K J$
B. $-530 K J$
C. $-563 K J$
D. none of these

## Answer: C

## (D) Watch Video Solution

16. For the reaction,
$C+O_{2} \rightarrow O_{2}, \Delta H=-393 J$
$2 \mathrm{Zn}+\mathrm{O}_{2} \rightarrow 2 \mathrm{ZnO}, \mathrm{H}=-412 \mathrm{~J}$
A. Carbon reduce $Z n O$ to $Z n$
B. Oxidation of carbon is not feasible
C. Oxidation of $Z n$ is not feasible
D. $Z n$ liberates more heat than carbon during oxidation

Answer: B

## D Watch Video Solution

17. A system absorbs 600 J of heat and work equivalent to $300 J$ on its surroundings. The change in internal energy is:
A. 300 J
B. 400 J
C. 500 J
D. 600 J

Answer: D
18. The density of ice at $0^{\circ} C$ is $0.99987 \mathrm{~g} / \mathrm{cc}$. The work done for melting mole of ice at 1.00 bar (assuming work is done only due to expansion) is approximately
A. $0.17 J$
B. $1.7 \times 10^{3} \mathrm{~J}$
C. $1.7 \times 10^{-6} \mathrm{~J}$
D. can't be determined

## Answer: A

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19. An ideal gas expands from $10^{-3} \mathrm{~m}^{3}$ to $10^{-2} \mathrm{~m}^{3}$ at 300 K against a constant pressure of $10^{5} \mathrm{Nm}^{-2}$. The workdone is
A. $900 K J$
B. $-900 J$
C. $270 K J$
D. $-900 J$

## Answer: B

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20. The difference between $\Delta H$ and $\Delta E$ (on a molar basis) for the combustion of n-octane $(l)$ at $25^{\circ} C$ would be:
A. $-13.6 K J$
B. $1.14 K J$
C. $-11.15 K J$
D. $+11.15 K J$

## Answer: D

## D Watch Video Solution

21. For the combustion reaaction at $298 K$,
$\mathrm{H}_{2}(g)+1 / 2 \mathrm{O}_{2}(g) \rightarrow \mathrm{H}_{2} \mathrm{O}(l)$
Which of the following alternetive (s) is/are correct ?
A. $\Delta H=\Delta E$
B. $\Delta H>\Delta E$
C. $\Delta H<\Delta E$
D. $\Delta H \& \Delta E$ have no relation with each other

## - Watch Video Solution

22. Consider the reaction: $\mathrm{N}_{2}+3 \mathrm{H}_{2} \Leftrightarrow 2 \mathrm{NH}_{3}$ carried out at constant pressure and temperature. If $\Delta H$ and $\Delta U$ are change in enthalpy and change in internal energy respectively, then:
A. $\Delta H=0$
B. $\Delta H=\Delta U$
C. $\Delta H<\Delta U$
D. $\Delta H>\Delta U$

Answer: C
23. The difference between the heats of reaction at constant pressure and a constant volume for the reaction $2 C_{6} H_{6}(l)+15 O_{2}(g) \rightarrow 12 \mathrm{CO}_{2}(g)+6 \mathrm{H}_{2} O(l)$ at $25^{\circ} \mathrm{C}$ in $k J$ is
A. -7.43
B. 3.72
C. -3.72
D. 7.43

Answer: A

D Watch Video Solution
24. Find the work done when 2 moles of hydrogen expand isothermally from 15 to 50 litres against a constant pressure of 1atm at $25^{\circ} \mathrm{C}$.
A. 847.0 cal
B. 847 Kcal
C. 84.7 cal
D. 84.7 Kcal

## Answer: A

## D Watch Video Solution

25. $(\Delta H-\Delta U)$ for the formation of carbon monoxide
$(C O)$ from its elements at $298 K$ is
$\left(R=8.314 K^{-1} \mathrm{~mol}^{-1}\right)$
A. $2477.57 \mathrm{~mol}^{-1}$
B. $-1238.78 \mathrm{Jmol}^{-1}$
C. $1238.78 \mathrm{Jmol}^{-1}$
D. $-2477.57 \mathrm{Jmol}^{-1}$

## Answer: A

## - Watch Video Solution

26. Calculate the work done when 2 moles of hydrogen expand isothermally and reversibly at $27^{\circ} \mathrm{C}$ from 15 to 50 litres.
A. 14.45 Kcal
B. 1445 J
C. -1445 cal
D. $14.45 K J$

## Answer: C

## D Watch Video Solution

27. An ideal gas expands from an intial volume $V$ into vacuume under isothermal conditions. For this process,
A. $\Delta U \neq 0, W=0$ and $Q \neq 0$
B. $\Delta U \neq 0, W \neq 0$ and $Q \neq O$
C. $\Delta U \neq 0, W \neq 0$ and $Q=0$
D. $\Delta U=0, W=0$ and $Q=0$

## Answer: D

## D Watch Video Solution

28. An ideal gas is allowed to expand both reversibly and irreversibly in an an islolated system. If $T_{i}$ is the initial temperature and $T_{f}$ is the final temperature, which of the following statements is correct ?
A. (a) $T_{f}$ and $T_{i}$ are both reversible and irreversible processes
B. $\left(T_{f}\right)_{\text {irrev }}>\left(T_{i}\right)_{\text {rev }}$
C. $T_{f}>T_{i}$ for irreversible process but $T_{f}$ and $T_{i}$ for irreversible process
D. $\left(T_{f}\right)_{\text {rev }}>\left(T_{i}\right)_{\text {irrev }}$

Answer: D

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29. Calculate the work invoved when when 1 mol of an ideal gas is compressed reversibly from 1.00 bar to 5.00 at a constant temperature of 300 K .
A. $-14.01 K J$
B. $+18.02 K J$
C. 4.01 KJ
D. $-8.02 K J$

## Answer: C

30. A gas expands isothermally and reversibly. The work done by the gas is
A. Zero
B. Minimum
C. Maximum
D. can't be determined

## Answer: C

## D Watch Video Solution

31. Evaluate $\Delta U$ at $500 K$ for the process
$M g(s)+2 H C 1(g)=M g C 1_{2}(s)+H_{2}(g)$

## $\Delta H=-109 \mathrm{Kcal}$

The volume change of solids to be ignored
A. -204 Kcal
B. -108 Kcal
C. -9 Kcal
D. +9 Kcal

## Answer: C

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32. A piston filled with 0.04 mol of an ideal gas expands reversibly from 50.0 mL to 375 mL at a constant temperature of $37.0^{\circ} \mathrm{C}$. As it does so, it absorbs 208 J of heat. The value of
$q$ and $w$ for the process will be:

$$
(R=8.314 J / m o l K)(\ln 7.5=2.01)
$$

A. $q=+208 J, W=-208 J$
B. $q=-208 J, W=-208 J$
C. $q=-208 J, W=+208 J$
D. $q=+208 J, W=+208 J$

Answer: B

## D Watch Video Solution

33. If 50 calories are added to a system and system does work of 30 calories on surroundings, the change in internal energy of system is
A. 20 cal
B. 50 cal
C. 40 cal
D. 30 cal

## Answer: A

## (D) Watch Video Solution

34. When heat is supplied to an ideal gas in isothermal process, the
A. Gas will do positive work
B. Gas will do negitive work
C. Knetic energy of the gas will incease
D. Gas will not obey the law of conservation of energy

## Answer: A

## D Watch Video Solution

35. The value of enthalpy change $(\Delta H)$ for the reaction
$\mathrm{C}_{2} \mathrm{H}_{5} \mathrm{OH}(l)+3 \mathrm{O}_{2}(g) \rightarrow 2 \mathrm{CO}_{2}(g)+3 \mathrm{H}_{2} \mathrm{O}(l)$
at $27^{\circ} \mathrm{C}$ is $-1366.5 \mathrm{~K} \mathrm{Jmol}^{-1}$. The value of internal energy
change for the above reaction at this tempearature will be
A. $-1371.5 K J$
B. $-1369.0 K J$
C. $-1364.0 K J$
D. $-1361.5 K J$

## Answer: C

## D Watch Video Solution

36. When a polyatomic gas undergoes an adiabatic process, its temperature and volume are related by the equation $T V^{n}$
=constant, the value of $n$ will be
A. 1.33
B. 0.33
C. 2.33
D. 1

## Answer: B

37. For the reation $F_{2}(g)+2 H C L(g) \rightarrow 2 H F(g)+C 1_{2}(g)$
$\Delta H^{\circ} \quad$ at $\quad 298 \mathrm{~K}$ is $-84.4 L c a l$
$\Delta H^{\circ} f(H F)=-64.2 \mathrm{Kcal} / \mathrm{mol}$
$\Delta H^{\circ} f$ for the $H C L(g)$ per gram is
A. -0.603 Kcal
B. -0603 cal
C. 0.0603 Kcal
D. 6.03 Kcal

## Answer: A

38. The coefficient of thermal expansion, $\alpha$, is nearly constant for a liquid $\alpha=\frac{1}{V}\left(\frac{d V}{d T}\right)_{P}$

At 293 K and 1 atm for water $\alpha=2.1 \mathrm{~K}^{-1}$

What is the approximate work done when 1 mole of liquid is heated from 288 K at 1 atm? Molar volume of liquid $=18 \mathrm{~m}$ ?
A. $-78.25 K J$
B. 78.15 J
C. $-37.8 J$
D. $-83.14 J$

## Answer: C

39. A stationary mass of gas is compressed without friction from an initial state of $0.3 \mathrm{~m}^{2}$ and 0.105 M pa to a final state of $0.15 \mathrm{~m}^{3}$ and $0.15 M \mathrm{pa}$. The pressure remaining constant. During the process there is a transfer of $37.6 K J$ of heat from the system. During the process the amount of internal energy change is
A. $-28.85 K J$
B. $-21.85 K J$
C. $-21.85 M J$
D. $-15750 K J$

## Answer: B

40. For an adiabatic reversible expansion of a perfect gas
$\Delta P / P$ is equal to
A. $\frac{\Delta V}{V}$
B. $\gamma \frac{\Delta V}{V}$
C. $-\gamma \frac{\Delta V}{V}$
D. $-\gamma^{2} \frac{\Delta V}{V}$

## Answer: C

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41. Heat of combustion of ethanol at constant pressue and at temperature $T K(=298 K)$ is found to be $-q J m a l^{-1}$.

Hence, heat of combustion (in $\mathrm{Jmol}^{-1}$ ) of ethanol at the same temperature at constant volume will be:
A. $R T-q$
B. $-(q+R T)$
C. $q-R T$
D. $q+R T$

Answer: C

## - Watch Video Solution

42. For the combustion of n-octane
$\mathrm{C}_{8} \mathrm{H}_{18}+\mathrm{O}_{2} \rightarrow \mathrm{CO}_{2}+\mathrm{H}_{2} \mathrm{O}$ at $25^{\circ} \mathrm{C}$ (ingnoring resonance in $\mathrm{CO}_{2}$ )
A. $\Delta H=\Delta E-5.5 \times 8.31 \times 0.298$ in $\mathrm{KJ} / \mathrm{mol}$
B. $\Delta H=\Delta E+4.5 \times 8.31 \times 0.298$ in $\mathrm{KJ} / \mathrm{mol}$
C. $\Delta H=\Delta E-4.5 \times 8.31 \times 0.298$ in $\mathrm{KJ} / \mathrm{mol}$
D. $\Delta H=\Delta E-4.5+8.31 \times 0.298$ in $\mathrm{KJ} / \mathrm{mol}$

## Answer: A

## - Watch Video Solution

43. Adiabatic reversible expansion of a gas is represented by
A. $\left(\frac{T_{1}}{T_{2}}\right)^{\gamma}=\left(\frac{P_{2}}{P_{1}}\right)^{1-\gamma}$
B. $\left(\frac{T_{1}}{T_{2}}\right)^{\gamma}=\left(\frac{P_{1}}{P_{2}}\right)^{1-\gamma}$
c. $\left(\frac{T_{1}}{T_{2}}\right)^{\gamma}=\left(\frac{P_{1}}{P_{2}}\right)^{\gamma-1}$
D. All of the above

## Answer: C

## D Watch Video Solution

44. When a gas is subjected to adiabatic expansion, it gets cooled due to
A. Loss in heat
B. Increases in internal energy
C. Due to repulsion between molecule
D. Energy spent in doing work

## Answer: D

## D Watch Video Solution

45. One mole of an ideal gas at $300 K$ is expanded isothermally from an inital volume of 1 letre to 10 litres. The
$\Delta E$ for this process is $\left(R=2\right.$ calmol $\left.^{-1} K^{-1}\right)$
A. 163.7 cal
B. zero
C. 138.1 cal
D. 9 Latm

## Answer: D

## - Watch Video Solution

46. One mole of a non-ideal gas undergoes a change of state
$(2.0 \mathrm{~atm}, 3.0 L, 95 \mathrm{~K}) \rightarrow(4.0 \mathrm{~atm}, 5.0 L, 245 \mathrm{~K})$

With a change in internal energy $\Delta E=30 L$ atm. The change in enthalpy $(\Delta H)$ in the process in $L$-atm is
A. 40.0
B. 42.3
C. 44.0
D. Not defined, because pressure is not cosntant

## Answer: C

## - Watch Video Solution

47. Heat of formation of $\mathrm{H}_{2} \mathrm{O}(\mathrm{g})$ at 1 atm and $25^{\circ} \mathrm{C}$ is $-243 K J . \Delta E$ for the reaction $H_{2}(g)+30 \mathrm{JK}^{-1} \mathrm{~mol}^{-1} \frac{1}{2}$
$O(g) \rightarrow \mathrm{H}_{2} \mathrm{O}(g)$ at $25^{\circ} \mathrm{C}$ is
A. $241.8 K J$
B. $-241.8 K J$
C. $-243 K J$
D. 243 KJ

## Answer: C

## - Watch Video Solution

48. A gas absobs $100 J$ of heat and is simultaneously compressed by a constant external pressure of 1.50 atmosphere fron a volume of $8 L$ to $2 L . \Delta E$ will be
A. $-812 J$
B. 812
C. $1011 J$
D. 911 J

## Answer: B

## - Watch Video Solution

49. A gas expands againts a constant external pressure of 2.00 atm , increasing its volume by 3.40 L . Simultaneously, the system absorbs 400 J of heat from its surroungs. What is $\Delta E$ , in joules, for this gas?
A. -689
B. -289
C. +400
D. +289

## Answer: C

## - Watch Video Solution

50. Which of the following statement is wrong ?
A. The two sulphur atoms in the thiosoulphate ions occoupy equivalent positions
B. Ice results from cooling of water whereas snow results from cooling of vapour to solid
C. Formation of ice is solidification whereas formation of
snow is hoar frost
D. Ice sublimes on moon

## Answer: B

## - Watch Video Solution

## Work, Internal Energy And Enthalpy

1. The relation between the volume and temperature of a sample of water in the range $0^{\circ} C$ to $100^{\circ} C$ is best represented as
A.

(b)



## Answer: A

## (D) Watch Video Solution

2. One gram-atom of graohite and one gram-atom of diamond were separately burnt to $\mathrm{CO}_{2}$. The amount of heat liberated was $393.5 K J$ and $305.4 K J$ respectivaly. It is apparent that
A. graphite has grreater affinity for oxygen
B. diamond has grreater affinity for oxygen
C. graphite is more stable than diamond
D. diamond is more stable than graphite

## Answer: D

## D Watch Video Solution

3. For the raction
$\mathrm{B}_{2} \mathrm{H}_{6}(g)+3 \mathrm{O}_{2}(g) \rightarrow \mathrm{B}_{2} \mathrm{O}_{2}(\mathrm{~s})+3 \mathrm{H}_{2} \mathrm{O}(l)$
$\Delta E=-2143.2 K J$

Calculate $\Delta H$ for the reaction at $25^{\circ} C$
A. $-2148.2 \mathrm{KJmol}^{-1}$
B. $-2138.6 \mathrm{KJmol}^{-1}$
C. $-2133.2 \mathrm{KJmol}^{-1}$
D. $-2143.2 \mathrm{~K} \mathrm{Jmol}^{-1}$

## Answer: C

## - Watch Video Solution

4. For the reaction,
$X_{2} O_{4}(l) \rightarrow 2 X_{2}(g), \Delta E=2.1 \mathrm{Kcal}$,
$\Delta S=20 \mathrm{cal} / \mathrm{K}$ at 300 K . Hence $\Delta G$ is
A. 2.7 Kcal
B. -2.7 Kcal
C. 9.3 Kcal
D. -9.3 Kcal

Answer: A

## D Watch Video Solution

5. Combustion of methance
A. is an exothermic reaction
B. is an endothermic reaction
C. requires a catalyst
D. given $H_{2}$

## Answer: B

D Watch Video Solution
6. 10 mol of an ideal gas confined to a volume of 10 L is released into atmosphere at $300 K$ where the pressure is 1bar. The work done by the gas is $\left(R=0.083 L \operatorname{bar} K^{-1} \mathrm{~mol}^{-1}\right)$
A. 2490L-bar
B. 259L-bar
C. 239L-bar
D. 220L-bar

## Answer: A

7. $\mathrm{NH}_{3}(\mathrm{~g})+3 \mathrm{C1}_{2}(\mathrm{~g}) \rightarrow \mathrm{NCL}_{3}(\mathrm{~g})+3 \mathrm{HC1}(\mathrm{~g}) \Delta \mathrm{H}_{1}$
$\mathrm{N}_{2}(\mathrm{~g})+3 \mathrm{H}_{2}(\mathrm{~g}) \rightarrow 2 \mathrm{NH}_{3}, \Delta \mathrm{H}_{2}$
$H_{2}(g)+C L_{2}(g) \rightarrow 2 H C 1(g), \Delta H_{1}$
The heat of fomation of $\mathrm{NC1}_{2}(\mathrm{~g})$ in the terms of $\Delta H_{1}, \Delta H_{2}$ and $\Delta H_{3}$ 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: B
8. The enthalpy change for a reaction does not depend upon:
A. The nature of intermediate state
B. The difference in initial and final temperature
C. The physical state of reactant and product
D. Use of different reactant for the same reaction

## Answer: A

## D Watch Video Solution

9. Enthalpy of combustion of $\mathrm{CH}_{4}, \mathrm{C}_{2} \mathrm{H}_{6}$ and $\mathrm{C}_{3} \mathrm{H}_{8}$ are
$-210-370$ and $-530 \mathrm{Kcal} / \mathrm{mol}$ respectivaly. The approximate value of enthalpy of combustion of $n$-hexane is
A. $-1170 \frac{\mathrm{Kcal}}{\mathrm{mol}}$
B. $-750 \frac{\mathrm{Kcal}}{\mathrm{mol}}$
C. $-1010 \frac{\mathrm{Kcal}}{\mathrm{mol}}$
D. $-590 \frac{\mathrm{Kcal}}{\mathrm{mol}}$

## Answer: C

## (D) Watch Video Solution

10. Given, $H_{2}(2)+B r_{2}(g) \rightarrow 2 H B r(g), \Delta h_{1}^{\circ}$ and standerd enthalpy of condensation of bromine is $\Delta H_{2}^{\circ}$, standard enthalpy of formation of HBr at $25^{\circ} \mathrm{C}$ is
A. $\Delta H_{1}^{\circ} / 2$
B. $\Delta H_{1}^{\circ} / 2+\Delta H^{\circ} 2$
C. $\Delta H_{1}^{\circ}-\Delta H_{2}^{\circ} / 2 \mathrm{~s}$
D. $\left(\Delta H_{1}^{\circ}-\Delta H_{2}^{\circ}\right) / 2$

## Answer: D

## - Watch Video Solution

11. The heat of combustion of yellow phoshphorus and red phosphorus are $-9.91 \mathrm{KJ} / \mathrm{mol}^{-1}$ and $-8.78 \mathrm{KJ} / \mathrm{mol}$ respectivaly. The heat of transition from yellow phosphrous to red phosphorus is
A. $1.13 K J$
B. $18.69 K J$
C. $+18.69 K J$
D. $+1.13 K J$

## Answer: D

## D Watch Video Solution

12. The enthalpies of combustion of carbon and carbon monoxide are -393.5 and $-282.5 \mathrm{KJmol}^{-1}$ respectivaly. The enthalpy of formation of carbon monoxide per mole is:
A. $-110.5 K J$
B. $676.5 K J$
C. $-67 h 6.5 K J$
D. 110.5 KJs

## - Watch Video Solution

13. The heat of formation of $\mathrm{C}_{2} \mathrm{H}_{5} \mathrm{OH}(\mathrm{l})$ is $-66 \mathrm{Kcal} / \mathrm{mol}$.

The heat of combustion of $\mathrm{CH}_{3} \mathrm{OCH}_{3}(\mathrm{~g})$ is $-348 \mathrm{Kcal} / \mathrm{mol}$
, $\Delta H_{f}$ for $\mathrm{H}_{2} \mathrm{O}$ and $\mathrm{CO}_{2}$ are $-68 \mathrm{Kcal} / \mathrm{mol}$ and $-94 \mathrm{Kcal} / \mathrm{mol}$. Respectively. Then, the $\Delta H$ for the isomerisation reaction $\mathrm{C}_{2} \mathrm{H}_{5} \mathrm{OH}(\mathrm{l}) \rightarrow \mathrm{CH}_{3} \mathrm{OCH}_{3}(g)$, and
$\Delta E$ for the same are at $T=25^{\circ} C$
A. $\Delta H=18 \mathrm{Kcal} / \mathrm{mol}, \Delta E=17.301 \mathrm{Kcal} / \mathrm{mol}$
B. $\Delta H=22 \mathrm{Kcal} / \mathrm{mol}, \Delta E=21.408 \mathrm{Kcal} / \mathrm{mol}$
C. $\Delta H=26 \mathrm{Kcal} / \mathrm{mol}, \Delta E=25.709 \mathrm{Kcal} / \mathrm{mol}$
D. $\Delta H=30 \mathrm{Kcal} / \mathrm{mol}, \Delta E=25.709 \mathrm{Kcal} / \mathrm{mol}$

## (b) Watch Video Solution

14. Given that $C+O_{2} \rightarrow O_{2}, \Delta H^{\circ}=-x K J$ and $2 \mathrm{CO}+\mathrm{O}_{2} \rightarrow 2 \mathrm{CO}_{2}, \Delta \mathrm{H}^{\circ}=-y \mathrm{KJ}$ The enthalpy of formation of carbon monoxide will be
A. $\frac{2 x-y}{2}$
B. $\frac{y-2 x}{2}$
C. $2 x-y$
D. $y=2 x$

## Answer: B

(D) Watch Video Solution
15. Assuming that water vapour is an ideal gas, the internal energy change $(\Delta U)$ when 1 mole of water is vaporised at 1 bar pressure and $100^{\circ} C$, (given: molar enthalpy of vaporisation of water $-41 \mathrm{KJmol}^{-1}$ at 1 bar and 373 K and $R=8.3 \mathrm{Jmol}^{-1} \mathrm{Kmol}^{-1}$ ) will be:
A. $4.100 \mathrm{KJmol}^{-1}$
B. $3.7904 \mathrm{~K} \mathrm{Jmol}^{-1}$
C. $37.904 \mathrm{~K} \mathrm{Jmol}^{-1}$
D. $41.00 \mathrm{KJmol}^{-1}$

## Answer: C

16. Given that $C+2 S \rightarrow C S_{2} \Delta H^{\circ} f=+117.0 \mathrm{KJmol}^{-1}$
(1)
$\mathrm{C}+\mathrm{O}_{2} \rightarrow \mathrm{CO}_{2} \Delta \mathrm{H}^{\circ} f=-393.0 \mathrm{KJmol}^{-1}$
$S+O_{2} \rightarrow \mathrm{SO}_{2} \Delta H^{\circ} f=+297.0 \mathrm{KJmol}^{-1}$
The heat of combustion of $\mathrm{CS}_{2}+3 \mathrm{O}_{2} \rightarrow \mathrm{CO}_{2}+2 \mathrm{SO}_{2}$ is
A. $-807 \mathrm{~K}_{\mathrm{Kmol}}{ }^{-1}$
B. -1104 K Jmol $^{-1}$
C. $807 \mathrm{~K} \mathrm{Jmol}^{-1}$
D. $1104 \mathrm{~K}^{\mathrm{Jmol}^{-1}}$

Answer: B
17. The enthaply at $298 K$ of the reaction
$\mathrm{H}_{2} \mathrm{O}_{2}(l) \rightarrow+\frac{1}{2} \mathrm{O}_{2}(g)$
is $-23.5 \mathrm{Kcalmol}^{-1}$ and the enthaply of formation of
$\mathrm{H}_{2} \mathrm{O}_{2}(\mathrm{l})$ is $-44.8 \mathrm{Kcalmol}^{-1}$. The enthaply of formatiom of $\mathrm{H}_{2} \mathrm{O}(l)$ is
A. $-68.3 \mathrm{Kcalmol}^{-1}$
B. $68.3 \mathrm{Kcalmol}^{-1}$
C. $-91.8 \mathrm{Kcalmol}^{-1}$
D. $91.8 \mathrm{Kcalmol}^{-1}$

Answer: A
18. Equal volumes of molar hydrochloric acid and subphuric acid are neutralized by dil. NaOH solution and $x$ Kcal and $y$ Kcal of heat are liberated respectively. Which of the following is true?
A. $x=y$
B. $x=\frac{1}{2} y$
C. $x=2 y$
D. None of these

Answer: A

D Watch Video Solution
19. From the standard enthalpies of formation values for some compounds (in $K_{\text {Jmol }}{ }^{-1}$ ), predict which one of them will be most stable?
A. Propane $(g)\left(\Delta H_{f}^{\circ}=-103.8\right)$
B. $n$-Butane $(g)\left(\Delta H_{f}^{\circ}=-124.7\right)$
C. $n$-Butane $(g)\left(\Delta H_{f}^{\circ}=-167.2\right)$
D. $n$-Octane $(g)\left(\Delta H_{f}^{\circ}=-208.4\right)$

## Answer: D

## D Watch Video Solution

20. $\Delta H_{1}^{\circ}$ for $\mathrm{CO}_{2}(g), \mathrm{CO}(g)$ and $\mathrm{H}_{2} \mathrm{O}(g)$ are $-393.5,-110.5$ and $-241.8 \mathrm{kJmol}^{-1}$ respectively.

Standard enthalpy change for the reacion

$$
\mathrm{CO}_{2}(g)+\mathrm{H}_{2}(g) \rightarrow \mathrm{CO}(g)+\mathrm{H}_{2} \mathrm{O}(g) \text { is }
$$

A. $524.1 \mathrm{KJmol}^{-1}$
B. $41.2 \mathrm{~K} \mathrm{Jmol}^{-1}$
C. $-262.5 \mathrm{KJmol}^{-1}$
D. $-41.2 \mathrm{KJmol}^{-1}$

## Answer: B

## - Watch Video Solution

21. Which of the following statements is correct about heat of combuustion?
A. It may be exothermic in some cases and endothermic in other cases
B. It is applicable to gaseous substances only
C. It is always an exothermic reaction
D. Its value does not change with tempareture

## Answer: B

## D Watch Video Solution

22. Given
$N_{2}(g)+3 H_{2}(g)=2 N_{3}(g), \Delta H^{\circ}=-22 k c a l$.
The
standard enthapy of formation of $\mathrm{NH}_{3}$ gas is

$$
\text { A. }-11 \mathrm{Kcal} / \mathrm{mol}
$$

B. $11 \mathrm{Kcal} / \mathrm{mol}$
C. $-22 \mathrm{Kcal} / \mathrm{mol}$
D. $22 \mathrm{Kcal} / \mathrm{mol}$

## Answer: A

## D Watch Video Solution

23. Smelting of iron ore takes place through this reaction
$2 \mathrm{FeO}_{3}(s)+3 \mathrm{C}(s) \rightarrow 4 \mathrm{Fe}(s)+3 \mathrm{CO}_{2}(g)$
$\Delta H^{\circ}{ }_{-}(f)$ of $\mathrm{Fe}_{2} \mathrm{O}_{3}$ and $\mathrm{CO}_{2}$ are $-8242 \mathrm{kJmol}^{-1}$
and $-393.7 \mathrm{kJmol}^{-1}$

The reaction is
A. Endothermic
B. Exothermic
C. $\Delta H=0$
D. None of these

## Answer: A

## D Watch Video Solution

24. Consider the reaction,
$4 \mathrm{NO}_{2}(g)+\mathrm{O}_{2}(g) \rightarrow 2 \mathrm{~N}_{2} \mathrm{O}_{5}(g), \Delta_{r} H=-111 k J$.
$\mathrm{N}_{2} \mathrm{O}_{5}(s)$ is formed instead of $\mathrm{N}_{2} \mathrm{O}_{5}(g)$ in the above reaction, the $\Delta_{r} H$ value will be
(Given, $\Delta H$ of sublimation for $N_{2} O_{5}$ is $54 \mathrm{kJmol}^{-1}$ )
A. $-165 K J$
B. $+54 K J$
C. $+219 K J$
D. $-219 K J$

Answer: A

D Watch Video Solution
25. (1) For the given heat of reaciton,
(i) $C(s)+O_{2}(g)=\mathrm{CO}_{2}(g)+97 k c a l$
(ii) $\mathrm{CO}_{2}(g)+C(s)=2 C O(g)-39 k c a l$
the heat of combustion of $C O(g)$ is:
A. 68 Kcal
B. -68 Kcal
C. +48 Kcal
D. None

## Answer: A

## - Watch Video Solution

26. Given the reaction at $967^{\circ} \mathrm{C}$ and 1 atm .
$\mathrm{CaCO}_{3}(s) \Leftrightarrow \mathrm{CaO}(s)+\mathrm{CO}_{2}(g)$
$\Delta H=176 \mathrm{kJmol}^{-1}$, then $\Delta E$ equals
A. $156.6 K J$
B. 165.6 KJ
C. $16.6 K J$
D. $1.656 K J$

Answer: A

## D Watch Video Solution

27. Values of heats of formation for $\mathrm{SiO}_{2}$ and MgO are
-48.4 and $-34.7 k J$ respectively. The heat of the reaction
$2 \mathrm{Mg}+\mathrm{SiO}_{2} \rightarrow 2 \mathrm{MgO}+S i$ is
A. $21.16 K J$
B. $-21.00 K J$
C. $-13.62 K J$
D. $13.6 K J$

Answer: B
28. On the basis of the following thermochemical data : $\left(\Delta_{f} G^{\circ} H_{(a q .)}^{+}=0\right)$
$\mathrm{H}_{2} \mathrm{O}_{(l)} \rightarrow H_{(a q .)}^{+}+\mathrm{OH}_{(a q .)}^{-}, \Delta H=57.32 k J$
$H_{2(g)}+\frac{1}{2} O_{2(g)} \rightarrow H_{2} O_{(l)}, \Delta H=-286.20 k J$
The value of enthalpy of formation of $\mathrm{OH}^{-}$ion at $25^{\circ} \mathrm{C}$ is :
A. $-22.88 K J$
B. $-22.88 K J$
C. $+228.88 K J$
D. $-343.52 K J$

Answer: B

- Watch Video Solution

29. Given that
$3 C(s)+2 \mathrm{Fe}_{2} \mathrm{O}_{3}(s) \rightarrow 4 \mathrm{Fe}(s)+3 \mathrm{CO}_{2}(g)$,
$\Delta H^{\circ}=-93657 \mathrm{kcal}$ at $25^{\circ} \mathrm{C}$
$3 \mathrm{C}(s)+3 \mathrm{O}_{2}(g) \rightarrow 3 \mathrm{CO}_{2}(g)$,
$\Delta H^{\circ}=-94050 \mathrm{kcal}$ at $25^{\circ} \mathrm{C}$

The value of $\Delta H^{\circ}{ }_{-}(f)\left(\mathrm{Fe}_{2} \mathrm{O}_{3}\right)$ is
A. 16.750 Kcal
B. -16.750 Kcal
C. -196.5 Kcal
D. -393 Kcal

## Answer: C

30. For which of the following equations is the enthapy change at $25^{\circ} \mathrm{C}$ and 1 atm equal to $\Delta H_{f}^{\circ}\left(\mathrm{CH}_{3} \mathrm{OH}, l\right)$
A. $\mathrm{CO}(g)+2 \mathrm{H}_{2}(g) \rightarrow \mathrm{CH}_{2} \mathrm{OH}(l)$
B. $\mathrm{CO}(\mathrm{g})+4 \mathrm{H}(\mathrm{g})+\mathrm{O}(\mathrm{g}) \rightarrow \mathrm{CH}_{3} \mathrm{OH}(\mathrm{l})$
C. $\mathrm{CO}(g)+4 \mathrm{H}(\mathrm{g})+\mathrm{O}(\mathrm{g}) \rightarrow \mathrm{CH}_{3} \mathrm{OH}(\mathrm{l})$
D. C (graphite) $+2 \mathrm{H}_{2}(g)+\frac{1}{2} \mathrm{O}_{2}(g) \rightarrow \mathrm{CH}_{3} \mathrm{OH}(l)$

Answer: C

## D Watch Video Solution

31. For an endothermic reaction,
A. $H_{R}=H_{P}$
B. $H_{R}>H_{P}$
C. $H_{R}<H_{P}$
D. None

## Answer: C

## (b) Watch Video Solution

32. 4.8 g of $C$ (diamond) on complete combustion evolves
$1584 k J$ of heat. The standard heat of formation of gaseous
carbon is $725 k J / m o l$. The energy required for the process

C(graphite) $\rightarrow \mathrm{C}$ (gas)
C (diamond) $\rightarrow \mathrm{C}$ (gas) are
A. 725,727
B. 727,725
C. 725,723
D. none of these

## Answer: C

## - Watch Video Solution

33. In the reaction
$\mathrm{CO}_{2}(g)+\mathrm{H}_{2}(g) \rightarrow \mathrm{CO}(g)+\mathrm{H}_{2} \mathrm{O}(g)$,
$\Delta H=2.8 k J$
$\Delta H$ represents
A. Heat of reaction
B. Heat of combustion
C. Heat of formation
D. Heat of solution

## Answer: C

## D Watch Video Solution

34. For the reaction
$A(g)+2 B(g) \rightarrow 2 C(g)+3 D(g)$,
the value of $\Delta H$ at $27^{\circ} C$ is 19.0 kcal . The value of $\Delta E$ for the reaction would be
$\left(R=2.0 \mathrm{calH}^{-1} \mathrm{~mol}^{-1}\right)$
A. 20.8 Kcal
B. 19.8 Kcal
C. 18.8 Kcal
D. 17.8 Kcal

Answer: A

## D Watch Video Solution

35. For the reaction
$N_{2}(g)+3 H_{2}(g) \Leftrightarrow 2 \mathrm{NH}_{3}(g), \Delta H=?$
A. $\Delta E+2 R T$
B. $\Delta E-2 R T$
C. $\Delta E+R T$
D. $\Delta E-R T$

Answer: D
36.

If $C(s)+O_{2}(g) \rightarrow \mathrm{CO}_{2}(g), \Delta H=X$ and
$\mathrm{CO}(\mathrm{g})+1 / 2 \mathrm{O}_{2}(\mathrm{~g}) \rightarrow \mathrm{CO}_{2}(\mathrm{~g}), \Delta \mathrm{H}=\mathrm{Y}$, then the heat of formation of $C O$ is
A. $X+Y$
B. $X-Y$
c. $Y-X$
D. $X Y$

Answer: B

- Watch Video Solution

37. Heat of solution of $\mathrm{BaCl}_{2} \cdot 2 \mathrm{H}_{2} \mathrm{O}=200 \mathrm{kJmol}^{-1}$

Heat of hydration of $\mathrm{BaCl}_{2}=-150 \mathrm{kJmol}^{-1}$
Hence heat of solution of $B a C l_{2}$ is
A. $350 \mathrm{~K} \mathrm{Jmol}^{-1}$
B. $50 \mathrm{~K} \mathrm{Jmol}^{-1}$
C. $-350 \mathrm{KJmol}^{-1}$
D. none of these

## Answer: B

## D Watch Video Solution

38. The mutual heat of neutralisation of 40 gNaOH and $60 \mathrm{CH}_{3} \mathrm{COOH}$ will be
A. $57.1 K J$
B. less than $57.1 K J$
C. more than $57.1 K j$
D. $13.7 K J$

## Answer: B

## ( Watch Video Solution

39. $\Delta H_{c o m b}^{\circ}$ of carbon is $-x k \mathrm{Jmol}^{-1}$. The standard formation of enthalpy of $\mathrm{CO}_{2}(\mathrm{~g})$ will be
A. $-x \mathrm{KJmol}^{-1}$
B. $+x \mathrm{KJmol}^{-1}$
C. $-x / 3 \mathrm{KJmol}^{-1}$
D. Data is insufficient to predict it

Answer: A

## D Watch Video Solution

40. The heat of combustion of carbon is $394 k J$. The heat evolved in combustion of $6.023 \times 10^{22}$ atoms of carbon is
A. $3940 K J$
B. $394.0 K J$
C. $39.4 K J$
D. $0.394 K J$

Answer: A
41. Heat of neutralisation of a strong acid by a strong base is equal to $\Delta H$ of
A. $\mathrm{H}^{+}+\mathrm{OH}^{-}=\mathrm{H}_{2} \mathrm{O}$
B. $\mathrm{H}_{2} \mathrm{O}+\mathrm{H}^{+}=\mathrm{H}_{3} \mathrm{O}^{+}$
C. $2 \mathrm{H}_{2} \mathrm{O}_{2}=2 \mathrm{H}_{2} \mathrm{O}$
D. $\mathrm{CH}_{3} \mathrm{COOH}+\mathrm{NaOH}=\mathrm{CH}_{3} \mathrm{COONa}+\mathrm{H}_{2} \mathrm{O}$

## Answer: C

## D Watch Video Solution

42. Heat of neutralisation is least when
A. NaOH is neutralised by $\mathrm{CH}_{3} \mathrm{COOH}$
B. NaOH is neutralised by $\mathrm{HNO}_{3}$
C. NaOH is neutralised by HCl
D. NaOH is neutralised by $\mathrm{H}_{2} \mathrm{SO}_{4}$

## Answer: A

## - Watch Video Solution

43. The standard heat of formation of $U_{3} O_{8}$ is $-853.5 \mathrm{kcl} / / \mathrm{mol}$
and the standard heat of the reaction $3 \mathrm{UO}_{2}+\mathrm{O}_{2} \rightarrow \mathrm{U}_{3} \mathrm{O}_{8}$
is -76.01 Kcal .
The standard heat of formation of $U O_{2}$ is
A. $-1083 \mathrm{~K} \mathrm{Tmol}^{-1}$
B. $-108.3 \mathrm{KJmol}^{-1}$
C. $-10.83 \mathrm{KJmol}^{-1}$
D. $-1.083 \mathrm{KJmol}^{-1}$

## Answer: C

## D Watch Video Solution

44. Given $N_{2}(g)+3 H(g)=2 N H_{3}(g), \Delta H^{\circ}=22$ kcal. The standard enthalpy of formation of $\mathrm{NH}_{3}$ gas is
A. $-11 \mathrm{Kcal} / \mathrm{mol}$
B. $11 \mathrm{Kcal} / \mathrm{mol}$
C. $-22 \mathrm{Kcal} / \mathrm{mol}$
D. $22 \mathrm{Kcal} / \mathrm{mol}$

Answer: B

## (D) Watch Video Solution

45. $\Delta H$ for $\mathrm{CaCO}_{3}(s) \rightarrow \mathrm{CaO}(s)+\mathrm{CO}_{2}(g)$ is
$176 \mathrm{kJmol}^{-1}$ at 1240 K . The $\Delta E$ for the change is equal to
A. 160 KJ
B. 165.6 KJ
C. 186.3 KJ
D. 180.0 KJ

Answer: A
46. $C_{\text {diamond }}+O_{2}(g) \rightarrow O_{2}(g), \Delta H=-395 k J$
$C_{\text {graphite }}+O_{2}(g) \rightarrow \mathrm{CO}_{2}(g), \Delta H=-393.5 K J$
The $\Delta H$, when diamond is formed from graphite, is
A. $-1.5 K J$
B. $+1.5 K J$
C. $+3.0 K J$
D. $-3.0 K J$

## Answer: B

## D Watch Video Solution

47. Given that
$O(g)+e^{-} \rightarrow O^{-}(g), \Delta H=34$ Kcalmol $^{-1}$
$O(g)+2 e^{-}(g) \rightarrow O^{2-}(g), \Delta H=168 \mathrm{Kcalmol}^{-1}$
The enthalply change for the reaction
$O^{-}(g)+e^{-} \rightarrow O^{2-}(g)$ is
A. $-202 \mathrm{Kcalmol}^{-1}$
B. -134 K $_{\text {calmol }}{ }^{-1}$
C. +134 K $_{\text {calmol }}{ }^{-1}$
D. $+202 \mathrm{Kcalmol}^{-1}$

## Answer: C

## D Watch Video Solution

48. The enthalpies of combustion of carbon and carbon momoxide are $-390 K J$ respectively. The enthalpy of fomation of $C O$ in $K J$ is
A. 668
B. -12
C. -112
D. -668

## Answer: C

## - Watch Video Solution

49. $2.1 g$ of $F e$ combines with $S$ evoling $3.77 K J$. The heat oof formation of FeS in $K J / m o l$ is
A. -3.77
B. -1.79
C. -100.5
D. none of these

## Answer: C

## D Watch Video Solution

50. The standard heat of combustion of propane is $-2220.1 \mathrm{KJmol}^{-1}$. The standard heat of vaporisation of liquid water is $44.0 \mathrm{~K}_{\mathrm{Jmol}^{-1}}$. What is $\Delta H^{\circ}$ of

$$
\mathrm{C}_{3} \mathrm{H}_{8}(g)+5 \mathrm{O}_{2}(g) \rightarrow 3 \mathrm{CO}_{2}(g)+4 \mathrm{H}_{2} \mathrm{O}(g)
$$

A. $-2220.1 K J$
B. $-2044.1 K J$
C. $-2396.1 K J$
D. $-2176.1 K J$

Answer: C

## D Watch Video Solution

51. The standard heat of combustion of solid boron is equal to
A. $\Delta H_{f}^{\circ}\left(B_{2} O_{3}\right)$
B. $1 / 2 \Delta H_{f}^{\circ}\left(B_{2} O_{3}\right)$
C. $2 \Delta H_{f}^{\circ}\left(B_{2} O_{3}\right)$
D. $-1 / 2 \Delta H_{f}^{\circ}\left(B_{2} O_{3}\right)$

Answer: B
52. If $\mathrm{H}^{+}+\mathrm{OH}^{-} \rightarrow \mathrm{H}_{2} \mathrm{O}+13.7 \mathrm{Kcal}$, the heat of neutralisation for complete neutralisation of 1 mole of $\mathrm{H}_{2} \mathrm{SO}_{4}$ by base will be
A. 13.7 Kcal
B. 27.4 Kcal
C. 6.85 Kcal
D. 3.425 Kcal

## Answer: B

## D Watch Video Solution

53. The heat of neutralisation of a strong acid and a strong alkali is $57.0 \mathrm{~K} \mathrm{Jmol}^{-1}$. The heat released when 0.5 mole of
$\mathrm{HNO}_{3}$ solution is mixed with 0.2 mole of KOH is
A. 57.0 KJ
B. 11.4 KJ
C. 28.5 KJ
D. 34.9 KJ

## Answer: B

## - Watch Video Solution

54. Based on the following thermochemical equations

$$
\mathrm{H}_{2} \mathrm{O}(\mathrm{~g})+\mathrm{C}(\mathrm{~s}) \rightarrow \mathrm{CO}(\mathrm{~g})+\mathrm{H}_{2}(\mathrm{~g}), \Delta H=131 \mathrm{KJ}
$$

$$
\mathrm{CO}(g)+1 / 2 \mathrm{O}_{2}(g) \rightarrow \mathrm{CO}_{2}(g), \Delta H=-282 \mathrm{KJ}
$$

$$
H_{2}(g)+1 / 2_{2}(g) \rightarrow H_{2} O(g), \Delta H=-242 K J
$$

$$
C(s)+O_{2}(g) \rightarrow C O_{2}(g), \Delta H=X K J
$$

The value of $X$ will be
A. $-393 K J$
B. $-655 K J$
C. $+393 K J$
D. +655 KJH

## Answer: B

## - Watch Video Solution

55. If $x_{1}, x_{2}$ and $x_{3}$ are enthalpies of $H-H, O=O$ and $O-H$ bonds respective, and $x_{4}$ is the enthaply of vaporisation of water, estimate the standard enthalpy opf combustion of bydrogen.
A. $x_{1}+\frac{x_{2}}{2}-2 x_{3}+x_{4}$
B. $x_{1}+\frac{x_{2}}{2}-2 x_{3}-x_{4}$
C. $x_{1}+\frac{x_{2}}{2}-x_{3}-x_{4}$
D. $2 x_{3}-x_{1}-\frac{x_{2}}{2}-x_{4}$

## Answer: A

## (3) Watch Video Solution

56. The standard enthalpy of formation $\left(\Delta_{f} H^{\circ}\right)$ at $298 K$ for methane $\left(\mathrm{CH}_{4(\mathrm{~g})}\right)$ is $-74.8 \mathrm{kJmol}^{-1}$. The additional information required to determine the average energy for $C-H$ bond formation would be :
A. The dissociation energy of hydrogen molecule, $H_{2}$
B. The dissociation energy of $H_{2}$ and enthlpy of sublimation of carbon
C. Latent heat vaporisation of methane
D. The first four ionisation energies of carbon and electron gain enthalpy of hydrogen

## Answer: B

## - Watch Video Solution

57. Heat of hydrogenation of ethene is $x_{1}$ and that of benzene is $x_{2}$. Hence resonance energy of benezene is
A. $x_{2}-3 x_{1}$
B. $x_{1}+x_{2}$
C. $3 x_{1}-x_{2}$
D. $x_{1}-3 x_{2}$

## Answer: B

## - Watch Video Solution

58. Under the same conditions, how many $m L$ of $1 M K O H$ and $0.5 \mathrm{MH}_{2} \mathrm{SO}_{4}$ solutions, respectively, when mixed to form a total volume of 100 mL , produces the highest rise in temperature?
A. $67: 33$
B. $33: 67$
C. 40: 60
D. $50: 50$

## Answer: C

## D Watch Video Solution

59. Bond energy of $(N-H)$ bond is $y K \mathrm{Jmol}^{-1}$ under standard state. Thus,change in internal energy in the following process is
$\mathrm{NH}_{3}(g) \rightarrow N(g)+3 H(g)$
A. $-3 y \mathrm{KJmol}^{-1}$
B. $-y \mathrm{KJmol}^{-1}$
C. $3 y K \mathrm{Jmol}^{-1}$
D. $y K \mathrm{Kmol}^{-1}$

## D Watch Video Solution

60. The enthaplpy changes state for the following processes are listed below:
$C l_{2}(g)=2 C l(g): 242.3 \mathrm{KJmol}^{-1}$
$I_{2}(g)=2 I(g), 151.0 K \mathrm{Jmol}^{-1}$
$I C l(g)=I(g)+C l(g): 211.3 K \operatorname{Jmol}^{-1}$
$I_{2}(s)=l_{2}(g), 62.76 K \mathrm{Jmol}^{-1}$
Given that the standard states for iodine chlorine are $I_{2}(s)$
and $C l_{2}(g)$, the standard enthalpy of formation for $I C l(g)$
is:
A. $+244.8 \mathrm{KJmol}^{-1}$
B. $-14.6 \mathrm{~K} \mathrm{Jmol}^{-1}$
C. $-16.8 \mathrm{~K} \mathrm{Jmol}^{-1}$
D. $+16.8 \mathrm{~K} \mathrm{Jmol}^{-1}$

## Answer: D

## - Watch Video Solution

61. For the equations
$C 1($ diamond $)+2 H_{2}(g) \rightarrow C H_{4}(g), \Delta H_{1}$
$C(g)+4 H(G) \rightarrow C H(g), \Delta H_{2} 1$
Predict whether
A. $\Delta H_{1}=\Delta H_{2}$
B. $\Delta H_{1}>\Delta H_{2}$
C. $\Delta H_{1}<\Delta H_{2}$
D. $\Delta H_{1}=\Delta H_{2}$

## Answer: D

## D Watch Video Solution

62. If $H_{2}(g)=2 H(g), \Delta H=104 c a l$, then heat of atomisation of hydrogen is
A. 52 Kcal
B. 104 cal
C. 208 Kcal
D. None of these

Answer: B
63. The average $X e-F$ bond energy is $34 \mathrm{Kcal} / \mathrm{mol}$, first I. $E$. Of $X e$ is $279 \mathrm{Kcal} / \mathrm{mol}$, electron affinity of $F$ is $85 \mathrm{Kcal} / \mathrm{mol}$. Then, the enthalpy chnage for the reaction $X e F_{4} \rightarrow X e^{+}+F^{-}+F_{2}+F$ will be
A. $367 \mathrm{Kcal} / \mathrm{mol}$
B. $425 \mathrm{Kcal} / \mathrm{mol}$
C. $292 \mathrm{Kcal} / \mathrm{mol}$
D. $392 \mathrm{Kcal} / \mathrm{mol}$

## Answer: A

64. The standard enthalpy of formation of $N H_{3}$ is $-46.0 \mathrm{~K} \mathrm{Jmol}^{-1}$. If the enthalpy of formation of $\mathrm{H}_{2}$ from its atoms is $-436 \mathrm{~K} \mathrm{Jmol}^{-1}$ and that of $N_{2}$ is $-712 \mathrm{~K} \mathrm{Jmol}^{-1}$, the average bond enthalpy of $\mathrm{N}-\mathrm{H}$ bond in $\mathrm{NH}_{3}$ is
A. $-964 \mathrm{KJmol}^{-1}$
B. $+352 \mathrm{KJmol}^{-1}$
C. $+105 \mathrm{~K} \mathrm{Jmol}^{-1}$
D. $-1102 \mathrm{~K} \mathrm{Jmol}^{-1}$

Answer: C

D Watch Video Solution
65. Given $H_{2}(g)=2 H(g) \Delta_{H-H}=103 \mathrm{Kcalmol}^{-1}$

The heat of reaction of

$$
C H_{4}(g)=C H_{3}(g)+H(g)
$$

A. $103 \mathrm{Kcalmol}^{-1}$
B. $206 \mathrm{Kcalmol}^{-1}$
C. $51.5 \mathrm{Kcalmol}^{-1}$
D. zero

## Answer: B

## - View Text Solution

66. Energy required to dissociate $4 g$ of gaseous hydrogen into free gaseous atoms is 208 Kcal at $25^{\circ} \mathrm{C}$

The bond energy of $H-H$ bond will be
A. 104 Kcal
B. 10.4 Kcal
C. 1040 Kcal
D. 1.40 Kcal

## Answer: D

## D Watch Video Solution

67. The $H-H$ bond energy is $430 \mathrm{KJmol}^{-1}$ and $\mathrm{Cl}-\mathrm{Cl}$ bonds is $240 \mathrm{KJ} \mathrm{mol}^{-1}$. DeltaHf or HClis-90KJ. TheH-Cl bond energy is about.
A. $425 \mathrm{KJmol}^{-1}$
B. $K J m o l^{-1}$
C. $360 \mathrm{~mol}^{-1}$
D. $180 \mathrm{~mol}^{-1}$

Answer: A

## D Watch Video Solution

68. Given the bond energies $N=N, H$ and $H-H$ bond are 945,436 and $391 \mathrm{KJmol}^{-1}$ respectively, the enthalpy change of the reaction
$\mathrm{N}_{2}(g)+3 \mathrm{H}_{2}(g) \rightarrow 2 \mathrm{NH}_{3}(g)$ is
A. $-93 K J$
B. $102 K J$
C. $90 K J$
D. 105 KJ

## Answer: A

## (D) Watch Video Solution

69. $A B, A_{2}$ and $B_{2}$ are diatomic molecules, if the bond enthalpies of $A_{2}, A B$ and $B_{2}$ are in the ratio of $1: 1: 0.5$ and the enthaly of formation of $A B$ from $A_{2}$ gives $A O$ and $\Delta H_{c}=-1200 \mathrm{KJmol}^{-1}$. Bond energy of $(O=O)$ bond is $500 \mathrm{~K} \mathrm{Jmol}^{-1}$. What is the bond enthalpy of $(A-O)$ bond?
A. $400 \mathrm{KJmol}-1$
B. $1650 \mathrm{KJmol}-1$
C. 1200 KJmol -1
D. $200 \mathrm{KJmol}-1$

## Answer: A

## - View Text Solution

70. The standard enthalpies of formation of $S F_{6}(g), S(g)$ and $F(g)$ are $-1150,+280$ and $+85 \mathrm{KJmol}^{-1}$. Thus, average bond energy of $(S-F)$ in $S F_{6}$ is
A. $309.16 \mathrm{~K} \mathrm{Jmol}^{-1}$
B. $1855 \mathrm{~K} \mathrm{Jmol}^{-1}$
C. $11.130 \times 10^{3} \mathrm{KJmol}^{-1}$
D. $323.33 \mathrm{~K} \mathrm{Jmol}^{-1}$

Answer: D

## D Watch Video Solution

71. Using bond enthalpies (symbolized by $\varepsilon$ ) an estimated value of $\Delta H^{\circ}$ for the reaction

$$
\mathrm{H}_{2} \mathrm{C}=\mathrm{CH}_{2}(g)+\mathrm{H}_{2}(g) \rightarrow \mathrm{CH}_{3}-\mathrm{CH}_{3}(g) \text { would be }
$$

A. $\varepsilon_{C=C}+\varepsilon_{H-H}-2 \varepsilon_{C-H}-\varepsilon_{C-C}$
B. $\varepsilon_{C=C}+\varepsilon_{H-H}-6 \varepsilon_{C-H}-\varepsilon_{C-C}$
C. $\varepsilon_{C=C}+\varepsilon_{H-H}-4 \varepsilon_{C-H}-\varepsilon_{C-C}$
D. $\varepsilon_{C=C}+\varepsilon_{H-H}-4 \varepsilon_{C-H}-\varepsilon_{C-C}$

Answer: D
72. The heat of formation of $\mathrm{CO}_{2}$ is $-407 \mathrm{KJ} / \mathrm{mol}$. The energy required for the process
$3 \mathrm{CO}_{2}(g) \rightarrow 3 \mathrm{C}(g)+2 \mathrm{O}_{3}(g)$ is
A. less than $1221 K J$
B. more than $1221 K J$
C. is equal to $1221 K J$
D. cannot be predicted

Answer: B
73. Heat evolved in the reaction
$\mathrm{H}_{2}+\mathrm{Cl}_{2} \rightarrow 2 \mathrm{HCl}$ is 182 kJ Bond energies $\mathrm{H}-\mathrm{H}=430$ $\mathrm{kJ} /$ mole, $\mathrm{Cl}-\mathrm{Cl}=242 \mathrm{~kJ} /$ mole. The $\mathrm{H}-\mathrm{Cl}$ bond energy is
A. $245 \mathrm{~K} \mathrm{Jmol}^{-1}$
B. $427 \mathrm{~K} \mathrm{Jmol}^{-1}$
C. $336 \mathrm{~K} \mathrm{Jmol}^{-1}$
D. $154 \mathrm{~K} \mathrm{Jmol}^{-1}$

## Answer: B

## - Watch Video Solution

74. Enthalpy of formation of 2 mol of $\mathrm{NH}_{3}(\mathrm{~g})$ is -90 KJ , and $\Delta H_{H-H}$ and $\Delta H_{N-H}$ respectively $435 \mathrm{KJmol}^{-1}$ and
$390 \mathrm{~K} \mathrm{Jmol}^{-1}$. The valule of $\Delta H_{N \equiv N}$ is
A. $-472.5 K J$
B. $-945 \mathrm{KJmol}^{-1}$
C. $472.5 K J$
D. $945 \mathrm{~K}_{\mathrm{Jmol}^{-1}}$

## Answer: A

## D Watch Video Solution

75. Oxidising power of chlorine in aqueous solution can be determined by the parameters indicated below

$$
\frac{1}{2} C L_{2}(g) \xrightarrow{\frac{1}{2} \Delta_{\text {diss }} H^{\Theta}} C l(g) \xrightarrow{\Delta H_{E g}^{\Theta}}
$$

$$
C l^{-}(g) \xrightarrow{\Delta_{h y d} H^{\ominus}} C l^{-}(a q)
$$

The energy involved in the conversion of $\frac{1}{2} C l_{2}(g)$ to
$C l^{-}(a q)$
(Using the data $\Delta_{d i s s} H_{C l_{2}}^{\Theta}=240 \mathrm{KJmol}^{-1}$ )
$\Delta_{E g} H_{C l}^{\Theta}=-349 \mathrm{KJmol}^{-1}$,
$\Delta_{E g} H_{C l}^{\Theta}=-381 \mathrm{KJmol}^{-1}$ ) will be
A. $+152 c$
B. $-610 \mathrm{KJmol}^{-1}$
C. $-850 \mathrm{~K} \mathrm{Jmol}^{-1}$
D. $+120 \mathrm{KJmol}^{-1}$

## Answer: D

76. The value of $\Delta H_{O-H}$ is $109 \mathrm{Kcal} / \mathrm{mol}$. The enthalpy of formation of 1 mole of water in gaseous state will be
A. $109 \times 2 \mathrm{KJmol}^{-1}$
B. $109 \mathrm{KJmol}^{-1}$
C. data is not sufficient to predict it
D. $109 \times 4$ K calmol $^{-1}$

Answer: B

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Entropy, Gibb'S Energy And Spontaneity Of Process

1. Calculate the entropy change when $3.6 g$ of liquid water is completely converted into vapour at $100^{\circ} \mathrm{C}$. The molar heat of vaporization is $40.85 \mathrm{~K} \mathrm{~mol}^{-1}$.
A. $6.08 J K^{-1}$
B. $109.5 \mathrm{JK}^{-1}$
C. $21.89 \mathrm{JK}^{-1}$
D. $-21.89 J K^{-1}$

## Answer: C

## D Watch Video Solution

2. In an irreversible process taking place at constant $P$ and $T$ in which only pressure volume work is being done by the
system the change in Gibb's energy $(\Delta G)$ and change in entropy $(\Delta)$, satisfy the criterion:
A. $(\Delta S)_{V . U}=0,(\Delta G)_{T . P}=0$
B. $(\Delta S)_{V \cdot U}=0,(\Delta G)_{T . P}=+v e$
C. $(\Delta S)_{V . U}=0,(\Delta G)_{T . P}=-v e$
D. $(\Delta S)_{V \cdot U}=0,(\Delta G)_{T \cdot P}=-v e$

## Answer: C

## - Watch Video Solution

3. The correct relationship between free energy change in a reaction and the corresponding equilibrium constant $K_{c}$ is:
A. $\Delta G^{\circ}=R T \ln K_{C}$
B. $-\Delta G^{\circ}=R T \ln K_{C}$
C. $\Delta G=R T \ln K_{C}$
D. $-\Delta G=R T \ln K_{C}$

## Answer: D

## - Watch Video Solution

4. Predict which of the following reaction $(s)$ has a positive entropy change?
$I . \mathrm{Ag}^{+}(a q)+\mathrm{Cl}^{-}(a q) \rightarrow \mathrm{AgCl}(s)$
$\mathrm{II} . \mathrm{NH}_{4} \mathrm{Cl}(\mathrm{s}) \rightarrow \mathrm{NH}_{3}(\mathrm{~g})+\mathrm{HCl}(\mathrm{g})$
III $.2 \mathrm{NH}_{3}(\mathrm{~g}) \rightarrow \mathrm{N}_{2}+3 \mathrm{H}_{2}(\mathrm{~g})$
A. I and II
B. III
C. II and III
D. II

Answer: B

## D Watch Video Solution

5. Maxing of non-reacting gases is generally accompanied by
A. 'Decreases in enthropy
B. Increases in entropy
C. Change in enthalpy
D. Change in free energy

## Answer: C

## D Watch Video Solution

6. A particular state of system is arrived at starting from a given state in two different ways (1) following reversible path and (2) irreversible path. Which of the following relations would be correct if the processes are isothermal ?
A. $\Delta S_{\text {rev }} \neq \Delta S_{\text {irrev }}$
B. $\Delta q_{\text {rev }}=\Delta q_{i r r e v}$
C. $\Delta S_{\text {rev }}=\Delta S_{\text {irrev }}=\frac{\Delta q_{r e v}}{T}$
D. $\Delta S_{i r r e v}=\frac{\Delta q_{i r r e v}}{T} \neq \Delta S_{r e v}$
7. For a spontaneous reaction, $\Delta G$, equilibrium constant $(K)$ and $E_{\text {cell }}^{0}$ will be respectively :
A. $-v e,>1,+v e$
B. $+v e,>1,-v e$
C. $-v e,<1,-v e$
D. $-v e,>1,-v e$

Answer: A

D Watch Video Solution
8.
For the water gas reaction
$C(s)+\mathrm{H}_{2} \mathrm{O}(g) \Leftrightarrow \mathrm{CO}(g)+\mathrm{H}_{2}(g)$
At $1000 K$, the standard Gibbs free energy change of the reaction is $-8.314 \mathrm{KJ} / \mathrm{mol}$. Therefore, at 1000 K the equilibrium constant of the above water gas reaction is
A. 1
B. 10
C. $\frac{1}{e}$
D. 2.718

Answer: A
9. At $500 K$, for an isobaric pracess.
$\Delta S_{\text {system }}=-10 \frac{\mathrm{KJ}}{\mathrm{molK}}$ and $\Delta S_{\text {surr }}=12 \frac{\mathrm{KJ}}{\mathrm{molK}}$
Therefore, $\Delta G$ for the entire process is
A. $-500 \mathrm{KJ} / \mathrm{mol}$
B. $-1000 \mathrm{KJ} / \mathrm{mol}$
C. $-600 \mathrm{KJ} / \mathrm{mol}$
D. $-1100 \mathrm{KJ} / \mathrm{mol}$

## Answer: D

## D Watch Video Solution

10. Identify the correct statement regarding a spontaneous
A. For a spontaneous process in an isolated system, the change in entropy is positive
B. Endothermic process are never spontaneous
C. Exothermic processes are always spontaneous
D. Lowering of energy in the reaction process is the only criterion for spontaneity

## Answer: B

## ( Watch Video Solution

11. Standard entropt of $X_{2}, Y_{2}$ and $X Y_{3}$ are 60,40 and $50 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$, respectively. For the reaction, $\frac{1}{2} X_{2}+\frac{3}{2} Y_{2} \rightarrow X Y_{3}, \Delta H=-30 K J \quad$, to be at equilibrium, the temperature will be:
A. $1250 K$
B. $500 K$
C. 750 K
D. $1000 K$

## Answer: A

## (D) Watch Video Solution

12. If liquids $A$ and $B$ from an ideal solution,
A. The entropy of mixing is zero
B. The Gibbs free energy as well as the entropy of mixing
C. The Gibbs free energy as well as the enthalpy of mixing
are zero
D. The enthalpy of mixing is zero

## Answer: C

## D Watch Video Solution

13. Which reaction, with the following value of $\Delta H$ and $\Delta S$
at $350 K$ is spontaneous and endothermic?
$\Delta H_{K J m o l}{ }^{-1} \Delta S K$ Jmol $^{-1} \Delta H_{K J m o l}{ }^{-1} \Delta S K^{\prime}$ Jmol $^{-1}$
A. $-48,+135 \times 10^{-3}$
B. $-48,-135$
C. $+48,+135 \times 10^{-3}$
D. $+48,-135 \times 10^{-3}$

## Answer: D

## D Watch Video Solution

14. The incorrect expression among the following is
A. $\frac{\Delta G_{\text {system }}}{\Delta G_{\text {total }}}=-T$
B. in isothermal process, $W_{\text {reversible }}=-n R T \operatorname{in} \frac{V_{f}}{V_{i}}$
C. $\ln K=\frac{\Delta H-T \Delta S^{\circ}}{R T}$
D. $K=e^{-\Delta G^{\circ} / R T}$

Answer: C
15. Which of the following reactions is associated with the most negative change in entropy?
A. $2 \mathrm{SO}_{2}(g)+\mathrm{O}_{2}(g) \rightarrow 2 \mathrm{SO}_{3}(g)$
B. $C_{2} H_{4}(g)+H_{2}(g) \rightarrow C_{3} H_{6}(g)$
C. $C(s, \quad$ graphite $)+O_{2} \rightarrow \mathrm{CO}_{2}(g)$
D. $3 C_{2} H_{2}(g) \rightarrow C_{6} H_{6}(g)$

## Answer: C

## D Watch Video Solution

16. For the reaction in the plant cells
$6 \mathrm{CO}_{2}(g)+12 \mathrm{H}_{2} \mathrm{O}(l) \rightarrow \mathrm{C}_{6} \mathrm{H}_{12} \mathrm{O}_{6}(\mathrm{~s})+6 \mathrm{O}_{2}(g)$
$+6 \mathrm{H}_{2} \mathrm{O}(\mathrm{l}) \Delta_{r} G^{0}=3000 \mathrm{KJ} / \mathrm{mol}$
$A T P \rightarrow A D P+P O_{4}^{3-} \Delta_{r} G^{0}=-30 \mathrm{KJ} / \mathrm{mol}$
Glucose is stored in the plant cell as starch $\left(\mathrm{C}_{6} \mathrm{H}_{10} \mathrm{O}_{5}\right)_{n}$. To produce $162 g$ of starch how many moles of $A T P$ are minimum required?
A. 100 mol
B. 10 mol
C. 20 mol
D. 200 mol

## Answer: D

## - Watch Video Solution

17. The entropy change involved in the isothermal reversible expansion of 2 moles of an ideal gas from a volume of $10 \mathrm{dm}^{3}$
to a volume of 100 dm at $27^{\circ} \mathrm{C}$ is
A. $38.3 J K^{-1}$
B. $35.8 \mathrm{JK}^{-1}$
C. $32.3 J K^{-1}$
D. $42.3 \mathrm{JK}^{-1}$

## Answer: A

## D Watch Video Solution

18. In view of the signs of $\Delta_{r} G^{0}$ for the following reactions
$\mathrm{PbO}_{2}+\mathrm{Pb} \rightarrow 2 \mathrm{PbO}, \Delta_{r} G^{0}<0$
$\mathrm{SnO}_{2}+\mathrm{Sn} \rightarrow 2 \mathrm{SnO}, \Delta_{r} G^{0}>0$
Which oxidation state 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: A

## ( Watch Video Solution

19. Two moles of an ideal gas is expanded irreversibly and isothermally at $37^{\circ} \mathrm{C}$ until its volume is doubled and 3.41 KJ heat is absorbed from surrounding. $\mathrm{P} \Delta S_{\text {total }}$ (system +surrounding) is:
A. $-0.52 J / K$
B. $0.52 J / K$
C. $22.52 J / K$
D. 0

Answer: B

## D Watch Video Solution

20. A spontaneous change is one in which a system under goes
A. an increases in internal energy
B. a lowering of entropy
C. a lowering of free energy
D. no energy change

Answer: B

## - Watch Video Solution

21. $\left.\mathrm{C}_{2} \mathrm{H}_{6}(g)+3.5\right)_{2}(g) \rightarrow 2 \mathrm{CO}_{2}(g)+3 \mathrm{H}_{2} \mathrm{O}(g)$
$\Delta S_{\text {vap }}\left(H_{2} O, l\right)=x_{1} c a l K^{-1}$ (boiling point $\left.=T_{1}\right)$
$\Delta H_{f}\left(H_{2} O, l\right)=x_{2}$
$\Delta H_{f}\left(C O_{2}\right)=x_{3}$
$\Delta H_{f}\left(C_{2} H_{6}\right)=x_{4}$
Hence, $\Delta H$ for the reaction is
A. $2 x_{3}+3 x_{2}-x_{4}$
B. $2 x_{3}+3 x_{2}-x_{4}+3 x_{1} T_{1}$
C. $2 x+3 x_{2}-x_{4}+3 x_{1} T_{1}$
D. $x_{1} T_{1}+x_{2}+x_{3}-x_{4}$

## Answer: C

## D Watch Video Solution

22. When reaction is at standard state at equilibrium, then
A. $\Delta H^{\circ}=0$
B. $\Delta S^{\circ}=0$
C. equilibrium constant $K=0$
D. equilibrium constant $K=1$

## Answer: B

## D Watch Video Solution

23. A spontaneous change is one in which a system under goes
A. $T_{e}>T$
B. $T>T_{e}$
C. $T_{e}$ is 5 times $T$
D. $T=T_{e}$

Answer: D

D Watch Video Solution
24. When reaction is at standard state at equilibrium, then
A. $80 \%$
B. $87 \%$
C. $90 \%$
D. $97 \%$

Answer: B

## D View Text Solution

25. For a spontaneous chemical process, the free energy change is
A. positive
B. negative
C. either positive or negative
D. zero

Answer: D

## D Watch Video Solution

26. A reaction has $\Delta H=-33 K J$ and $\Delta S=-58 \frac{J}{H}$. This reaction would be:
A. spontanceous at all temperatures
B. non-spontaneous at all temperatures
C. spontaneous above a certain temperature
D. spontaneous below a certain temperature

## Answer: B

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

Statement $(i)$ : The entropy of isolated system with $P-V$ work only is always maximized at euilibrium.

Stetement (ii) : It is possible for the entropy of close system to decreases substantilly in an irreversible process.

Statement (iii) : Entropy can be created but not be destroyed.

Statement $(i v): \Delta S$ system is zero for reversible process in an isolated system.
A. Statements $I, i i, i i i$,
B. Statement $i i, i v$
C. Statement $I, i i, i v$
D. All of these

## Answer: D

28. The process of evaporation of a liquid is accompanied by
A. an increases in entropy
B. a decreases in entropy
C. no change in entropy
D. no change in free energy

## Answer: D

## D Watch Video Solution

29. During winters, moisture condenses in the from of dew and can be seen on plant leaves and grass. The entropy of
the system in such cases decreases as liquids process lesser disorder as compared to gases. With reference to the second law, which statement is correct. for the above process?
A. The randomness of the universe decreases
B. The randomness of the surroundings decreases
C. Increases in randomness of surrroundings equals ito
the decreases in randomness of system
D. The increases in randomness of the surroundings is
greater as compared to the decreases in randomness
of the system.

## Answer: A

## D Watch Video Solution

30. Combustion of sucrose is used by aerobic oranisms for providing energy for the life sustaining processes. If all the capturing of energy from reaction is done through electrical process (non $P-V$ work), then calculate maximum available energy which can be captured by combustion of $34.2 g$ of sucrose.

Given, $\Delta H_{\text {combustion }}($ surrose $)=-6000 \mathrm{KJmol}^{-1}$
$\Delta S_{\text {combustion }}=180 \mathrm{~J} / \mathrm{K}-\mathrm{mol}$ and body temperatuire is $300 K$
A. $600 K J$
B. $594.6 K J$
C. $5.4 K J$
D. 605.4 KJ

## Answer: D

## - Watch Video Solution

31. At $0^{\circ} C$, ice and water are in equilibrium and $\Delta S$ and $\Delta G$ for the conversion of ice to liquid water is
A. $0,21.98 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
B. $-v e$, zero
C. $+v e, 21.98 \mathrm{JKk}^{-1} \mathrm{~mol}^{-1}$
D. All of these

## Answer: D

## - View Text Solution

32. In which case, a spontaneous reaction is possible at any temperature
A. $\Delta H<0, \Delta S>0$
B. $\Delta H<0, \Delta S<0$
C. $\Delta H>0, \Delta S>0$
D. None of these

## Answer: C

## D Watch Video Solution

33. When a bottle of perfume is opened, odorous molecules mix with air and slowly diffuse throughout the entire room.

Which is not correct for this process?
A. $\Delta G<0$
B. $\Delta S>0$
C. $\Delta s H \approx 0$
D. $\Delta S<0$

## Answer: A

## - Watch Video Solution

34. Change in entropy is negative for
A. Bromine ( $l$ ) $\rightarrow$ Bromine $(\mathrm{g})$
B. $\mathrm{C}(s)+\mathrm{H}_{2} \mathrm{O}(g) \rightarrow \mathrm{CO}(g)+\mathrm{H}_{2}(g)$
C. $N_{2}(g, 10 a t m) \rightarrow N_{2}(g, 1 a t m)$
D. $F e(1 \mathrm{~mol}, 400 \mathrm{~K}) \rightarrow F e(1 \mathrm{~mol}, 300 \mathrm{~K})$

Answer: B

## D Watch Video Solution

35. In which of the following reactions $\Delta S$ is positive?
A. $\mathrm{H}_{2} \mathrm{O}(l) \rightarrow \mathrm{H}_{2}+\mathrm{O}(s)$
B. $3 O_{2} \rightarrow 2 O_{3}(g)$
C. $\mathrm{H}_{2} \mathrm{O}(\mathrm{l}) \rightarrow \mathrm{H}_{2} \mathrm{O}(\mathrm{g})$
D. $\mathrm{N}_{2}(g)+3 \mathrm{H}_{2}(g) \rightarrow 2 \mathrm{NH}_{3}(g)$

Answer: D

D Watch Video Solution
36. The molar enthlpy of fusion of water is $6.01 \mathrm{KJmol}^{-1}$.

The entropy change of 1 mol of water at its melting point will be
A. $22 \mathrm{Jmol}^{-1} \mathrm{~K}^{-1}$
B. $109 \mathrm{Jmol}^{-1} \mathrm{~K}^{-1}$
C. $44 \mathrm{Jmol}^{-1} \mathrm{~K}^{-1}$
D. spontaneous below a certain temperature

## Answer: A

D Watch Video Solution
37. When ice melts into water, entropy
A. Becomes zero
B. Decreases
C. Increases in randomness of surrroundings equals ito
the decreases in randomness of system
D. Remains same

## Answer: A

D Watch Video Solution
38. The value of free energy change of an equilibrium process
is
A. positive
B. Negative
C. Zero
D. Not definite

## Answer: C

## (D) Watch Video Solution

39. The standard entropies of $\mathrm{N}_{2}(g), \mathrm{H}_{2}(g)$ and $\mathrm{NH}_{3}(g)$ are $191.5,192.6 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$. The value of $\Delta S^{0}$ during the formation of 1 mole of ammonia is
A. $-98.9 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
B. $-9.78 J K^{-1} \mathrm{~mol}^{\wedge}(-1)^{\wedge}$
C. $+129.4 \mathrm{JK}^{-1} \mathrm{~mol}^{-}$
D. Zero

Answer: C

## D Watch Video Solution

40. One mole of an ideal gas at $25^{\circ} \mathrm{C}$ is subjected to expand reversible ten times of its intial volume. The change in entropy of expansion is
A. $19.15 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
B. $16.15 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
C. $22.15 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
D. None

Answer: A
41. The entropy change for the reaction given below is
$2 \mathrm{H}_{2}(g)+\mathrm{O}_{2}(g) \rightarrow 2 \mathrm{H}_{2} \mathrm{O}(l)$
is ... At 300 K . Standard entropies of $\mathrm{H}_{2}(g), \mathrm{O}_{2}(g)$ and $\mathrm{H}_{2} \mathrm{O}(l)$ are $126.6,201.20$ and $68.0 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$ respectively.
A. $-318.4 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
B. $318.4 \times \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
C. $31.84 \times \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
D. None of these

## Answer: A

42. The a reaction to be spontaneous at all temperature
A. $\Delta G$ and $\Delta H$ should be negative
B. $\Delta G$ for the reaction is zero
C. $\Delta G$ and $\Delta H$ should be positive
D. $\Delta H<\Delta G$

## Answer: A

## - Watch Video Solution

43. Which of the following statements is true? The entropy of the universe
A. Increases and moves towards maximumm value
B. Decreases and moves to zero
C. Remains constant
D. Decreases and increases with a periodic rrate

## Answer: A

## D Watch Video Solution

44. Enthalpy of fusion of a liquid is $1.435 \mathrm{Kcalmol}^{-1}$ and molar entropy change is $5.26 \mathrm{calmol}^{-1} \mathrm{~K}^{-1}$ Hence melting point of liquid is
A. $100^{\circ} \mathrm{C}$
B. $0^{\circ}$
C. $373 K$
D. $-273^{\circ} \mathrm{C}$

Answer: A

## D Watch Video Solution

45. If $S^{\circ}$ for $H_{2}, C l_{2}$ and $H C L$ are $0.13,0.22$ and $0.19 \mathrm{KJK}^{-1} \mathrm{~mol}^{-1}$ respectively. The total change in standard entropy for the reaction $\mathrm{H}_{2}+\mathrm{Cl}_{2} \rightarrow 2 \mathrm{HCl}$ is
A. $0.5 \mathrm{KJK}^{-1} \mathrm{~mol}^{-1}$
B. $40 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
C. $60 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
D. $20 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$

## (D) Watch Video Solution

46. If the enthalpy of vaporization for water is 198.5 $\mathrm{K} \mathrm{Jmol}^{-1}$, the entropy of its vaprization will be
A. $0.5 K J^{-1}$
B. $1.0 \mathrm{KJK}^{-1} \mathrm{~mol}^{-1}$
C. $1.5 \mathrm{KJK}^{-1} \mathrm{~mol}^{-1}$
D. $2.0 \mathrm{KJK}^{-1} \mathrm{~mol}^{-1}$

Answer: A

- Watch Video Solution

47. In the following Table, which one is correct
$\Delta H \Delta S$ Nature of reaction
A. $(-)(+)$ Spontaneous only at high temperature
B. $(+)(-)$ Spontaneous regardless of temperature
C. $(+)(+)$ Spontaneous only at low temperature
D. $(-)(-)$ Spontaneous at all temperature

## Answer: A

## D Watch Video Solution

48. For the reaction,

$$
X_{2} O_{4}(l) \rightarrow 2 X_{2}(g), \Delta E=2.1 \mathrm{Kcal}
$$

$\Delta S=20 \mathrm{cal} / \mathrm{K}$ at 300 K . Hence $\Delta G$ is
A. 2.7 Kcal
B. -2.7 Kcal
C. 9.3 Kcal
D. -9.3 Kcal

## Answer: B

## - Watch Video Solution

49. The temperature at which the reaction,
$\mathrm{Ag}_{2} \mathrm{O}(s) \rightarrow 2 \mathrm{Ag}(s)+1 / 2 \mathrm{O}_{2}(g)$
Is at equilibrium is ..., Given $\Delta H=30.5 \mathrm{KJmol}^{-1}$ and $\Delta S$
$=0.066 K J K^{-1}$
A. $462.12 K$
B. $362.12 K$
C. $262.12 K$
D. $562.12 K$

Answer: B

## D Watch Video Solution

50. Given
(I)
$C$ (diamond)
$+\mathrm{O}_{2}(\mathrm{~g}) \rightarrow \mathrm{CO}_{2}(\mathrm{~g}), \Delta \mathrm{H}^{\circ}=-92.0 \mathrm{Kcalmol}^{-1}$
(II)
$C$ (graphite)
$O_{2}(g) \rightarrow \mathrm{CO}_{2}(g), \Delta H^{\circ}=-96.0 \mathrm{Kcalmol}^{-1}$
A. $2.907 \mathrm{KcalK}^{-1}$
B. $2.013 \mathrm{KcalK}^{-1}$
C. $305.4 \mathrm{calK}^{-1}$
D. $-2.013 \mathrm{KcalK}^{-1}$

## Answer: A

## D View Text Solution

51. For a certain reaction $X \operatorname{rarr} Y$ the value of $\Delta H$ and $\Delta S$ are $50.50 \mathrm{KJmol}^{-1}$ and $100.03 \mathrm{JK}^{-1}$ respectively. The temperature at which $\Delta G=0$ is
A. $505^{\circ} C$
B. $232^{\circ} \mathrm{C}$
C. $252^{\circ} \mathrm{C}$
D. $450^{\circ} \mathrm{C}$

Answer: A

## - Watch Video Solution

52. Which of the following processes process towards more disordered state?

I Stretching the rubberll. Sublimation of dry ice III

Crystallisation of salt from solution
$I V$. Dissolution of sugar from solution
A. $I, I I, I V$
B. $I, I I I$
C. $I I I, I V$
D. II, IV

## Answer: B

## D Watch Video Solution

## Heat Capacity And Calorimetry

1. The temperature of a 5 ml of storng acid increases by $5^{\circ} \mathrm{C}$
when 5 mol of a strong base is added to it. If 10 ml of each is mixed, temperature should increases by
A. $5^{\circ} C$
B. $10^{\circ} \mathrm{C}$
C. $15^{\circ} \mathrm{C}$
D. Cannot be known

## Answer: A

## D Watch Video Solution

2. A heat engine absorbs heat $Q_{1}$ at temperature $T_{1}$ and $Q_{2}$ at temperature $T_{2}$. Work done by the engine is $\left(Q_{1}+Q_{1}\right)$. This data:
A. Violates first law of thermodynamics
B. Violates first law of thermodynamics if $Q_{1}=-v e$
C. Violates first law of thermodynamics if $Q_{2}=-v e$
D. Does not violates first law of thermodynamics

## Answer: A

## (D) Watch Video Solution

3. The heat required to raise the temperature of body by $1^{\circ} C$ is called:
A. Specific heat
B. Thermal capacity
C. Water equivalent
D. None of these

## Answer: D

Watch Video Solution
4. If for an ideal gas, the ratio of pressure and volume is constant and is equal to $1 \mathrm{~atm} L^{-1}$, the molar heat capacity at constant pressure would be
A. $\frac{3}{2} R$
B. $2 R$
C. $\frac{5}{2} R$
D. zero

## Answer: C

## D View Text Solution

5. For the complete combustion of ethanol,
$\mathrm{C}_{2} \mathrm{H}_{5} \mathrm{OH}(l)+3 \mathrm{O}_{2}(g) \rightarrow 2 \mathrm{CO}_{2}(g)+3 \mathrm{H}_{2} \mathrm{O}(l)$ the amount
of heat produced as measured in bomb calorimeter is $1364.47 \mathrm{~K} \mathrm{Jmol}^{-1}$ at $25^{\circ} \mathrm{C}$. Assuming ideality, the enthalpy of combustion, $\Delta H_{C}$, for the reaction will be

$$
\left[R=8.314 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}\right]
$$

A. $-1366.95 \mathrm{~K} \mathrm{Jmol}^{-1}$
B. $-1361.95 \mathrm{~K} \mathrm{Jmol}^{-1}$
C. $-1460.50 \mathrm{KJmol}^{-1}$
D. $-1350 \mathrm{~K} \mathrm{Jmol}^{-1}$

## Answer: A

## D Watch Video Solution

6. The reaction of cyanamide $\mathrm{NH}_{2} \mathrm{CN}(\mathrm{s})$ with oxygen was
carries out in a bomb calorimeter and $\Delta q_{v}$ at $300 K$ was
measured to be $-750 \mathrm{KJ} / \mathrm{mol}$. The value of $\Delta H$ per mole of $\mathrm{NH}_{2} \mathrm{CN}(s)$ in the given reaction is
A. $-741.75 \mathrm{KJ} / \mathrm{mol}$
B. $-748.75 \mathrm{KJ} / \mathrm{mol}$
C. $-752.75 \mathrm{KJ} / \mathrm{mol}$
D. $-750 \mathrm{KJ} / \mathrm{mol}$

## Answer: A

## - Watch Video Solution

7. $\frac{1}{2} \mathrm{~N}_{2}(\mathrm{~g})+\mathrm{O}_{2} \rightarrow \mathrm{NO}_{2}(\mathrm{~g}), \Delta_{r} H^{\circ}=-40 \mathrm{KJ} / \mathrm{mol}$

Given:
$C_{P . m}\left(\mathrm{NO}_{2}, g\right)=40 \mathrm{~J} / \mathrm{mol} / \mathrm{K}, C_{p, m}\left(\mathrm{O}_{2}, g\right)=30 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
$C_{P, m} N_{2}(g)=30 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
What is the enthalpy of formation of $\mathrm{NO}_{2}(\mathrm{~g})$ at 1298 K ?
A. $-40 \mathrm{KJ} / \mathrm{mol}$
B. $-50 \mathrm{KJ} / \mathrm{mol}$
C. $-45 \mathrm{KJ} / \mathrm{mol}$
D. $-6 \mathrm{KJ} / \mathrm{mol}$

## Answer: B

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8. What percentage $T_{1}$ is of $T_{2}$ for a $10 \%$ efficiency of a heat engine? $T_{1}$ is the temperature of sink and $T_{2}$ is the temperature of heat reservoir.
A. $T_{1}=90 \%$ of $T_{2}$
B. $T_{1}=T_{2}$
C. $T_{2}=90 \%$ of $T_{1}$
D. $T_{1}=50 \%$ of $T_{2}$

## Answer: C

## (D) Watch Video Solution

9. When $20 m L$ of a strong acid is added to $20 m L$ of an alkali, the temperature rises by $5^{\circ} \mathrm{C}$. If 200 mL of each liquid is mixed, the temperature rise will be
A. $5^{\circ} C$
B. $50^{\circ} \mathrm{C}$
C. $20^{\circ} \mathrm{C}$
D. $0.5^{\circ} \mathrm{C}$

## Answer: A

## (D) Watch Video Solution

10. Calculate the maximum efficiency of an engine operating between $110^{\circ} \mathrm{C}$ and $25^{\circ} \mathrm{C}$.
A. $11.1 \%$
B. $22.2 \%$
C. $33.3 \%$
D. $44.4 \%$

Answer: A

## D Watch Video Solution

11. The ammount of heat required to raise the temperature of 1 mole of diatomic gas by $1^{\circ} \mathrm{C}$ at constant pressure is 60 cal .

The amount of heat which goes as internal energy of the gas is nearly.
A. 60 Cal
B. 30Cal
C. 42.6 Cal
D. 49.8 Cal
12. Molar heat capacity of water in equilibrium with ice at constant pressure is
A. Zero
B. Infinity ( $\infty$ )
C. $40.45 \mathrm{KJK}^{-1} \mathrm{~mol}^{-1}$
D. $75.48 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$

Answer: B

D Watch Video Solution
13. In which cases of maxing of a strong acid and a base each of $1 N$ concentration, increases in temperature is the highest.
A. $20 m l$ acid $-30 m l$ alkali
B. 10 ml acid -40 ml alkali
C. $25 m l$ acid $-25 m l$ alkali
D. $35 m l$ acid $-15 m l$ alkali

Answer: B

## D View Text Solution

Section B - Assertion Reasoning

1. Assertion: The enthalpy of formation of geseous oxygen molecules at $298 K$ and under of 1 atm is zero.

Reason: The entropy of formation of gaseous oxygen molecules under the same condition is zero.
A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: C

2. Assertion: We feel cold on touching the ice.

Reason: Ice is a solid form of water.
A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

Answer: B

## D Watch Video Solution

3. Assertion: Entropy of ice is less than water. Reason: Ice has cage-like structure.
A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

Answer: B

## D Watch Video Solution

4. Assertion: The heat absorbed during the isothermal
expansion of an ideal gas againts vacuum is zero.
Reason: The volume occupied by the molecules of an ideal gas is zero.
A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is
not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: B

5. Assertion: Mass and volume are extensive properties.

Reason: Mass/volume is also an extensive parameter.
A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: C

6. Assertion: $\Delta H$ and $\Delta E$ are almost the same for the reaction. $N_{2}(g)+O_{2}(g) \Leftrightarrow 2 N O_{g}$

Reason: All reactants and products are gases.
A. If both the assertion and reason are true and the
reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

Answer: B
7. Assertion: Work and internal energy are not state functions.

Reason: The sum of $q+w$ is a state function.
A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: B

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8. Assertion: The zeroth law of thermodynamics was know before the first law of thermodynamics.

Reason: The zeroth law concerning thermal equilibrium appeared after three laws (I,II and $I I I)$ of thermodynamics and thus was named zeroth law.
A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

Answer: B
9. Assertion: A non-spontaneous endothermic reaction at room temperature may be spontaneous at high temperature. Reason: At high temperature $T \Delta S$ becomes more than $\Delta H$.
A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is
not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: D

10. Assertion (A) : There is a natural asymmetry between converting work to heat and converting heat of work. Reason (R) : No process is possible in which the sole result is the absorption of heat from a reservoir and its complete conversion into work.
A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: A

11. Assertion: Kinetic energy of photoelectrons is directly proportinal of the intensity of the incident radiation.

Reason: Each photo of light causes the emission of only one photoelectron.
A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is
not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## ( Watch Video Solution

12. Assertion: An exothermic reaction in principle cannot have zero activetion energy.

Reason: In exothermic reaction $\Sigma H$ (Products) $<\Sigma H$
(Reactants).
A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is
not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## - Watch Video Solution

13. Assertion: When a real gas is allowed to expand adiabatically through a fine hole from a region of high presssure to a region of low pressure, the temperature of gas falls in a completely insulated container. Reason: Work is done at the cost of internal energy of the gas.
A. If both the assertion and reason are true and the
reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is
not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: D

## D Watch Video Solution

14. Assertion: For any gas $\Delta W=-P \Delta V, P$ represents the external pressure.

Reason: Throughout the process, external pressure must be remain constant.
A. If both the assertion and reason are true and the
reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: A

## D Watch Video Solution

15. Assertion: Where a mole of electron is transported across
a potential difference of $1 V$ from positive electrode to negative electrode, then work done is $-96500 J$.

Reason: Work done due to transportation of electrons depends on the product of potential difference between the two points and amount to charge carried.
A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: A

## ( Watch Video Solution

16. Assertion: The product of pressure and volume for a fixed amount of gas is equal to a constant represented by $R T$ Reason: At constant temperature, for a fixed amount of a gas, pressure is inversely proportional to volume.
A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: A

## ( Watch Video Solution

17. Assertion: Adsorption is exothermic and spontaneous in spite of the fact that adsorption is accompanied with deccrease in entropy.

Reason: The factor $T \Delta S$ is lesser than $\Delta H$
A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: D

## D Watch Video Solution

## AIPMT/ NEET Questions

1. When 1 mole of gas is heated at constant volume.

Temperature is raised from 298 to $308 K$. Heat supplied to the gas is 500 J . Then which stamenet is correct?
A. $q=-W=500 J, \Delta U=0$
B. $q=\Delta U=500 J, W=0$
C. $q=-W=500 J, \Delta U=0$
D. $\Delta U=0, q=W=-500 J$

## Answer: C

## D Watch Video Solution

2. $\mathrm{PbO}_{2} \rightarrow \mathrm{PbO}, \Delta G_{298}<0$
$\mathrm{SnO}_{2} \rightarrow \mathrm{SnO}, \Delta G_{298}>0$

Most proble oxidation states of $P b$ and $S n$ will be
A. $\mathrm{Pb}^{4+}, S n^{4+}$
B. $\mathrm{Pb}^{4+}, S n^{2+}$
C. $\mathrm{Pb}^{2+}, \mathrm{Sn}^{2+}$
D. $\mathrm{Pb}^{2+}, S n^{4+}$

## Answer: B

## D Watch Video Solution

3. Change in entropy for reaction
$2 \mathrm{H}_{2} \mathrm{O}_{2}(l) \rightarrow 2 \mathrm{H}_{2} \mathrm{O}(l)+\mathrm{O}_{2}(g)$
if heat of formation of $\mathrm{H}_{2} \mathrm{O}_{2}(l)$ and $\mathrm{H}_{2} \mathrm{O}(l)$ are -188 and
$-286 \mathrm{KJ} / \mathrm{mol}$ respectively is
A. $-196 \mathrm{KJ} / \mathrm{mol}$
B. $+196 \mathrm{KJ} / \mathrm{mol}$
C. $+948 \mathrm{KJ} / \mathrm{mol}$
D. $-948 \mathrm{KJ} / \mathrm{mol}$

## Answer: D

## (D) Watch Video Solution

4. Enthalpy of $\mathrm{CH}_{4}+\frac{1}{2} \mathrm{O}_{2} \rightarrow \mathrm{CH}_{3} \mathrm{OH}$ is
negative. If enthalpy of combustion of $\mathrm{CH}_{4}$ and $\mathrm{CH}_{4} \mathrm{OH}$ are $x$ and $y$ respectively, then which relation is correct?
A. $x>y$
B. $x<y$
C. $x=y$
D. $x \geq y$

## Answer: B

## (D) Watch Video Solution

5. The unit of entropy is
A. $\mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
B. $K J^{-1} \mathrm{~mol}^{-1}$
C. $K$ Jmol $^{-1}$
D. $J^{-1} K^{-1} \mathrm{~mol}^{-1}$

Answer: A
6. In a closed insulated container, a liquid is stirred with a paddle to increase the temperature, which of the following is true?
A. $\Delta U-W=0, q=0$
B. $\Delta U+W=q \neq 0$
C. $\Delta U+Q, W=q \neq 0$
D. $W=0, \Delta U=q \neq 0$

Answer: A

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7. Two moles of ideal gas at $27^{\circ} \mathrm{C}$ temperature is expanded reversibly from 2 litre to 20 liter. Find entropy change ( $R=2 \mathrm{cal} / \mathrm{mol} K)$.
A. 92.1
B. 0
C. 4
D. 9.2

## Answer: D

## D Watch Video Solution

8. Heat of combustion $\Delta H^{\circ}$ for $C(s), H_{2}(g)$ and $C H_{4}(g)$ are $94,-68$ and $-213 \mathrm{Kcal} / \mathrm{mol}$. Then $\Delta H^{\circ}$ for

$$
C(s)+2 H_{2}(g) \rightarrow \Delta C H_{4}(g) \text { is }
$$

A. -17 Kcal
B. 111 Kcal
C. -170 Kcal
D. -85 Kcal

## Answer: D

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9. The molar heat capacity of water at constant pressure $P$, is $75 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$. When 1.0 KJ of heat is supplied to 100 g of water which is free to expand, the increase in temperature of water is
A. $1.2 K$
B. $2.4 K$
C. 4.8 K
D. $6.6 K$

## Answer: B

## (D) Watch Video Solution

10. What is the entropy change (in $J K^{-1} \mathrm{~mol}^{-1}$ ) when one mole of ice is converted into water at $0^{\circ} C$ ?
(The enthalpy change for the conversion of ice to liquid water is $6.0 \mathrm{~K} \mathrm{Jmol}^{-1}$ at $0^{\circ} \mathrm{C}$ )
A. 20.13
B. 2.013
C. 2.198
D. 21.98

Answer: B

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11. For which one of the following equation is $\Delta H_{\text {reaction }}^{\circ}$ equal to $\Delta H_{f}^{\circ}$ for the product ?
A. $\mathrm{N}_{2}(g)+\mathrm{O}_{3}(g) \rightarrow \mathrm{N}_{2} \mathrm{O}_{3}(g)$
B. $\mathrm{CH}_{4}(g)+2 \mathrm{Cl}_{2}(g) \rightarrow \mathrm{CH}_{2} \mathrm{Cl}_{2}(l)+2 \mathrm{HCl}(g)$
C. $X e(g)+2 F_{2}(g) \rightarrow X e F_{4}(g)$
D. $2 \mathrm{CO}(g)+\mathrm{O}_{2}(g) \rightarrow 2 \mathrm{CO}_{2}(g)$

Answer: D

## D Watch Video Solution

12. For the reaction
$\mathrm{C}_{3} \mathrm{H}_{8}(g)+5 \mathrm{O}_{2} \rightarrow 3 \mathrm{CO}_{3}(g)+4 \mathrm{H}_{2} \mathrm{O}(l)$
at constant temperature, $\Delta H-\Delta U$ is
A. $+R T$
B. $-3 R T$
C. $+3 R T$
D. $-R T$

Answer: C
13. The densities of graphite and diamond at $298 K$ are 2.25 and $3.31 \mathrm{gcm}^{-3}$, respectively. If the standard free energy difference $\left(\Delta G^{0}\right)$ is equal to $1895 \mathrm{Jmol}^{-1}$, the pressure at which graphite will be transformed into diamond at 298 K is
A. $9.92 \times 106 P a$
B. $9.92 \times 105 \mathrm{~Pa}$
C. $9.92 \times 108 P a$
D. $9.92 \times 107 P a$

## Answer: B

14. Considering entropy $(S)$ as a thermodynamics parameter, the criterion for the spontaneity of any process is
A. $\Delta S_{\text {system }}+\Delta S_{\text {surrounding }} b e+v e$
B. $\Delta S_{\text {system }}-\Delta S_{\text {surroundings }} b e+$ ve
C. $\Delta S_{\text {system }}$ be zero
D. $\Delta S_{\text {surroundings }} b e$ zero

## Answer: C

## D Watch Video Solution

15. Standard enthalpy and standard entropy change for the oxidation of $\mathrm{NH}_{3}$ at 298 K are $-382.64 \mathrm{KJmol}^{-1}$ and
$145.6 \mathrm{Jmol}^{-1}$ respectively. Standard free energy change for the same reaction at 298 K is
A. $-221.1 \mathrm{KJmol}^{-1}$
B. $-339.3 \mathrm{KJmol}^{-1}$
C. $-439.3 \mathrm{KJmol}^{-1}$
D. $-523.2 \mathrm{KJmol}^{-1}$

## Answer: A

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16. The work done during the expansion of a gas from a volume of $4 d m^{3}$ to $6 d m^{3}$ againts a constant external presuure of 3 atm is $(1 \mathrm{~atm}-L=101.32 \mathrm{~J})$
A. $-6 J$
B. $-608 J$
C. $+304 J$
D. $-304 J$

## Answer: B

## (D) Watch Video Solution

17. The bond energies of $H--H, B r--B r$ and $H--B r$ are $433,, 192$ and $364 \mathrm{~K} \mathrm{Jmol}^{-1}$ respectively. The
$\Delta H^{\circ}$ for the reaction

$$
H_{2}(g)+B r_{2}(g) \rightarrow 2 H B r(g) \text { is }
$$

A. $261 K J$
B. $+103 K J$
C. $+261 K J$
D. -103 KJ

Answer: B

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18. The absolute enthalpy of neutralization of the reaction,
$\mathrm{MgO}(s)+2 \mathrm{HCl}(\mathrm{aq})+.\mathrm{H}_{2} \mathrm{O}(l)$ will be
A. Greater than $-57.33 \mathrm{KJmol}^{-1}$
B. Less than $-57.33 \mathrm{KJmol}^{-1}$
C. $-57.33 \mathrm{KJmol}^{-1}$
D. $57.33 \mathrm{KJmol}^{-1}$

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19. A reaction occurs spontaneously if:
A. $T \Delta S=\Delta H$ and both $\Delta H$ and $\Delta S$ are positive
B. $T \Delta S>\Delta H$ and both $\Delta H$ and $\Delta S$ are positive
C. $T \Delta S>\Delta H$ and both $\Delta H$ and $\Delta S$ are positive
D. $T \Delta S>\Delta H$ and both $\Delta H$ and $\Delta H$ is positive and
$\Delta S$ is negative

Answer: A
20. Which of the following pairs of a chermical reaction is centain to result in a spontaneous reaction?
A. Exothermic and decreasesing disorder
B. Exothermic and increasesing disorder
C. Exothermic and increasesing disorder
D. Exothermic and decreasesing disorder

## Answer: B

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21. Identify the correct statement for change of Gibbs energy
for a system $\left(\Delta G_{\text {system }}\right)$ at constant temperature and pressure:
A. if $\Delta G_{\text {system }}=0$, the system is still moving in a particular direction
B. if $\Delta G_{\text {system }}=-v e$, the process is not spontaneous
C. if $\Delta G_{\text {system }}=+v e$, the process is spontaneous
D. if $\Delta G_{\text {system }}=0$, the sytem has attained equilibrium

## Answer: C

## D Watch Video Solution

22. The enthalpy and entropy change for the reaction,
$B r_{2}(l)+C l_{2}(g) \rightarrow 2 B r C l(g)$
are $30 \mathrm{KJmol}^{-1}$ and $105 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$ respectively. The temperation at which the raction will be in equilibrium is:
A. 450 K
B. 300 K
C. 285.7 K
D. $272 K$

## Answer: D

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23. Assume each reaction is carried out in an open container.

For which reaction will $\Delta H=\Delta U$ ?
A. $\mathrm{PCl}_{3}(g) \rightarrow \mathrm{PCl}_{3}(g)+C l_{2}(g)$
B. $2 \mathrm{CO}(g)+\mathrm{O}_{2}(g) \rightarrow 2 \mathrm{CO}_{2}(g)$
C. $\mathrm{H}_{2}(g)+B r_{2}(g) \rightarrow H B r(g)$
D. $\mathrm{C}(\mathrm{s})+2 \mathrm{H}_{2} \mathrm{O}(\mathrm{g}) \rightarrow 2 \mathrm{H}_{2}(\mathrm{~g})+\mathrm{CO}_{2}(\mathrm{~g})$

## Answer: C

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24. The standard ethelpy of combustion at $25^{\circ} \mathrm{C}$ of hydrogen, cyclohexene ( $\mathrm{C}_{6} \mathrm{H}_{10}$ ), and cyclohexane ( $\mathrm{C}_{6} \mathrm{H}_{12}$ ) are $-241,-3800$, and $-3920 \mathrm{kJmol}^{-1}$ repectively. Calculate the heat of hydrogenation of cyclohexane.
A. -121 KJ per mol
B. $+121 K J$ per mol
C. $+242 K J$ per mol
D. -242 KJ per mol

Answer: C

## D Watch Video Solution

25. The enthalpy of hydrogenation of cyclohexene is
$-119.5 K J$. If resonance energy of benzene is
$-150.4 \mathrm{KJMol}^{-1}$, its enthalpy of hydrogenation would be
A. $-269.9 \mathrm{KJmol}^{-1}$
B. $-358.5 \mathrm{KJmol}^{-1}$
C. $-508.9 \mathrm{KJmol}^{-1}$
D. $-208.1 \mathrm{KJmol}^{-1}$

Answer: A
26. Identify the correct statement regarding a spontaneous process.
A. Lowering of energy is the only criterion for spontaneity.
B. For a spontaneous process in an isolated system, the change in entropy is positive.
C. Endothermic processes are never spontaneous.
D. Exothermic processes are always spontaneous.

## Answer: D

## D Watch Video Solution

27. The $H-H$ bond energy is $430 \mathrm{KJmol}^{-1}$ and $\mathrm{Cl}-\mathrm{Cl}$ bond energy is $240 \mathrm{KJmol}^{-1} . \Delta H$ for $H C l$ is $-90 K J$. The $H-C l$ bond energy is about
A. $425 \mathrm{~K} \mathrm{Jmol}^{-1}$
B. $213 \mathrm{~K} \mathrm{Jmol}^{-1}$
C. $306 \mathrm{~K} \mathrm{Jmol}^{-1}$
D. $180 \mathrm{~K}_{\mathrm{Jmol}^{-1}}$

## Answer: B

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28. Consider the following reactions:
(i) $\mathrm{H}^{+}(a q)+\mathrm{OH}^{-}(a q) \rightarrow \mathrm{H}_{2} \mathrm{O}(l)$,
$\Delta H==-X_{1}$ Kjmol $^{-1}$
(ii) $\mathrm{H}_{2}(\mathrm{~g})+\frac{1}{2} \mathrm{O}_{2}(g) \rightarrow \mathrm{H}_{2} \mathrm{O}(\mathrm{l}), \Delta \mathrm{H}=-\mathrm{X}_{2} \mathrm{Kjmol}^{-1}$
(iii) $\mathrm{CO}_{2}(\mathrm{~g})+\mathrm{H}_{2}(\mathrm{~g}) \rightarrow \mathrm{CO}(\mathrm{g})+\mathrm{H}_{2} \mathrm{O}(\mathrm{l})$,
$\Delta H=-X_{3} K \mathrm{Jmol}^{-1}$
(iv) $\mathrm{C}_{2} \mathrm{H}_{2}(\mathrm{~g})+\frac{5}{2} \mathrm{O}_{2}(\mathrm{~g}) \rightarrow 2 \mathrm{CO}_{2}(\mathrm{~g})+\mathrm{H}_{2} \mathrm{O}(\mathrm{l})$,
$\Delta H=+X_{4} K J m o l^{-1}$
Enthanlpy of formation of $\mathrm{H}_{2} \mathrm{O}(l)$ is
A. $-x_{2} K \mathrm{Jmol}^{-1}$
B. $+x_{3} \mathrm{KJmol}^{-1}$
C. $-x_{4} K \mathrm{Jmol}^{-1}$
D. $+x_{1} K \mathrm{Jmol}^{-1}$

Answer: A
29. Which of the following are not state functions?
(I) $q+w$
(II) $q$
(III) $w$
(IV) $H-T S$
A. $(I I),(I I I)$ and (IV)
B. $(I),(I I)$ and $(I I I)$
C. (II) and (III)
D. (I) and (IV)'

Answer: A

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30. For the gas phase reaction,
$\mathrm{PCl}_{5}(g) \rightarrow \mathrm{PCl}_{3}(g)+C L_{2}(g)$
Which of the following conditions are correct?
A. $\Delta H>0$ and DeltaSgt0` B. \(\Delta H<0\) and DeltaSIt0`
C. $\Delta H>0$ and DeltaSgt0`
D. $\Delta=0$ and $\Delta S<0$

## Answer: C

## D Watch Video Solution

31. Bond dissociation enthalpy of $\mathrm{H}_{2}, \mathrm{Cl}_{2}$ and HCl are 434,242 and $431 \mathrm{KJmol}^{-1}$ respectively. Enthalpy of
formation of HCl is
A. $-245 \mathrm{KJmol}^{-1}$
B. $-63 \mathrm{~K} \mathrm{Jmol}^{-1}$
C. $245 \mathrm{KJmol}^{-1}$
D. $-93 \mathrm{~K} \mathrm{Jmol}^{-1}$

## Answer: A

## D Watch Video Solution

32. For the gas phase reaction
$\mathrm{PCl}_{5} \rightarrow \mathrm{PCl}_{3}(g)+\mathrm{Cl}_{2}(g)$
which of the following conditions are correct?
A. $\Delta H=0$ and $\Delta S<0$
B. $\Delta H>0$ and $\Delta S>0$
C. $\Delta H<0$ and $\Delta S<0$
D. $\Delta H>0$ and $\Delta S<0$

## Answer: D

## D Watch Video Solution

33. At $27^{\circ} \mathrm{C}$ latent heat of fusion of a compound is 2930 mol .

Entropy change during fusion is
A. $9.77 \mathrm{~J} / \mathrm{molK}$
B. $10.77 \mathrm{~J} / \mathrm{molK}$
C. $9.07 \mathrm{~J} / \mathrm{molK}$
D. $0.977 \mathrm{~J} / \mathrm{molK}$

Answer: B

## D Watch Video Solution

34. The values of $\Delta H$ and $\Delta S$ for the reacrtion,
$C_{\text {graphite }}+\mathrm{CO}_{2}(g) \rightarrow 2 \mathrm{CO}(g)$
are 170 KJ and $170 \mathrm{JJK}^{-}$respectively. This reaction will be
spontaneous at
A. $510 K$
B. $710 K$
C. $910 K$
D. $1110 K$
35. The energy absorbed by each molecule $\left(A_{2}\right)$ of a substance is $4.4 \times 10^{-19} \mathrm{~J}$ and bond energy per molecule is $4.0 \times 10^{-19} \mathrm{~J}$. The kinetic energy of the molecule per atom will be
A. $4.0 \times 10^{-20} J$
B. $2.0 \times 10^{-20} J$
C. $2.2 \times 10^{-19} J$
D. $2.0 \times 10^{-19} J$

## Answer: D

D View Text Solution
36. From the following bond energies: $H--H$ bond energy: $431.37 \mathrm{KJmol}^{-1}$
$C=C$ bond energy: $606.10 \mathrm{~K} \mathrm{~mol}^{-1}$
$C--C$ bond energy: $336.49 \mathrm{KJmol}^{-1}$
$C--H$ bond energy: $410.50 \mathrm{KJmol}^{-1}$
Enthalpy for the reaction will be:

A. $553.0 \mathrm{KJmol}^{-1}$
B. $1523.6 \mathrm{~K} \mathrm{Jmol}^{-1}$
C. $-243.6 \mathrm{~K} \mathrm{Jmol}^{-1}$
D. $-120.0 \mathrm{~K} \mathrm{Jmol}^{-1}$

Answer: B
37. Three moles of an ideal gas expanded spotaneously into vacuum. The work done will be
A. Infinite
B. 3 joules
C. 9 joules
D. zero

## Answer: D

## D Watch Video Solution

38. For vaporization of water at 1 atmospheric pressure the values of $\Delta H$ and $\Delta S$ are $40.63 \mathrm{KJmol}^{-1}$ and
$108 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$, respectively. The temperature when Gibbs energy change ( $\Delta G$ ) for this transformation will be zero is
A. $273.4 K$
B. 393.4 K
C. $373.4 K$
D. $293.4 K$

## Answer: D

## - Watch Video Solution

39. The following two reactionas are known
$\mathrm{FeO}_{3}(\mathrm{~s})+3 \mathrm{CO}(\mathrm{g}) \rightarrow 2 \mathrm{Fe}(\mathrm{s})+\mathrm{CO}_{2}(\mathrm{~g}):$
$\Delta H=-26.8 K J$
$\mathrm{FeO}(s)+\mathrm{CO}(g) \rightarrow \mathrm{Fe}(\mathrm{s})+\mathrm{CO}_{2}(\mathrm{~g}): \Delta H=-16.5 \mathrm{KJ}$

The value of $\Delta H$ for the following reaction

$$
\mathrm{Fe}_{2} \mathrm{O}_{3}(s)+\mathrm{CO}(g) \rightarrow 2 \mathrm{FeO}_{2}(s)+\mathrm{CO}_{2}(g) \text { is }
$$

A. $+10.3 K J$
B. $-43.3 K J$
C. -10.3 KJ
D. 6.2 KJ

## Answer: C

## D Watch Video Solution

40. Which of the following is the correct option for the 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

## D Watch Video Solution

41. Enthalpy change for the reaction
$4 H(g) \rightarrow 2 H_{2}(g)$ is $-869.6 k J$

The dissociation energy of $H-H$ bond is:
A. $=217.4 K J$
B. $-434.8 K J$
C. $-869.6 K J$
D. $+434.8 K J$

## Answer: D

## D Watch Video Solution

42. Standard enthalpy of vaporisation $\Delta V_{\text {vap }} . H^{\Theta}$ for water at $100^{\circ} \mathrm{C}$ is $40.66 \mathrm{kJmol}^{-1}$. Teh internal energy of Vaporization of water at $100^{\circ} C\left(\mathrm{in} \mathrm{kJ} \mathrm{mol}^{-1}\right)$ is
A. +4376
B. +40.66
C. +37.56
D. -43.76

## (D) Watch Video Solution

43. The enthalpy of fusion of water is $1.435 \mathrm{kcal} / \mathrm{mol}$.The molar entropy change for the melting of ice at $0^{\circ} \mathrm{C}$ is
A. $5.260 \mathrm{cal} /(\mathrm{molK})$
B. $0.560 \mathrm{cal} /(\mathrm{molK})$
C. $10.52 \mathrm{cal} /(\mathrm{molK})$
D. $21.04 \mathrm{cal} /(\mathrm{molK})$

## Answer: C

(D) Watch Video Solution
44. In which of the following reactions,standard reaction entropy change $\left(\Delta S^{\circ}\right)$ is positive and standard Gibb,s energy change $\left(\Delta G^{\circ}\right)$ decreases sharply with increasing temperature?
A. $M g(s)+\frac{1}{2} O_{2}(g) \rightarrow M g O(s)$
B. $\frac{1}{2} C($ graphite $)+\frac{1}{2} O_{2}(g) \rightarrow \frac{1}{2} C O_{2}(g)$
C. $C($ graphite $)+\frac{1}{2} O_{2}(g) \rightarrow C O(g)$
D. $\mathrm{CO}(g)+\frac{1}{2} \mathrm{O}_{2}(g) \rightarrow \mathrm{CO}_{2}(g)$

Answer: A

D Watch Video Solution
45. Equal volumes of two monmoatomic gases, $A, B$, at the same temperature and pressure are mixed.The ratio of specific heats $\left(C_{p} / C_{v}\right)$ of the mixture will be
A. 0.83
B. 1.50
C. 3.3
D. 1.67

## Answer: C

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46. A reaction having equal energies of activation for forward and reverse reactions has
A. $\Delta G=0$
B. $\Delta H=0$
C. $\Delta H=\Delta G=\Delta S=0$
D. $\Delta S=0$

## Answer: D

## - Watch Video Solution

47. Which of the following statements of correct for the spontaneous adsoption of a gas?
A. $\Delta S$ is negative and therefore, $\Delta H$ should be highly positive.
B. $\Delta S$ is negative and therefore, $\Delta H$ should be highly
negative.
C. $\Delta S$ is positive and therefore, $\Delta H$ should be highly negative.
D. $\Delta S$ is positive and therefore, $\Delta H$ should be highly positive.

## Answer: B

## ( Watch Video Solution

48. For the reaction:
$\mathrm{X}_{2} \mathrm{O}_{4}(\mathrm{l}) \rightarrow 2 \mathrm{XO}_{2}(\mathrm{~g})$
$\Delta U=2.1 \mathrm{cal}, \Delta S=20 \mathrm{cal} \mathrm{K}^{-1} \mathrm{at} 300 \mathrm{~K}$

Hence $\Delta G$ is
A. 2.7 Kcal
B. -2.7 Kcal
C. 9.3 Kcal
D. -9.3 Kcal

## Answer: B

## - Watch Video Solution

49. Given :


The enthalpy of hydrogenation of these compounds will be in the order as
A. $I I>I I I>I$
B. $I I>I>I I I$
C. $I>I I>I I I$
D. $I I I>I I>I$

## Answer: B

## (b) Watch Video Solution

50. The heat of combustion of carbon to $\mathrm{CO}_{2}$ is $-395.5 k J / m o l$. The heat released upon the formation of
35.2 g of $\mathrm{CO}_{2}$ from carbon and oxygen gas is
A. $-630 K J$
B. $-3.15 K J$
C. $-315 K J$
D. $+315 K J$

## Answer: D

## (D) Watch Video Solution

51. The correct thermodnamic conditions for the spontaneous reaction at all temperature is:
A. $\Delta H<0$ and $\Delta S<0$
B. $\Delta H<0$ and $\Delta S=0$
C. $\Delta H>0$ and $\Delta S<0$
D. $\Delta H<0$ and $\Delta S>0$

## Answer: C

## D Watch Video Solution

52. For a given reaction $\Delta H=35.5 \mathrm{kJmol}^{-1}$ and
$\Delta S=83.6 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$. The reaction is spontaneous at :
(Assume that $\Delta H$ and $\Delta S$ do no vary with temperature)
A. $T>425 K$
B. All temperatures
C. $T>298 K$
D. $T<425 K$

Answer: D
53. The bond dissociation energies of $X_{2}, Y_{2}$ and $X Y$ are in the ratio of1:0.5:1. $\Delta H$ for the formation of $X Y$ is $-200 \mathrm{kJmol}^{-1}$. The bond dissociation energy of $X_{2}$ will be
A. $200 \mathrm{~K} \mathrm{Jmol}^{-1}$
B. $100 \mathrm{~K} \mathrm{Jmol}^{-1}$
C. $800 \mathrm{~K} \mathrm{Jmol}^{-1}$
D. $400 \mathrm{~K} \mathrm{Jmol}^{-1}$

## Answer: A

## D Watch Video Solution

1. Which of the following is not a state function?
A. Internal energy
B. Enthalpy
C. Work
D. Entropy

Answer: C

- Watch Video Solution

2. Among them intensive property is
A. mass
B. volume
C. surface tension
D. Enthalpy

## Answer: C

## (D) Watch Video Solution

3. At constant $T$ and $P$, which of the following statements is correct for the reaction,
$\mathrm{CO}(G)+\frac{1}{2} \mathrm{O}_{2}(g) \rightarrow \mathrm{CO}_{2}(g)$,
A. $\Delta H$ is independent of the physical state of the
reactants of that compound
B. $\Delta H>\Delta E$
C. $\Delta H>\Delta E$
D. $\Delta H=\Delta E$

## Answer: C

## D Watch Video Solution

4. For the reaction of one mole of zinc dust with one mole of sulphuric acid in a bomb calorimeter $\Delta U$ and $w$ correspond to
A. $\Delta U<0, w=0$
B. $\Delta U=0, w=0$
C. $\Delta U>0, w=0$
D. $\Delta U<0, w>0$

Answer: C
5. Which of the following expressions represent the first law of thermodyanmics?
A. $\Delta E=-q+W$
B. $\Delta E=q-W$
C. $\Delta E=q+W$
D. $\Delta E=-q-W$

## Answer: A

## D Watch Video Solution

6. The relation between change in internal energy $(\Delta E)$ change in enthalpy $(\Delta H)$ and work done $(W)$ is represented
A. $\Delta H=\Delta E+W$
B. $W=\Delta E-\Delta H$
C. $\Delta E=W-\Delta H$
D. $\Delta E=\Delta H+W$

## Answer: C

## D Watch Video Solution

7. Work done during isothermal expansion of one mole of an ideal gas form 10atm to 1atm at 300 K is (Gas constant=2)
A. 938.8 cal
B. 1138.8 cal .
C. 1381.8cal .
D. 1581.8 cal .

## Answer: A

## (D) Watch Video Solution

8. Internal energy is sum of
A. parthly potential and partly Kinetic
B. totally Kinetic
C. totally potential
D. none of these

Answer: C
9. For whichreaction from the following ,( $\Delta S$ ) will be maximum

$$
\begin{aligned}
& \text { A. } \mathrm{Ca}(\mathrm{~s})+\frac{1}{2} \mathrm{O}_{2}(\mathrm{~g}) \rightarrow \mathrm{CaO}(\mathrm{~s}) \\
& \text { B. } \mathrm{CaCO}_{3}(s) \rightarrow \mathrm{CaO}(s)+\mathrm{CO}_{2}(g) \\
& \text { C. } \mathrm{C}(\mathrm{~s})+\mathrm{O}_{2}(g) \rightarrow \mathrm{CO}_{2}(g) \\
& \text { D. } \mathrm{N}_{2}(\mathrm{~g})+\mathrm{O}_{2}(\mathrm{~g}) \rightarrow 2 \mathrm{NO}(\mathrm{~g})
\end{aligned}
$$

## Answer: A

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10. The occurrence of a reaction of impossible if
A. $\Delta H$ is $+v e, \Delta S$ is also $+v e$ but $\Delta H<T \Delta S$
B. $\Delta H$ is $-v e, \Delta S$ is also $-v e$ but $\Delta H<T \Delta S$
C. $\Delta H$ is $-v e, \Delta S$ is $+v e$
D. $\Delta H$ is $+v e, \Delta S$ is $-v e$

## Answer: B

## - Watch Video Solution

11. Which of the followingis true for the reaction
A. $\Delta E=0$
B. $\Delta H=0$
C. $\Delta H=\Delta E$
D. $\Delta H=T \Delta S$

Answer: D

## - Watch Video Solution

12. Following data is known about melting of a compound $A B$
$. \Delta H=9.2 \mathrm{kJmol}^{-1}, \Delta S=0.008 \mathrm{kJK}^{-1} \mathrm{~mol}^{-1}$
melting point is
A. 736 K
B. 1050 K
C. $1150 k$
D. $1150^{\circ} \mathrm{C}$

Answer: D
13. One mole of an ideal gas is allowed to expand reversible and adiabatically from a temperatureof $27^{\circ} \mathrm{C}$ ) if the work done during the process is 3 kJ , the final temperature will be equal to $\left(C_{v}=20 J^{-1}\right)$
A. $150 K$
B. 100 K
C. $26.85^{\circ} \mathrm{C}$
D. 295 K

Answer: A
14. Equal volumes of monoatomic and diatomic gases a same initial temperature and pressure are mixed.The ratio of specific heats of the mixture $\left(C_{p} / C_{v}\right)$ will be
A. 1
B. 2
C. 1.67
D. 1.5

## Answer: A

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15. Which of the following has $\Delta S^{\circ}$ greater than zero
A. $\mathrm{CaO}+\mathrm{CO}_{2}(\mathrm{~g}) \Leftrightarrow \mathrm{CaCo}_{3}$
B. $\mathrm{NaCl}(a q) \Leftrightarrow \mathrm{NaCl}(s)$
C. $\mathrm{NaNO}_{3}(s) \Leftrightarrow N a^{+}(a q)+\mathrm{NO}_{3}^{-}(a q)$
D. $\mathrm{N}_{2}(\mathrm{~g})+3 \mathrm{H}_{2}(\mathrm{~g}) \Leftrightarrow 2 \mathrm{NH}_{3}(\mathrm{~g})$

## Answer: D

## - Watch Video Solution

16. Which of the following neutralisation reasons, the heat of neutralisation will be highest?
A. $\mathrm{NH}_{4} \mathrm{OH}$ and $\mathrm{CH}_{3} \mathrm{COOHH}$
B. $\mathrm{NH}_{4} \mathrm{OH}$ and HCl
C. NaOH and $\mathrm{CH}_{3} \mathrm{COOH}$

## Answer: C

## D Watch Video Solution

17. The heat of neutralisationof a strong acid and a strong alkali is $57.0 \mathrm{kJmol}^{-1}$. The heat released when 0.5 mole of $\mathrm{HNO}_{3}$ solution is mixed with 0.2 mole fo KOH is
A. $57.0 K J$
B. $11.4 K J H$
C. $28.5 K J$
D. $34.9 K J$

## (D) Watch Video Solution

18. If enthalpies of formation of $\mathrm{C}_{2} \mathrm{H}_{4}(g) 1$ and $\mathrm{H}_{2} \mathrm{O}(l)$ at $25(\circ) C$ and1atm pressure be $52,-394$ and $-286 \mathrm{kJmol}^{-1}$ respectively , the enthalpy of combustion of $C_{2} H_{4}(g)$ will be
A. $1412 \mathrm{~K} \mathrm{Jmol}^{-1}$
B. $-1412 \mathrm{~K} \mathrm{Jmol}^{-1}$
C. $+141.2 \mathrm{KJmol}^{-1}$
D. $-141.2 \mathrm{KJmol}^{-1}$

## Answer: B

19. Combustion fo glucose takes place according to the equation,
$\mathrm{C}_{6} \mathrm{H}_{12} \mathrm{O}_{6}+6 \mathrm{O}_{2} \rightarrow 6 \mathrm{CO}_{2}+6 \mathrm{H}_{2} \mathrm{O}, \Delta \mathrm{H}=-72 \mathrm{kcal}$ How much energy will be required for the production of 1.6 g of glucose (Molecular mass of glucose=180g)
A. 0.064 Kcal
B. 0.64 Kcal
C. 6.4 Kcal
D. 64 Kcal

Answer: B
20. Ozone is prepared by passing silent electric discharge through oxygen. In this reaction
A. energy is given out
B. energy is absorbed
C. oxygen is loaded with energy
D. oxygen is dissociated into atoms

## Answer: B

## D Watch Video Solution

21. When $4 g$ of iron is burnt to ferric oxide at constant pressure, $29.28 K J$ of heat is evolved. What is the enthalpy of formation of ferric oxide (At wt. of $F e=56$ )
A. $-81.98 K J$
B. $-819.8 K J$
C. $-40.99 K J$
D. $+819.8 K J$

## Answer: A

## (D) Watch Video Solution

22. Enthalpy of neutralisation of acetic acid by NaOH is
$-50.6 \mathrm{KJ} / \mathrm{mol}$ and the heat of neutralisation of a storng acid with a strong bases is $-55.9 \mathrm{KJ} / \mathrm{mol}$. What is the value of $\Delta H$ for the ionisation of $\mathrm{CH}_{3} \mathrm{COOH}$ ?
A. $+5.3 \mathrm{KJ} / \mathrm{mol}$
B. $+6.2 \mathrm{KJ} / \mathrm{mol}$
C. $+8.2 \mathrm{KJ} / \mathrm{mol}$
D. $+9.3 \mathrm{KJ} / \mathrm{mol}$

Answer: B

## D Watch Video Solution

23. The enthalpy of combustion of $C_{6} H_{6}(l)$ is $-3250 K J$.

When $039 g$ of benzene is burnt excess of oxygen in an open
vessel, the amount of heat evolved is
A. 16.25 J
B. 16.25 KJ
C. 32.5 J
D. 32.5 KJ

## Answer: A

## D Watch Video Solution

24. One gram sample of $\mathrm{NH}_{4} \mathrm{NO}_{3}$ is decomposed in a bomb calorimeter. The temperature of the calorimeter increases by
6.12 K . The heat capacity of the system is $1.23 \mathrm{KJ} / \mathrm{g} / \mathrm{deg}$.

What is the molar heat of decomposition for $\mathrm{NH}_{4} \mathrm{NO}_{3}$ ?
A. $-7.53 \mathrm{KJ} / \mathrm{mol}$
B. $-398.1 \mathrm{KJ} / \mathrm{mol}$
C. $-16.1 \mathrm{KJ} / \mathrm{mol}$
D. $-602 \mathrm{KJ} / \mathrm{mol}$

Answer: B

## D Watch Video Solution

25. How much energy is released when 6 mole of octane is burnt in air? Given $\Delta H_{f}^{\circ}$ for $\mathrm{CO}_{2}(g), \mathrm{H}_{2} \mathrm{O}(g)$ and $C_{8} H_{18}(l)$ respectively are $-490,-240$ and $+160 \mathrm{KJ} / \mathrm{mol}$
A. $-6.2 K J$
B. $-37.4 K J$
C. $-35.5 K J$
D. $-20.0 K J$

Answer: A
26. In an isobaric process, the ratio of heat supplied to the system $(d Q)$ and work done by the system $(d W)$ for diatomic gas is
A. 1:1
B. 7: 2
C. $7: 5$
D. 5:7

Answer: B
27. Sulphur $(2.56 g)$ is burend in a constant volume
calorimeter with excess $O_{2}(g)$. The temperature increases from $21.25^{\circ}$ to $26.72^{\circ} \mathrm{C}$, The bomb has a heat capacity of $923 J K^{-1}$. Calorimeter energy contains $815 g$ of water. Thus, change in internal energy per mole of $\mathrm{SO}_{2}$ formed for the reaction is

$$
S_{8}(s)+8 O_{2}(g) 8 S O_{2}(g)
$$

(specific heat of water is $4.184 J K^{-1} g^{-1}$ ).
A. $-296.27 K J$
B. $+296.27 K J$
C. $-2370.13 K J$
D. $+2370.13 K J$

Answer: B
28. One monoatomic gas is expanded adibatically from $2 L$ to
$10 L$ at atm external pressure find $\Delta U$ (in atm $L$ )?
A. -8
B. 0
C. -66.7
D. 58.2

Answer: A

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29. Which are extensive properties?
A. $V$ and $E$
B. $V$ and $T$
C. $V$ and $C_{p}$
D. $P$ and $T$

## Answer: A

## - Watch Video Solution

## Assertion - Reasoning Questions

1. Assertion:Absolute values of intenal energy of substances
cannot be determined.

Reason:It is impossible to determine exact values of constituent energies of the substances.
A. If both ther assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: A

## ( Watch Video Solution

2. Assertion:The increase in internal energy $(\Delta E)$ for the vaporiation of one mole of water at 1atmand 373 K is zero.

Reason: For all isothermal processes $\Delta T=0$
A. If both ther assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: A

## ( Watch Video Solution

3. Assertion:The enthalpies of neutralised of strong acids and
strong bases are always same.
Reason:Neutralisation is heat of formation of water.
A. If both ther assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: A

## ( Watch Video Solution

4. Assertion:Phase transition involves change in internal
energy only.
Reason:Phase transition occurs at constant pressure.
A. If both ther assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: A

## D Watch Video Solution

5. Assertion:The $S$ Iunit of entropy is $\mathrm{JK}^{-1} \mathrm{~mol}^{-1}$

Reason: $\Delta S=\frac{q_{\text {rev }}}{T}$
A. If both ther assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: D

## ( Watch Video Solution

6. Assertion:The change in entropy during melting of ice is negligible in comparison to change in entropy during vaporisation.

Reason:The volume occupied by solid and liquids is too less in comparison to volume occupied by gas.
A. If both ther assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: A

7. Assertion:Spontaneous process is an irreversible process and may be reversed by some external agency.

Reason:Decrease in enthalpy is a conrtributory factor for spontaneity.
A. If both ther assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is
not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: A

## Section D - Chapter End Test

1. Calcualte the maximum efficiency of an engine operating between $110^{\circ} \mathrm{C}$ and $25^{\circ} \mathrm{C}$.
A. $11.1 \%$
B. $22.2 \%$
C. $33.3 \%$
D. $44.4 \%$

Answer: B

- Watch Video Solution

2. Five moles of anideal gas expends reversily from a volume of $8 \mathrm{dm}^{3}$ at a temperature of $27^{\circ} C$ Calculate the change in entropy.
A. $70.26 \mathrm{JK}^{-1}$
B. $82.55 \mathrm{JK}^{-1}$
C. $95.73 J K^{-1}$
D. $107.11 \mathrm{JK}^{-1}$

## Answer: B

## D Watch Video Solution

3. Entropy change involve in conversion of 1 mole of liquid water at $373 K$ to vapour at the same temperature (latent
heat of vaporisation of water $=2.257 \mathrm{kJg}^{-1}$ )
A. $30.7 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
B. $60.3 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
C. $90.8 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
D. $108.9 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$

## Answer: C

## (D) Watch Video Solution

4. What is the value of $\Delta E$ (heat change at constant volume)for reversible isothermal evaporation of $90 g$ water at $100^{\circ}$ CAssuming water vapour behaves as an ideal gas and $\left(\Delta H_{\mathrm{vap}}\right)_{\text {water }}=540 \mathrm{calg}^{-1}$
A. $9 \times 10^{3} \mathrm{cal}$
B. $6 \times 10^{3} \mathrm{cal}$
C. 4.49cal
D. none of these

## Answer: D

## (D) Watch Video Solution

5. Which of the statement is correct?
A. Slope of adiabatic $P-V$ curve will be the same as that of isothermal one.
B. Slope of adiabatic $P-V$ curve is smaller than that of isothermal one.
C. Slope of adiabatic $P-V$ curve is larger than that in isothermal one.
D. Slope of adiabatic $P-V$ curve may be smaller or larger depending on the value $V$.

## Answer: D

## ( Watch Video Solution

6. The specific heats of iodine vapour and solid are 0.031 and
$0.055 \mathrm{cal} / \mathrm{g}$ respectively. If heat of sublimation of iodinde is
$24 \mathrm{cal} / \mathrm{g}$ at $200^{\circ} \mathrm{C}$, what is its value at $250^{\circ} \mathrm{C}$ ?
A. $5.7 \mathrm{calg}^{-1}$
B. $11.4 \mathrm{calg}^{-1}$
C. $22.8 \mathrm{calg}^{-1}$
D. $45.6 \mathrm{calg}^{-1}$

## Answer: C

## - Watch Video Solution

7. Bond dissociation energy of $\mathrm{CH}_{3}-H$ bond is $103 \mathrm{Kcalmol}^{-1}$ and $0.055 \mathrm{cal} / \mathrm{g}$ respectively, If specific heat of iodine is $24 \mathrm{cal} / \mathrm{g}$ at $200^{\circ}$,Calcualte its value at $250^{\circ} \mathrm{C}$ is
A. $3.61 \mathrm{Kcalmol}^{-1}$
B. $-3.61 \mathrm{Kcalmol}^{-1}$
C. $33.61 \mathrm{Kcalmol}^{-1}$
D. $-33.61 \mathrm{Kcalmol}^{-1}$

## Answer: C

## - View Text Solution

8. Given, $H_{s}(g)=2 H(g) \Delta_{H-H}=103 \mathrm{kcalmol}^{-1}$
$\mathrm{CH}_{4}(g)=\mathrm{CH}_{3}(g)+H(g) \Delta_{C H_{3}-H}=103 \mathrm{kcalmol}^{-1}$
The heat of reaction of
$\mathrm{CH}_{4}(g)=\mathrm{CH}_{3}(g)+H(g)$
A. $103 \mathrm{Kcalmol}^{-1}$
B. $206 \mathrm{Kcalmol}^{-1}$
C. 51.5
D. zero

## Answer: C

9. For the combustion of n-octane
$\mathrm{C}_{8} \mathrm{H}_{18}+\mathrm{O}_{2} \rightarrow \mathrm{CO}_{2}+\mathrm{H}_{2} \mathrm{O}$ at $25^{\circ} \mathrm{C}$ (ingnoring resonance in $\mathrm{CO}_{2}$ )
A. $\Delta H=\Delta E-5.5 \times 8.31 \times 0.298 \in K J / \mathrm{mol}$
B. $\Delta H=\Delta E-4.5 \times 8.31 \times 0.298 \in K J / \mathrm{mol}$
C. $\Delta H=\Delta E-4.5 \times 8.31 \times 0.298 \in K J / \mathrm{mol}$
D. $\Delta H=\Delta E-4.5 \times 8.31 \times 0.298 \in K J / \mathrm{mol}$

## Answer: D

- Watch Video Solution

10. The enthapies of neutralisation of $\mathrm{HClO}_{4}$ and
$\mathrm{Cl}_{3} \mathrm{C}-\mathrm{COOH}$ are
$-13.5 k c a l / g$-equivalent and

- 13. . $5 k c a l / g-$ equivalent respectively

When 40 g of solid NaOH is added to a mixture of $1 \mathrm{gmolHClO}_{4}$ and $1 \mathrm{gmolCl}_{3} \mathrm{C}-\mathrm{COOH}$,sodium perchlorate and sodium trichloeoacetate are formed in molar ratio of3:1

Then.
A. $\Delta H$ for the reaction of $N a O H$ is added to a mixtureis 6.45 Kcal .
B. $\Delta H$ for the reaction of $N a O H$ is added to a mixtureis 13.8 Kcal.
C. After reaction the total no. of moles of acid remained
$0.5\left(\mathrm{HCIO}_{4}+\mathrm{Cl}_{3} \mathrm{Cl}-\mathrm{COOH}\right)$
D. After reaction the total weight of acid remained
$147.75 \mathrm{~g}\left(\mathrm{HCIO}_{4}+\mathrm{Cl}-\mathrm{COOH}\right)$
and $\Delta H$ for the reaction of $N a O H$ with mixture is -13.8 Kcal.

## Answer: C

## - View Text Solution

11. The work done in erge for the reversible expansion of 1 mole of an ideal gas from a volume of 10 litres to 20 litres at $25^{\circ} \mathrm{C}$ is
A. $2.303 \times 298 \times 0.082 \log 2$
B. $-298 \times 10^{7} \times 8.31 \times 2.303 \log 2$
C. $2.303 \times 298 \times 0.082 \log 0.5$
D. $2.303 \times 298 \times 2 \log 2$

## Answer: D

## - Watch Video Solution

12. If $900 \mathrm{~J} / \mathrm{gof}$ heat is exchanged at boiling point of water then water is the increase in entropy.
A. $43.4 \mathrm{~J} / \mathrm{mol}$
B. $87.2 \mathrm{~J} / \mathrm{mol}$
C. $900 \mathrm{~J} / \mathrm{mol}$
D. Zero

Answer: B

## - Watch Video Solution

13. The enthalpy of formation of $\mathrm{H}_{2} \mathrm{O}(l)$ is $-280.70 \mathrm{~kJ} / \mathrm{mol}$ and enthalpy of neutralisation of a strong acid and strong base is $-56.70 \mathrm{~kJ} / \mathrm{mol}$. What is the enthalpy of formation of $\mathrm{OH}^{-}$ ions?
A. $+229.70 K J$
B. $-229.70 K J$
C. $+226.70 K J$
D. $-22.670 K J$

## Answer: A

14. One gram sample of $\mathrm{NH}_{4} \mathrm{NO}_{3}$ is decomposed in a bomb calorimeter. The temperature of the calorimeter increases by 6.12 K . The heat capacity of the system is $1.23 \mathrm{KJ} / \mathrm{g} / \mathrm{deg}$.

What is the molar heat of decomposition for $\mathrm{NH}_{4} \mathrm{NO}_{3}$ ?
A. $-7.53 \mathrm{KJ} / \mathrm{mol}$
B. $398 \mathrm{KJ} / \mathrm{mol}$
C. $-16.1 \mathrm{KJ} / \mathrm{mol}$
D. $-602 \mathrm{KJ} / \mathrm{mol}$

## Answer: B

15. Calculate the resonance enegry of $\mathrm{N}_{2} \mathrm{O}$ form the following data
$\Delta_{f} H^{\Theta}$ of $N_{2} O=82 \mathrm{kJmol}^{-1}$
Bond enegry of $N \equiv N, N=N, O=O$, and $N=O$ bond is $946,418,498$, and $607 \mathrm{kJmol}^{-1}$, respectively.
A. $-88 \mathrm{~K} \mathrm{Jmol}^{-1}$
B. $-44 \mathrm{~K} \mathrm{Jmol}^{-1}$
C. $-22 \mathrm{~K} \mathrm{Jmol}^{-1}$
D. None of these

Answer: A
16. If a $298 K$ the bond energies of $C-H, C-C, C=C$ and $H-H$ bonds are respectivly $414,347,615 \mathrm{KJmol}^{-1}$, the vlaue of enthalpy change for the reaction

$$
\mathrm{H}_{2} \mathrm{C}=\mathrm{CH}_{2}(g)+\mathrm{H}_{2}(g)+\mathrm{H}_{2}(g) \rightarrow \mathrm{H}_{3} \mathrm{C}-\mathrm{CH}_{3}(g) \quad \text { at }
$$

$298 K$ will be
A. $+250 K J$
B. $-250 K J$
C. $+125 K J$
D. $-125 K J$

Answer: B
17. The enthalpies of formation of $\mathrm{Al}_{2} \mathrm{O}_{3}$ and $\mathrm{Cr}_{2} \mathrm{O}_{3}$ are
$-1596 K J$ and $-1134 K J$ respectively. $\Delta H$ for the reaction
$2 \mathrm{Al}+\mathrm{Cr}_{2} \mathrm{O}_{2} \rightarrow 2 \mathrm{Cr}+\mathrm{Al}_{2} \mathrm{O}_{3}$ is
A. $-2730 K J$
B. $-462 K J$
C. $-1365 K J$
D. $+2730 K J$

## Answer: B

## - Watch Video Solution

18. "The quanity of heat which must be supplied to decompose a compound into its element is equal to the heat
evolved durring the formation of that compound from the element. " This statement is known as
A. Hess's law
B. Joule's law
C. Le-Chatelier's principle
D. Lavoisier and Laplace law

## Answer: B

## - Watch Video Solution

19. $C_{\text {graphite }}+O_{2}(g) \rightarrow \mathrm{CO}_{2}(g)$
$\delta H=-94.05$ Kcalmol $^{-1}$
`C_("diamond")+O_(2)(g),DeltaH=-94.50Kcalmol^(-1)
Therefore,
A. $C_{\text {graphite }} \rightarrow C_{\text {diamond }}, \Delta H_{298 K^{\circ}=-450 \text { calmol }-1}$
B. $C_{\text {diamond }} \rightarrow C_{\text {graphite }}, \Delta H_{298 K^{\circ}}=+450$ calmol $^{-1}$
C. Graphite is the stabler allotrope
D. Diamond is harder than graphite

## Answer: D

## - Watch Video Solution

20. Which of the follwing has lowest fusion temperature?
A. Naphthalene
B. Diamond
C. NaCl
D. $M n$

Answer: C

## D Watch Video Solution

21. Given the bond energirs $N=N, H-H$ and $N-H$ bonds are 945,436 and $391 \mathrm{KJmol}^{-1}$ respectively, the enthalpy of the follwing reactlon
$\mathrm{N}_{2}(g)+3 \mathrm{H}_{2}(g) \rightarrow 2 \mathrm{NH}_{3}(g)$ is
A. $-93 K J$
B. $102 K J$
C. $90 K J$
D. 105 KJ
22. For conversion $C$ (graphite) $\rightarrow C$ (diamond) the $\Delta S$ is
A. Zero
B. Positive
C. Negative
D. Unknown

## Answer: A

## - Watch Video Solution

23. Smelting of iron ore takes place through this reaction
$2 \mathrm{Fe}_{2} \mathrm{O}_{3}(s)+3 \mathrm{C}(s) \rightarrow 4 \mathrm{Fe}(s)+3 \mathrm{CO}_{2}(g)$
$\Delta H_{f}^{2}$ of $\mathrm{Fe}_{2} \mathrm{O}_{3}$ and $\mathrm{CO}_{2}$ are $-8242 \mathrm{KJmol}^{-1}$ and $-393.7 \mathrm{KJmol}^{-1}$

The reaction is
A. Endothermic
B. Exothermic
C. $\Delta H=0$
D. None of these

## Answer: A

## D Watch Video Solution

24. For the given heat of reaction,
(i) $\mathrm{C}(\mathrm{s})+\mathrm{O}_{2}(g) \mathrm{CO}_{2}(g)+97 \mathrm{Kcal}$
(ii) $\mathrm{CO}_{2}(\mathrm{~g})+\mathrm{C}(\mathrm{s})=2 \mathrm{CO}(\mathrm{g})-39 \mathrm{Kcal}$
the heat of combustion of $C O(g)$ is:
A. 68 Kcal
B. -68 Kcal
C. +489 Kcal
D. None

Answer: B

## - Watch Video Solution

25. What is the amount of heat to be supplied to prepare 128 g of $\mathrm{CaCO}_{3}$ by using $\mathrm{CaCO}_{3}$ and followed by reduction with carbon, Reactions are
$\mathrm{CaCO}_{3}(s)=\mathrm{CaO}(s)+\mathrm{CO}_{2}(g), \Delta H^{\circ}=42.8 \mathrm{Kcal}$
$C a C O(s)=3 C(s)=C a C_{2}+C O(g), \Delta H^{\circ}=111 K c a l$
A. 102.6 Kcal
B. 221.78 Kcal
C. 307.6 Kcal
D. 453.46 Kcal

## Answer: A

## - Watch Video Solution

26. Ionisation energy of $A 1=5137 \mathrm{KJmol}^{-1}(\Delta H)$ hydration of $A l^{3+}=-4665 \mathrm{KJmol}^{-1} \cdot(\Delta H)_{\text {hydration }}$ for $\mathrm{Cl}^{-}=-381 \mathrm{KJmol}^{-1}$. Which of the following statement is correct?
A. $A l C l_{3}$ would remauin covalent in aqueous solution
B. Only at infinite dilution $\mathrm{AlCl}_{3}$ undergoes ionisation
C. In aqueous solution $\mathrm{AlCl}_{3}$ becomes ionic
D. Nonee of these

## Answer: C

## - Watch Video Solution

27. At $0^{\circ} \mathrm{C}$, ice and water are in reuilibrium and $\Delta S$ and $\Delta G$ for the conversion of ice to liquid water is
A. $0,21.98 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
B. $-v e$, zero
C. $-v e, 21.98 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
D. Zero, zero

## Answer: C

## D Watch Video Solution

28. Assertion : Molar entropy of vaporization of water is different from ethanol.

Reason : Water is more polar than ethanol.
A. If both the assertion and reason are true and the
reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is
not the correct explanation of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: B

## D Watch Video Solution

29. Assertion: The increase in internal energy $(\Delta E)$ for the vaporisation of 1 mole of water at 1 atm and $373 K$ is zero.

Reason: For all isothermal processes $\Delta E=0$.
A. If both ther assertion and reason are true and the
reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is
not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

## Answer: B

## D Watch Video Solution

30. Assertion: The enthalpies of neutralisation of strong acids and strong bases are always same.

Reason: Neutralisation is heat of formation of water.
A. If both ther assertion and reason are true and the
reason is the correct explanation of the assertion.
B. If both the assertion and reason are true but reason is not the correct explantion of the assertion.
C. If the assertion is true but reason is false.
D. If assertion is false but reason is true.

Answer: A

## D View Text Solution

## Others

1. Calculate the entropy change when $3.6 g$ of liquid water is completely converted into vapour at $100^{\circ} \mathrm{C}$. The molar heat of vaporization is $40.85 \mathrm{~K} \mathrm{~mol}^{-1}$.
A. $6.08 J K^{-1}$
B. $109.5 \mathrm{JK}^{-1}$
C. $21.89 \mathrm{JK}^{-1}$
D. $-21.89 J^{-1}$

## Answer: C

## D Watch Video Solution

2. In an irreversible process taking place at constant $P$ and $T$ in which only pressure volume work is being done by the system the change in Gibb's energy $(\Delta G)$ and change in entropy $(\Delta)$, satisfy the criterion:
A. $(\Delta S)_{V . U}=0,(\Delta G)_{T . P}=0$
B. $(\Delta S)_{V \cdot U}=0,(\Delta G)_{T . P}=+v e$
C. $(\Delta S)_{V . U}=0,(\Delta G)_{T . P}=-v e$
D. $(\Delta S)_{V \cdot U}=0,(\Delta G)_{T . P}=-v e$

## Answer: C

## D Watch Video Solution

3. The correct relationship between free energy change in a reaction and the corresponding equilibrium constant $K_{c}$ is:
A. $\Delta G^{\circ}=R T \ln K_{C}$
B. $-\Delta G^{\circ}=R T \ln K_{C}$
C. $\Delta G=R T \ln K_{C}$
D. $-\Delta G=R T \ln K_{C}$

## Answer: D

4. Predict which of the following reaction $(s)$ has a positive entropy change?
$I . A g^{+}(a q)+C l^{-}(a q) \rightarrow A g C l(s)$
$\mathrm{II} . \mathrm{NH}_{4} \mathrm{Cl}(\mathrm{s}) \rightarrow \mathrm{NH}_{3}(g)+\mathrm{HCl}(g)$
$I I I .2 \mathrm{NH}_{3}(g) \rightarrow \mathrm{N}_{2}+3 \mathrm{H}_{2}(g)$
A. I and II
B. III
C. II and III
D. II

## Answer: B

5. Maxing of non-reacting gases is generally accompanied by
A. 'Decreases in enthropy
B. Increases in entropy
C. Change in enthalpy
D. Change in free energy

## Answer: C

## - Watch Video Solution

6. A particular state of system is arrived at starting from a given state in two different ways (1) following reversible path and (2) irreversible path. Which of the following relations would be correct if the processes are isothermal ?
A. $\Delta S_{\text {rev }} \neq \Delta S_{i r r e v}$
B. $\Delta q_{r e v}=\Delta q_{i r r e v}$
C. $\Delta S_{\text {rev }}=\Delta S_{\text {irrev }}=\frac{\Delta q_{r e v}}{T}$
D. $\Delta S_{\text {irrev }}=\frac{\Delta q_{\text {irrev }}}{T} \neq \Delta S_{\text {rev }}$

## Answer: B

## (D) Watch Video Solution

7. For a spontaneous reaction, $\Delta G$, equilibrium constant $(K)$ and $E_{\text {cell }}^{0}$ will be respectively :
A. $-v e,>1,+v e$
B. $+v e,>1,-v e$
C. $-v e,<1,-v e$
D. $-v e,>1,-v e$

## Answer: A

## D Watch Video Solution

8. 

For
the
water
gas
reaction
$\mathrm{C}(s)+\mathrm{H}_{2} \mathrm{O}(g) \Leftrightarrow \mathrm{CO}(g)+\mathrm{H}_{2}(g)$

At $1000 K$, the standard Gibbs free energy change of the reaction is $-8.314 \mathrm{KJ} / \mathrm{mol}$. Therefore, at 1000 K the equilibrium constant of the above water gas reaction is
A. 1
B. 10
C. $\frac{1}{e}$
D. 2.718

Answer: A

## D Watch Video Solution

9. At $500 K$, for an isobaric pracess.
$\Delta S_{\text {system }}=-10 \frac{\mathrm{KJ}}{\mathrm{molK}}$ and $\Delta S_{\text {surr }}=12 \frac{\mathrm{KJ}}{\mathrm{molK}}$
Therefore, $\Delta G$ for the entire process is
A. $-500 \mathrm{KJ} / \mathrm{mol}$
B. $-1000 \mathrm{KJ} / \mathrm{mol}$
C. $-600 \mathrm{KJ} / \mathrm{mol}$
D. $-1100 \mathrm{KJ} / \mathrm{mol}$

## - Watch Video Solution

10. 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 process are never spontaneous
C. Exothermic processes are always spontaneous
D. Lowering of energy in the reaction process is the only criterion for spontaneity

Answer: B
11. Standard entropt of $X_{2}, Y_{2}$ and $X Y_{3}$ are 60,40 and $50 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$, respectively. For the reaction, $\frac{1}{2} X_{2}+\frac{3}{2} Y_{2} \rightarrow X Y_{3}, \Delta H=-30 K J \quad$, to be at equilibrium, the temperature will be:
A. $1250 K$
B. $500 K$
C. 750 K
D. $1000 K$

## Answer: A

## - Watch Video Solution

12. If liquids $A$ and $B$ from an ideal solution,
A. The entropy of mixing is zero
B. The Gibbs free energy as well as the entropy of mixing
are zero
C. The Gibbs free energy as well as the enthalpy of mixing
are zero
D. The enthalpy of mixing is zero

## Answer: C

## (D) Watch Video Solution

13. Which reaction, with the following value of $\Delta H$ and $\Delta S$
at $350 K$ is spontaneous and endothermic?

A. $-48,+135 \times 10^{-3}$
B. $-48,-135$
C. $+48,+135 \times 10^{-3}$
D. $+48,-135 \times 10^{-3}$

## Answer: D

## (D) Watch Video Solution

14. The incorrect expression among the following is
A. $\frac{\Delta G_{\text {system }}}{\Delta G_{\text {total }}}=-T$
B. in isothermal process, $W_{\text {reversible }}=-n R T \operatorname{in} \frac{V_{f}}{V_{i}}$
C. $\ln K=\frac{\Delta H-T \Delta S^{\circ}}{R T}$
D. $K=e^{-\Delta G^{\circ} / R T}$

Answer: C

## D Watch Video Solution

15. Which of the following reactions is associated with the most negative change in entropy?
A. $2 \mathrm{SO}_{2}(g)+\mathrm{O}_{2}(g) \rightarrow 2 \mathrm{SO}_{3}(g)$
B. $C_{2} H_{4}(g)+H_{2}(g) \rightarrow C_{3} H_{6}(g)$
C. $C(s, \quad$ graphite $)+O_{2} \rightarrow \mathrm{CO}_{2}(g)$
D. $3 C_{2} H_{2}(g) \rightarrow C_{6} H_{6}(g)$

## Answer: C

16. For the reaction in the plant cells
$6 \mathrm{CO}_{2}(g)+12 \mathrm{H}_{2} \mathrm{O}(l) \rightarrow \mathrm{C}_{6} \mathrm{H}_{12} \mathrm{O}_{6}(s)+6 \mathrm{O}_{2}(g)$
$+6 \mathrm{H}_{2} \mathrm{O}(\mathrm{l}) \Delta_{r} G^{0}=3000 \mathrm{KJ} / \mathrm{mol}$
$A T P \rightarrow A D P+\mathrm{PO}_{4}^{3-} \Delta_{r} G^{0}=-30 \mathrm{KJ} / \mathrm{mol}$
Glucose is stored in the plant cell as starch $\left(\mathrm{C}_{6} \mathrm{H}_{10} \mathrm{O}_{5}\right)_{n}$.
To produce $162 g$ of starch how many moles of $A T P$ are minimum required?
A. 100 mol
B. 10 mol
C. 20 mol
D. 200 mol

## Answer: D

17. The entropy change involved in the isothermal reversible expansion of 2 moles of an ideal gas from a volume of $10 \mathrm{dm}{ }^{3}$ to a volume of $100 \mathrm{dm}^{3}$ at $27^{\circ} \mathrm{C}$ is
A. $38.3 J^{-1}$
B. $35.8 \mathrm{JK}^{-1}$
C. $32.3 J K^{-1}$
D. $42.3 \mathrm{JK}^{-1}$

## Answer: A

## - Watch Video Solution

18. In view of the signs of $\Delta_{r} G^{0}$ for the following reactions
$\mathrm{PbO}_{2}+\mathrm{Pb} \rightarrow 2 \mathrm{PbO}, \Delta_{r} G^{0}<0$
$\mathrm{SnO}_{2}+\mathrm{Sn} \rightarrow 2 \mathrm{SnO}, \Delta_{r} G^{0}>0$
Which oxidation state are more characteristic for lead and tin?
A. For lead +4 , for $\operatorname{tin}+2$
B. For lead +2 , for tin +2
C. For lead +4 , for tin +4
D. For lead +2 , for tin +4

## Answer: A

## - Watch Video Solution

19. Two moles of an ideal gas is expanded irreversibly and isothermally at $37^{\circ} \mathrm{C}$ until its volume is doubled and 3.41 KJ
heat is absorbed from surrounding. $\mathrm{P} \Delta S_{\text {total }}$ (system
+surrounding) is:
A. $-0.52 J / K$
B. $0.52 J / K$
C. $22.52 \mathrm{~J} / \mathrm{K}$
D. 0

## Answer: B

## - Watch Video Solution

20. A spontaneous change is one in which a system under goes
A. an increases in internal energy
B. a lowering of entropy
C. a lowering of free energy
D. no energy change

Answer: B

## D Watch Video Solution

21. $\left.\mathrm{C}_{2} \mathrm{H}_{6}(g)+3.5\right)_{2}(g) \rightarrow 2 \mathrm{CO}_{2}(g)+3 \mathrm{H}_{2} \mathrm{O}(g)$
$\Delta S_{\text {vap }}\left(H_{2} O, l\right)=x_{1} c a l K^{-1}$ (boiling point $\left.=T_{1}\right)$
$\Delta H_{f}\left(H_{2} O, l\right)=x_{2}$
$\Delta H_{f}\left(C O_{2}\right)=x_{3}$
$\Delta H_{f}\left(C_{2} H_{6}\right)=x_{4}$

Hence, $\Delta H$ for the reaction is
A. $2 x_{3}+3 x_{2}-x_{4}$
B. $2 x_{3}+3 x_{2}-x_{4}+3 x_{1} T_{1}$
C. $2 x+3 x_{2}-x_{4}+3 x_{1} T_{1}$
D. $x_{1} T_{1}+x_{2}+x_{3}-x_{4}$

## Answer: C

## D Watch Video Solution

22. When reaction is at standard state at equilibrium, then
A. $\Delta H^{\circ}=0$
B. $\Delta S^{\circ}=0$
C. equilibrium constant $K=0$
D. equilibrium constant $K=1$

## Answer: B

## D Watch Video Solution

23. A spontaneous change is one in which a system under goes
A. $T_{e}>T$
B. $T>T_{e}$
C. $T_{e}$ is 5 times $T$
D. $T=T_{e}$

Answer: D

D Watch Video Solution
24. When reaction is at standard state at equilibrium, then
A. $80 \%$
B. $87 \%$
C. $90 \%$
D. $97 \%$

Answer: B

## D View Text Solution

25. For a spontaneous chemical process, the free energy change is
A. positive
B. negative
C. either positive or negative
D. zero

## Answer: D

## D Watch Video Solution

26. A reaction has $\Delta H=-33 K J$ and $\Delta S=-58 \frac{J}{H}$. This reaction would be:
A. spontanceous at all temperatures
B. non-spontaneous at all temperatures
C. spontaneous above a certain temperature
D. spontaneous below a certain temperature

Answer: B

## D Watch Video Solution

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

Statement $(i)$ : The entropy of isolated system with $P-V$ work only is always maximized at euilibrium.

Stetement (ii) : It is possible for the entropy of close system to decreases substantilly in an irreversible process.

Statement (iii) : Entropy can be created but not be destroyed.

Statement $(i v): \Delta S$ system is zero for reversible process in an isolated system.
A. Statements $I, i i, i i i$,
B. Statement $i i, i v$
C. Statement $I, i i, i v$
D. All of these

## Answer: D

## - View Text Solution

28. The process of evaporation of a liquid is accompanied by
A. an increases in entropy
B. a decreases in entropy
C. no change in entropy
D. no change in free energy

Answer: D
29. During winters, moisture condenses in the from of dew and can be seen on plant leaves and grass. The entropy of the system in such cases decreases as liquids process lesser disorder as compared to gases. With reference to the second law, which statement is correct. for the above process?
A. The randomness of the universe decreases
B. The randomness of the surroundings decreases
C. Increases in randomness of surrroundings equals ito
the decreases in randomness of system
D. The increases in randomness of the surroundings is
greater as compared to the decreases in randomness
of the system.

## Answer: A

## D Watch Video Solution

30. Combustion of sucrose is used by aerobic oranisms for providing energy for the life sustaining processes. If all the capturing of energy from reaction is done through electrical process (non $P-V$ work), then calculate maximum available energy which can be captured by combustion of $34.2 g$ of sucrose.

Given, $\Delta H_{\text {combustion }}($ surrose $)=-6000 \mathrm{KJmol}^{-1}$
$\Delta S_{\text {combustion }}=180 \mathrm{~J} / \mathrm{K}-\mathrm{mol}$ and body temperatuire is $300 K$
A. 600 KJ
B. $594.6 K J$
C. $5.4 K J$
D. $605.4 K J$

## Answer: D

## - Watch Video Solution

31. At $0^{\circ} C$, ice and water are in equilibrium and $\Delta S$ and $\Delta G$ for the conversion of ice to liquid water is
A. $0,21.98 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
B. $-v e$, zero
C. $+v e, 21.98 J \mathrm{Kk}^{-1} \mathrm{~mol}^{-1}$
D. All of these

Answer: D

## D View Text Solution

32. In which case, a spontaneous reaction is possible at any temperature
A. $\Delta H<0, \Delta S>0$
B. $\Delta H<0, \Delta S<0$
C. $\Delta H>0, \Delta S>0$
D. None of these

Answer: C
33. When a bottle of perfume is opened, odorous molecules mix with air and slowly diffuse throughout the entire room.

Which is not correct for this process?
A. $\Delta G<0$
B. $\Delta S>0$
C. $\Delta s H \approx 0$
D. $\Delta S<0$

## Answer: A

## - Watch Video Solution

34. Change in entropy is negative for
A. Bromine ( $l$ ) $\rightarrow$ Bromine $(\mathrm{g})$
B. $\mathrm{C}(\mathrm{s})+\mathrm{H}_{2} \mathrm{O}(g) \rightarrow \mathrm{CO}(g)+\mathrm{H}_{2}(g)$
C. $N_{2}(g, 10 \mathrm{~atm}) \rightarrow N_{2}(\mathrm{~g}, 1 \mathrm{~atm})$
D. $\mathrm{Fe}(1 \mathrm{~mol}, 400 \mathrm{~K}) \rightarrow \mathrm{Fe}(1 \mathrm{~mol}, 300 \mathrm{~K})$

Answer: B

## - Watch Video Solution

35. In which of the following reactions $\Delta S$ is positive?
A. $\mathrm{H}_{2} \mathrm{O}(\mathrm{l}) \rightarrow \mathrm{H}_{2}+\mathrm{O}(s)$
B. $3 \mathrm{O}_{2} \rightarrow 2 \mathrm{O}_{3}(\mathrm{~g})$
C. $\mathrm{H}_{2} \mathrm{O}(\mathrm{l}) \rightarrow \mathrm{H}_{2} \mathrm{O}(\mathrm{g})$
D. $\mathrm{N}_{2}(\mathrm{~g})+3 \mathrm{H}_{2}(\mathrm{~g}) \rightarrow 2 \mathrm{NH}_{3}(\mathrm{~g})$

Answer: D

## D Watch Video Solution

36. The molar enthlpy of fusion of water is $6.01 \mathrm{KJmol}^{-1}$.

The entropy change of 1 mol of water at its melting point will be
A. $22 \mathrm{Jmol}^{-1} \mathrm{~K}^{-1}$
B. $109 \mathrm{Jmol}^{-1} \mathrm{~K}^{-1}$
C. $44 \mathrm{Jmol}^{-1} \mathrm{~K}^{-1}$
D. spontaneous below a certain temperature

Answer: A
37. When ice melts into water, entropy
A. Becomes zero
B. Decreases
C. Increases in randomness of surrroundings equals ito
the decreases in randomness of system
D. Remains same

## Answer: A

## D Watch Video Solution

38. The value of free energy change of an equilibrium process
A. positive
B. Negative
C. Zero
D. Not definite

## Answer: C

## (b) Watch Video Solution

39. The standard entropies of $\mathrm{N}_{2}(g), \mathrm{H}_{2}(g)$ and $\mathrm{NH}_{3}(g)$ are $191.5,192.6 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$. The value of $\Delta S^{0}$ during the formation of 1 mole of ammonia is
A. $-98.9 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
B. $-9.78 J K^{-1} \mathrm{~mol}^{\wedge}(-1)^{\wedge}$
C. $+129.4 \mathrm{JK}^{-1} \mathrm{~mol}^{-}$
D. Zero

## Answer: C

## - Watch Video Solution

40. One mole of an ideal gas at $25^{\circ} \mathrm{C}$ is subjected to expand reversible ten times of its intial volume. The change in entropy of expansion is
A. $19.15 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
B. $16.15 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
C. $22.15 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
D. None

## Answer: A

## (D) Watch Video Solution

41. The entropy change for the reaction given below is
$2 \mathrm{H}_{2}(g)+\mathrm{O}_{2}(g) \rightarrow 2 \mathrm{H}_{2} \mathrm{O}(l)$
is ... At 300 K . Standard entropies of $\mathrm{H}_{2}(\mathrm{~g}), \mathrm{O}_{2}(\mathrm{~g})$ and
$\mathrm{H}_{2} \mathrm{O}(\mathrm{l})$ are $126.6,201.20$ and $68.0 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$ respectively.
A. $-318.4 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
B. $318.4 \times \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
C. $31.84 \times \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
D. None of these

## Answer: A

42. The a reaction to be spontaneous at all temperature
A. $\Delta G$ and $\Delta H$ should be negative
B. $\Delta G$ for the reaction is zero
C. $\Delta G$ and $\Delta H$ should be positive
D. $\Delta H<\Delta G$

## Answer: A

## - Watch Video Solution

43. Which of the following statements is true? The entropy of the universe
A. Increases and moves towards maximumm value
B. Decreases and moves to zero
C. Remains constant
D. Decreases and increases with a periodic rrate

## Answer: A

## (D) Watch Video Solution

44. Enthalpy of fusion of a liquid is $1.435 \mathrm{Kcalmol}^{-1}$ and molar entropy change is $5.26 \mathrm{calmol}^{-1} \mathrm{~K}^{-1}$ Hence melting point of liquid is
A. $100^{\circ} \mathrm{C}$
B. $0^{\circ}$
C. 373 K
D. $-273^{\circ} \mathrm{C}$

## Answer: A

## - Watch Video Solution

45. If $S^{\circ}$ for $H_{2}, C l_{2}$ and $H C L$ are $0.13,0.22$ and $0.19 \mathrm{KJK}^{-1} \mathrm{~mol}^{-1}$ respectively. The total change in standard entropy for the reaction $\mathrm{H}_{2}+\mathrm{Cl}_{2} \rightarrow 2 \mathrm{HCl}$ is
A. $0.5 \mathrm{KJK}^{-1} \mathrm{~mol}^{-1}$
B. $40 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
C. $60 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
D. $20 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$

Answer: B

## D Watch Video Solution

46. If the enthalpy of vaporization for water is 198.5 $\mathrm{K} \mathrm{Jmol}^{-1}$, the entropy of its vaprization will be
A. $0.5 K J^{-1}$
B. $1.0 \mathrm{KJK}^{-1} \mathrm{~mol}^{-1}$
C. $1.5 \mathrm{KJK}^{-1} \mathrm{~mol}^{-1}$
D. $2.0 \mathrm{KJK}^{-1} \mathrm{~mol}^{-1}$

Answer: A
47. In the following Table, which one is correct
$\Delta H \Delta S$ Nature of reaction
A. $(-)(+)$ Spontaneous only at high temperature
B. ( + ) ( - ) Spontaneous regardless of temperature
C. $(+)(+)$ Spontaneous only at low temperature
D. $(-)(-)$ Spontaneous at all temperature

## Answer: A

## - Watch Video Solution

48. For the reaction,
$X_{2} O_{4}(l) \rightarrow 2 \mathrm{XO}_{2}(g), \Delta E=2.1 \mathrm{Kcal}$,
$\Delta S=20 \mathrm{cal} / K$ at $300 K$. Hence $\Delta G$ is
A. 2.7 Kcal
B. -2.7 Kcal
C. 9.3 Kcal
D. -9.3 Kcal

## Answer: B

## - Watch Video Solution

49. The temperature at which the reaction,
$\mathrm{Ag}_{2} \mathrm{O}(s) \rightarrow 2 \mathrm{Ag}(s)+1 / 2 \mathrm{O}_{2}(g)$
Is at equilibrium is ..., Given $\Delta H=30.5 \mathrm{KJmol}^{-1}$ and $\Delta S$
$=0.066 K J K^{-1}$
A. $462.12 K$
B. $362.12 K$
C. $262.12 K$
D. $562.12 K$

Answer: B

## D Watch Video Solution

50. Given
(I)
$C$ (diamond)
$+\mathrm{O}_{2}(\mathrm{~g}) \rightarrow \mathrm{CO}_{2}(\mathrm{~g}), \Delta \mathrm{H}^{\circ}=-92.0 \mathrm{Kcalmol}^{-1}$
(II)
$C$ (graphite)
$O_{2}(g) \rightarrow \mathrm{CO}_{2}(g), \Delta H^{\circ}=-96.0 \mathrm{Kcalmol}^{-1}$
A. $2.907 \mathrm{KcalK}^{-1}$
B. $2.013 \mathrm{KcalK}^{-1}$
C. $305.4 \mathrm{calK}^{-1}$
D. $-2.013 \mathrm{KcalK}^{-1}$

## Answer: A

## D View Text Solution

51. For a certain reaction $X \operatorname{rarr} Y$ the value of $\Delta H$ and $\Delta S$ are $50.50 \mathrm{KJmol}^{-1}$ and $100.03 \mathrm{JK}^{-1}$ respectively. The temperature at which $\Delta G=0$ is
A. $505^{\circ} \mathrm{C}$
B. $232^{\circ} \mathrm{C}$
C. $252^{\circ} \mathrm{C}$
D. $450^{\circ} \mathrm{C}$

Answer: A

## D Watch Video Solution

52. Which of the following processes process towards more disordered state?

I Stretching the rubberll. Sublimation of dry ice III

Crystallisation of salt from solution
$I V$. Dissolution of sugar from solution
A. $I, I I, I V$
B. $I, I I I$
C. $I I I, I V$
D. II, IV

Answer: B
(D) Watch Video Solution

