| Date Planned : __ / __ / __ | Daily Tutorial Sheet-2 | Expected Duration : 90 Min |
|---|---|---|
| Actual Date of Attempt : __ / __ / __ | JEE Main (Archive) | Exact Duration :_____ |

**16.** The process with negative entropy change is : **(2019)**

**(A)** Synthesis of ammonia from $N_2$ and $H_2$

**(B)** Dissociation of $CaSO_4(s)$ to $CaO(s)$ and $SO_3(g)$

**(C)** Subimation of dry ice

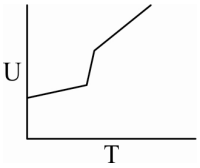
**(D)** Dissolution of iodine in water

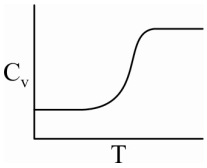
**17.** Two blocks of the same metal having same mass and at temperature $T_1$ and $T_2$, respectively, are brought in contact with each other and allowed to attain thermal equilibrium at constant pressure. The change in entropy, $\Delta S$, for this process is : **(2019)**

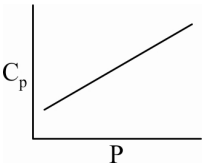
**(A)** $2C_P \ln\left[\frac{T_1+T_2}{2T_1T_2}\right]$ **(B)** $2C_P \ln\left[\frac{T_1+T_2}{4T_1T_2}\right]$

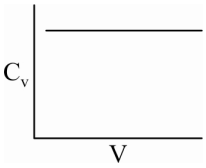
**(C)** $2C_P \ln\left[\frac{(T_1+T_2)^{1/2}}{T_1T_2}\right]$ **(D)** $C_P \ln\left[\frac{(T_1+T_2)^2}{4T_1T_2}\right]$

**18.** For a diatomic ideal gas in a closed system, which of the following plots does not correctly describe the relation between various thermodynamics quantities ? **(2019)**

**(A)** 


**(B)** 


**(C)** 


**(D)** 


**19.** A process has $\Delta H = 200\ J\ mol^{-1}$ and $\Delta S = 40 JK^{-1}\ mol^{-1}$. Out of the values given below, choose the minimum temperature above which the process will be spontaneous : **(2019)**

**(A)** 5 K **(B)** 12 K **(C)** 4 K **(D)** 20 K

**20.** The standard reaction Gibbs energy for a chemical reaction at an absolute temperature T is given by $\Delta_r G^\circ = A - BT$ Where A and B are non-zero constants. Which of the following is True about this reaction? **(2019)**

**(A)** Exothermic if $B < 0$ **(B)** Exothermic if $A > 0$ and $B < 0$

**(C)** Endothermic if $A < 0$ and $B > 0$ **(D)** Endothermic if $A > 0$

**21.** The reaction, $MgO(s) + C(s) \rightarrow Mg(s) + CO(g)$, for which $\Delta_r H^0 = +491.1\ kJ\ mol^{-1}$ and $\Delta_r S^0 = 198.0\ J\ K^{-1}\ mol^{-1}$, is not feasible at 298 K. Temperature above which reaction will be feasible is : **(2019)**

**(A)** 2480.3 K **(B)** 1890.0 K **(C)** 2380.5 K **(D)** 2040.5 K

**22.** A process will be spontaneous at all temperatures if : **(2019)**

**(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 $\Delta S > 0$

**23.** Among the following, the set of parameters that represents path functions, is : **(2019)**

**I.** $q + w$ **II.** q **III.** w **IV.** $H - TS$

**(A)** II, III and IV **(B)** I, II and III **(C)** II and III **(D)** I and IV

**24.** Maltose on treatment with dilute HCl gives : **(2019)**

**(A)** D-Galactose **(B)** D-Fructose

**(C)** D-Glucose and D-Fructose **(D)** D-Glucose

**25.** For silver, $C_p(JK^{-1}mol^{-1}) = 23 + 0.01T$. If the temperature (T) of 3 moles of silver is raised from 300 K to 1000 K at 1 atm pressure, the value of $\Delta H$ will be close to : **(2019)**

**(A)** 21 kJ **(B)** 13 kJ **(C)** 16 kJ **(D)** 62 kJ

**26.** Which one of the following equations does not correctly represent the first law of thermodynamics for the given processes involving an ideal gas ? (Assume non-expansion work is zero) **(2019)**

**(A)** Cyclic process : $q = -w$ **(B)** Adiabatic process : $\Delta U = -w$

**(C)** Isochoric process : $\Delta U = q$ **(D)** Isothermal process : $q = -w$

**27.** During compression of a spring the work done is 10 kJ and 2 kJ escaped to the surroundings as heat. The change in internal energy, $\Delta U$ (in kJ) is : **(2019)**

**(A)** 8 **(B)** $-12$ **(C)** 12 **(D)** $-8$

**28.** 5 moles of an ideal gas at 100 K are allowed to undergo reversible compression till its temperature becomes 200 K. If $C_V = 28JK^{-1}\,mol^{-1}$, calculate $\Delta U$ and $\Delta pV$ for this process. ($R = 8.0\,JK^{-1}\,mol^{-1}$)

**(A)** $\Delta U = 14\,kJ;\ \Delta(pV) = 4\,kJ$ **(B)** $\Delta U = 14\,J;\ \Delta(pV) = 0.8\,J$ **(2019)**

**(C)** $\Delta U = 14\,kJ;\ \Delta(pV) = 18\,kJ$ **(D)** $\Delta U = 28\,kJ;\ \Delta(pV) = 0.8kJ$

**29.** At constant volume, 4 mol of an ideal gas when heated from 300 K to 500 K changes its internal energy by 5000 J. The molar heat capacity at constant volume is _____. **(2020)**

**30.** The true statement amongst the following is : **(2020)**

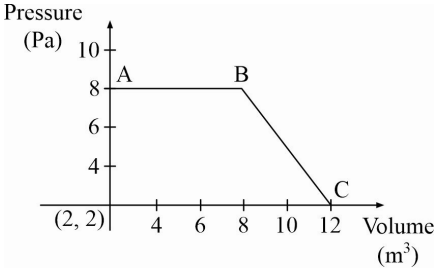
**(A)** S is a function of temperature but $\Delta S$ is not a function of temperature

**(B)** S is not a function of temperature but $\Delta S$ is a function of temperature

**(C)** Both S and $\Delta S$ are not functions of temperature

**(D)** Both $\Delta S$ and S are functions of temperature

**31.** The magnitude of work done by a gas that undergoes a reversible expansion along the path ABC shown in the figure is _____. **(2020)**




**32.** For reaction; $A(\ell) \longrightarrow 2B(g)$

$\Delta U = 2.1\,kcal$, $\Delta S = 20\,cal\,K^{-1}$ at $300\,K$. Hence $\Delta G$ in kcal is_____. **(2020)**