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TARGET : NEET (UG) 2024

Course : SARANSH (Youtube Live CRASH COURSE)

CHEMISTRY
DPP
DAILY PRACTICE PROBLEMS
DPP NO. 1

CHEMISTRY: Thermodynamics

DPP No. : 1

1. One mole of an ideal gas at 300 K is expanded isothermally from an initial volume of 1 litre to 10 litres. The ΔE for this process is (R = 2 cal. mol^{-1})

(1) 163. 7 cal
(2) zero
(3) 1381.1 cal
(4) 9 lit. atm

2. During isothermal expansinon of an ideal gas, its

(1) internal energy increases
(2) enthalpy decreases
(3) enthalpy remains unaffected
(4) enthalpy reduces to zero

3. Under isothermal condition, a gas at 300 K expands front 0.1 L to 0.25 L against a constant external pressure of 2 bar. The work done by the gas is [Given that 1 L bar = 100 J]

(1) –30 J
(2) 5 kJ
(3) 25 J
(4) 30 J

4. An ideal gas expands isothermally from 10^{-3} m^3 to 10^{-2} m^3 at 300 K against a constant pressure of 10^5 Nm^{-2}. The work done on the gas is :

(1) + 270 kJ
(2) –900 J
(3) + 900 kJ
(4) –900 kJ

5. A gas is allowed to expand in a well insulated container against a constant external pressure of 2.5 atm from an initial volume of 2.50 L to a final volume of 4.50 L. The change in internal energy ΔU of the gas in joules will be:

(1) 1136.25 J
(2) –500 J
(3) –505 J
(4) +505 J

6. Adiabatic expansions of an ideal gas is accompanied by

(1) decrease in ΔE
(2) increase in temperature
(3) decrease in ΔS
(4) non change in any one of the above properties

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7. The correct option for free expansion of an ideal gas under adiabatic condition is:

(1) $q = 0$, $\Delta T < 0$ and $w > 0$ (2) $q < 0$, $\Delta T = 0$ and $w = 0$

(3) $q > 0$, $\Delta T > 0$ and $w > 0$ (4) $q = 0$, $\Delta T = 0$ and $w = 0$

8. Three moles of an ideal gas expanded spontaneously into vaccum. The work done will be :

(1) Zero   (2) infinite

(3) 3 Joules   (4) 9 Joules

9. Considering entropy (s) as a thermodynamic parameter, the criterion for the spontaneity of any process is

(1) $\Delta S_{system} + \Delta S_{surroundings}, > 0$ (2) $\Delta S_{system} - \Delta S_{surroundings}, > 0$

(3) $\Delta S_{system} > 0$ only   (4) $\Delta S_{surroundings} > 0$ only

10. For irreversible expansion of an ideal gas under isothermal condition, the correct option is :

(1) $\Delta U \neq 0$, $\Delta S_{total} = 0$ (2) $\Delta U = 0$, $\Delta S_{total} = 0$

(3) $\Delta U \neq 0$, $\Delta S_{total} \neq 0$ (4) $\Delta U = 0$, $\Delta S_{total} \neq 0$

11. A chemical reaction will be spontaneous if it is accompainded by a decreae of

(1) entropy of the system   (2) enthalpy of the system

(3) internal energy of the system   (4) free energy of the system

12. Identify the correcrt statement for change of Gibbs energy for a system (ΔG_{system}) at constant temperature and pressure :

(1) If $\Delta G_{system} = 0$, the system has attained equilirbium

(2) If $\Delta G_{system} = 0$, the system is still moving in a particular direction

(3) If $\Delta G_{system} < 0$, the process is not spontaneous

(4) If $\Delta G_{system} > 0$, the process is not spontaneous

13. For the reaction, $2Cl(g) \longrightarrow Cl_2(g)$, the correct option is :

(1) $\Delta_r H > 0$ and $\Delta_r S < 0$ (2) $\Delta_r H < 0$ and $\Delta_r S > 0$

(3) $\Delta_r H < 0$ and $\Delta_r S < 0$ (4) $\Delta_r H > 0$ and $\Delta_r S > 0$

14. In which case change in entropy is negative ?

(1) Evaporation of water

(2) Expansion of a gas at constant temperature

(3) Sublimation of solid to gas

(4) $2H(g) \rightarrow H_2(g)$

15. For the gas phase reaction,

$PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$

which of the following conditions are correct?

(1) $\Delta H = 0$ and $\Delta S < 0$ (2) $\Delta H > 0$ and $\Delta S > 0$

(3) $\Delta H > 0$ and $\Delta S < 0$ (4) $\Delta H > 0$ and $\Delta S < 0$

16. The correct thermodynamics conditions for the spontaneous reaction at all temperatures is

    (1) $\Delta H > 0$ and $\Delta S > 0$ (2) $\Delta H > 0$ and $\Delta S < 0$

    (3) $\Delta H < 0$ and $\Delta S > 0$ (4) $\Delta H < 0$ and $\Delta S < 0$

17. Which amongst the following options is the correct relation between change in enthalpy and change in internal energy?

    (1) $\Delta H = \Delta U + \Delta n_g RT$ (2) $\Delta H - \Delta U = -\Delta n RT$

    (3) $\Delta H + \Delta U = \Delta n R$ (4) $\Delta H = \Delta U - \Delta n_g RT$

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

    (1) $C(s) + 2H_2O(g) \rightarrow 2H_2(g) + CO_2(g)$

    (2) $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$

    (3) $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$

    (4) $H_2(g) + Br_2(g) \rightarrow 2HBr(g)$

19. For the reaction

    $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(l)$

    at constant temperature, $\Delta H - \Delta E$ is

    (1) $-RT$ (2) $+RT$

    (3) $-3RT$ (4) $+3RT$

20. For the reaction

    $N_2 + 3H_2 \rightarrow 2NH_3$, $\Delta H = ?$

    (1) $\Delta E + 2RT$ (2) $\Delta E - 2RT$

    (3) $\Delta H = RT$ (4) $\Delta E - RT$

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