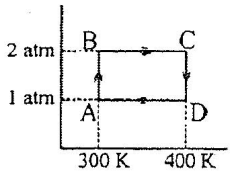
Daily Problem Practice-I (CHEMICAL-THERMODYNAMICS)

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



(a) –100 Rln4 (b) +100 Rln4 (c) +200 Rln4 (d) –200 Rln4

2. Which of the following is true for an ideal gas-

(a) $\left(\frac{\partial H}{\partial P}\right)_T = 0$ (b) $\left(\frac{\partial H}{\partial V}\right)_T = 0$ (c) Both (A) & (B) (d) $\left(\frac{\partial U}{\partial V}\right)_T > 0$

3. Calculate the work done when 1 mol of an ideal gas is compressed reversibly from 1.00 bar to 5.00 bar at a constant temperature of 300 K.
(a) –14.01 kJ (b) +18.02 kJ (c) +4.01 kJ (d) –8.02 kJ

4. Calculate the work done when 1 mol of an ideal gas is expanded reversibly from 20.0 dm^3 to 40.0 dm^3 at a constant temperature of 300 K.
(a) 7.78 kJ (b) –1.73 kJ (c) 11.73 kJ (d) –4.78 kJ

5. If the internal energy of an ideal gas decreases by the same amount as the work done by the system, the process is
(a) Cyclic (b) isothermal (c) adiabatic (d) isolated

6. ΔH and ΔE for the reaction,
$Fe_2O_3(s) + 3H_2(g) \rightarrow 2Fe(s) + H_2O\ (l)$ at constant temperature are related as
(A) ΔH = ΔE (b) ΔH = ΔE + RT (c) ΔH = ΔE + 3RT (d) ΔH = ΔE – 3RT

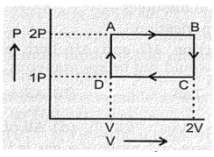
7. Energy equivalent to one erg, one joule, one calorie are in order:
(a) 1 erg > 1 J > Cal (b) 1 erg > 1 Cal > 1 J (c) 1 Cal > 1 J > 1 erg (d) 1 J > 1 Cal > 1 erg

8. One mole of a gas in the state A (P_1, V_1, T_1) is subjected to adiabatic expansion to attain state B(P_2, V_2, T_2). The work done by the gas is :

(a) $\frac{R(T_1 - T_2)}{\gamma - 1}$ (b) $\frac{nR(T_2 - T_1)}{\gamma - 1}$ (c) $\frac{R(T_2 - T_1)}{1 - \gamma}$ (d) $\frac{P_2V_2 - P_1V_1}{1 - \gamma}$

9. Starting with the same initial conditions, one mole of an ideal monoatomic gas expands reversibly from volume V_1 to V_2 in three different ways. The work done by gas is w_1 if the process is purely isothermal, w_2 it purely isobaric and w_3 if purely adiabatic, then:
(a) $w_2 > w_1 > w_3$ (b) $w_2 > w_3 > w_1$ (c) $w_1 > w_2 > w_3$ (d) $w_1 > w_3 > w_2$

10. An ideal mono-atomic gas follows the path ABCDA as shown in figure. The work done during the cycle is:



(a) –PV (b) –2PV (c) –1/2PV (d) Zero

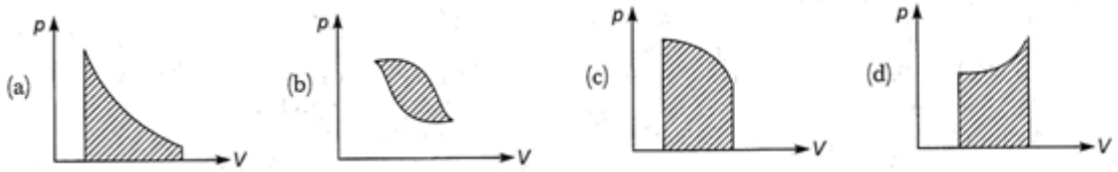
11. Temperature of 1 mole of a ideal gas is increased by 1°C at constant pressure. The work done is equal to:
(a) R (b) 2R (c) R/2 (d) 3R

12. The quantity remaining constant in the isothermal expansion of an ideal gas is
(a) Heat (b) internal energy (c) pressure (d) temperature and pressure

13. The work done W during an isothermal process in which the gas expands from an initial volume V_1 to a final volume V_2 is given by (R = Gas constant, T = Temperature)

(A) $R(V_2 - V_1)\log_e\left(\frac{T_1}{T_2}\right)$ (B) $R(V_2 - V_1)\log_e\left(\frac{V_2}{V_1}\right)$ (C) $RT\log_e\left(\frac{V_2}{V_1}\right)$ (D) $RT\log_e\left(\frac{V_1}{V_2}\right)$

14. The work done by the gas in adiabatic expansion is represented in the diagram



15. for an ideal gas, the value of $\left(\frac{dU}{dV}\right)_T$ is:

(a) Positive (b) zero (c) negative (d) interchangeable

16. For a cyclic process, the condition is:

(a) $\Delta U = 0$ (b) $\Delta H = 0$ (c) $\Delta U > 0$ and $\Delta H > 0$ (d) both $\Delta U = 0$ and $\Delta H = 0$

17. The value of μ_{JT} is:

(a) $\left(\frac{\partial H}{\partial P}\right)dP_T$ (b) $-\frac{1}{C_p}\left(\frac{\partial H}{\partial P}\right)_T$ (c) $\left(\frac{\partial (PV)}{\partial P}\right)_T$ (d) $T\left(\frac{\partial V}{\partial T}\right)_p - V$

18. In an adiabatic process which of the following is true:

(a) q = +W (b) q = 0 (c) $\Delta E = q$ (d) $P\Delta V = 0$

19. Which of the following is not correct?

(a) $\mu_{JT} = \left(\frac{\partial T}{\partial P}\right)_H$ (b) $\mu_{JT} = \frac{-1}{C_P}\left(\frac{\partial H}{\partial P}\right)_T$ (c) $\left(\frac{\partial T}{\partial P}\right)_H = \frac{1}{C_P}\left(\frac{2a}{RT} - b\right)$ (d) $\mu_{JT} = \left(\frac{\partial P}{\partial H}\right)_T$

20. Which of the following statements is correct for the reaction, $CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g)$ at constant temperature and pressure?

(a) $\Delta H = \Delta U$ (b) $\Delta H < \Delta U$ (c) $\Delta H > \Delta U$ (d) None of these

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Answer Key

Q.No.	ANSWER	Q.No.	ANSWER	Q.No.	ANSWER	Q.No.	ANSWER
1.		6.		11.		16.	
2.		7.		12.		17.	
3.		8.		13.		18.	
4.		9.		14.		19.	
5.		10.		15.		20.	