DPP-6 [Adiabatic Process]

Marks nahin, mehnat count hoti hai—start now.

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1. **When a gas undergoes adiabatic expansion, it gets cooled. This is because**

(1) It is an exothermic process
(2) It is an endothermic process
(3) Internal energy of the system decreases
(4) Ideal gas becomes a real gas

2. **Which of the following is correct expression for 1st law of thermodynamics under adiabatic condition?**

(1) $\Delta U = Q + W$
(2) $\Delta U = Q - W$
(3) $Q = -W$
(4) $\Delta U = W$

3. **In which of the following process work is independent of path:**

(1) Isothermal
(1) Isochoric
(1) Adiabatic
(1) Isobaric

4. **When a gas is compressed adiabatically and reversibly, the final temperature is**

(1) Higher than the initial temperature
(2) Lower than the initial temperature
(3) The same as initial temperature
(4) Dependent upon the rate of compression

5. **The temperature of an ideal gas increases in an-**

(1) Adiabatic compression
(2) Adiabatic expansion
(3) Isothermal expansion
(4) Isothermal compression

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

(1) $q = 0,\ \Delta T = 0,\ w = 0$
(2) $q \neq 0,\ \Delta T = 0,\ w = 0$
(3) $q = 0,\ \Delta T \neq 0,\ w = 0$
(4) $q = 0,\ \Delta T < 0,\ w \neq 0$

7. **For adiabatic process which is correct-**

(1) $\Delta T = 0$
(2) $w = 0$
(3) $q = 0$
(4) $\Delta U = 0$

8. **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) –500 J
(2) –505 J
(3) +505 J
(4) 1136.25 J

9. **During adiabatic expansion of an ideal gas in vacuum:**

(1) $q = 0$ and $\Delta U \neq 0$
(2) $q \neq 0$ and $\Delta U \neq 0$
(3) $q \neq 0$ and $\Delta U = 0$
(4) $q = 0$ and $\Delta U = 0$

10. **A sample of 3 mol of an ideal gas at 200K and 2 atm is compressed reversibly and adiabatically until the temperature reaches 250K. Given that molar heat capacity is 27.5 J K^{-1} mol^{-1} at constant volume, calculate w.**

(1) 4125J
(2) 4125KJ
(3) 4.125J
(4) 41.25J

11. **One mole of an ideal gas $C_{v,m} = \frac{5}{2}R$ at 300 K and 5 atm is expanded adiabatically to a final pressure of 2 atm against a constant pressure of 2 atm. Final temperature of the gas is:**

(A) 270 K
(B) 273 K
(C) 248.5 K
(D) 200 K

12. **Two moles of an ideal gas ($C_v = \frac{5}{2}R$) was compressed adiabatically against constant pressure of 2 atm, which was initially at 350 K and 1 atm pressure. The work involve in the process is equal to:**

(A) 250 R
(B) 300 R
(C) 400 R
(D) 500 R

13. **A gas $C_{v,m} = \frac{5}{2}R$ behaving ideally was allowed to expand reversibly and adiabatically from 1 L to 32 L. Its initial temperature was 327°C. The molar enthalpy change (in J/mol) for the process is:**

(A) –1125 R
(B) –575 R
(C) –1575 R
(D) –75 R

14. **One mole of ideal gas is allowed to expand reversibly and adiabatically from a temperature of 27°C. If the work done by the gas in the process is 3 kJ, the final temperature will be equal to ($C_v = 20$ J $K^{-1}mol^{-1}$)**

(A) 100 K
(B) 450 K
(C) 150 K
(D) 400 K

15. **1 mole of NH_3 gas at 27°C is expanded in reversible adiabatic condition to make volume 8 times ($\gamma = 1.33$). Final temperature and work done respectively are:**

(A) 150 K, 900 cal
(B) 150 K, 400 cal
(C) 250 K, 1000 cal
(D) 200 K, 800 cal