FLOT

1. What is the difference between change in enthalpy and change in internal energy at constant volume :

(A) 0 (B) VdP (C) –VdP (D) PdV

2. The work done in an adiabatic process on an ideal gas by a constant external pressure would be :

(A) Zero (B) ΔE (C) ΔH (D) q

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

(A) $q = 0, \Delta T \neq 0, w = 0$ (B) $q \neq 0, \Delta T = 0, w = 0$

(C) $q = 0, \Delta T = 0, w = 0$ (D) $q = 0, \Delta T < 0, w \neq 0$

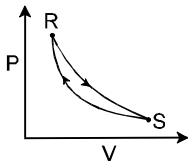
4. Consider the cyclic process $R \rightarrow S \rightarrow R$ as shown in the fig. You are told that one of the path is adiabatic and the other one isothermal. Which one of the following is(are) true?

(A) Process $R \rightarrow S$ is isothermal

(B) Process $S \rightarrow R$ is adiabatic

(C) Process $R \rightarrow S$ is adiabatic

(D) Such a graph is not possible



5. Calculate the heat needed to raise the temperature of 20 g iron from 25ºC to 500ºC, if specific heat capacity of iron is 0.45 $JK^{-1}g^{-1}$.

(A) 4275 J (B) 225 J (C) 15.66 J (D) 2250 J

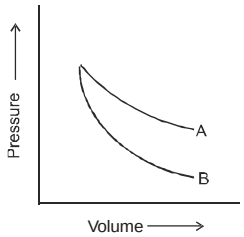
6. The ratio of slopes of P–V plots for reversible adiabatic process and reversible isothermal process of an ideal gas is equal to :

(A) γ (B) $1 - \gamma$ (C) $(\gamma - 1)$ (D) $1/\gamma$

7. For an ideal gas having molar mass M, specific heat at constant pressure can be given as :

(A) $\frac{\gamma RM}{\gamma - 1}$ (B) $\frac{R}{M(\gamma - 1)}$ (C) $\frac{RM}{\gamma - 1}$ (D) $\frac{\gamma R}{M(\gamma - 1)}$

8. P–V plots for two gases during an adiabatic process are given in the figure :



Plot A and plot B should correspond to : (Assume ideal behaviour)

(A) He and O_2 (B) SO_2 and Ar (C) O_2 and He (D) Both (B) and (C)

9. An ideal gas with $C_v = 3R$ expands adiabatically into a vacuum thus doubling its volume. The final temperatue is given by :

(A) $T_2 = T_1[2^{-1/3}]$ (B) $T_2 = T_1$ (C) $T_2 = 2T_1$ (D) $T_2 = \frac{T_1}{2}$

10. A monoatomic ideal gas ($C_V = \frac{3}{2} R$) is allowed to expand adiabatically and reversibly from initial volume of 8 L at 300 K to a volume of V_2 at 250 K. V_2 is : (Given $(4.8)^{1/2} = 2.2$)

(A) 10.56 L (B) 17.6 L

(C) 11.52 L (D) Expansion not possible since temperature has decreased

***11.** An ideal gas is expanded from volume V_0 to $4V_0$ by following two ways : (from same initial state)

(a) Ist using reversible isothermal expansion from V_0 to $2V_0$, then using reversible adiabatic expansion from $2V_0$ to $4V_0$.

(b) Ist using reversible adiabatic expansion from V_0 to $2V_0$, then from $2V_0$ to $4V_0$ using reversible isothermal expansion.

Then which of the following options is correct :

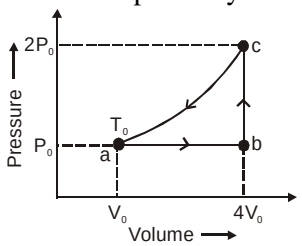
(A) Work done in (a) process > work done in (b) process

(B) Work done in (b) process > work done in (a) process

(C) Work done in (b) process = work done in (a) process

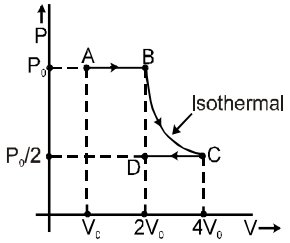
(D) Work done in both processes cannot be compared

12. One mole of an ideal monoatomic gas is caused to go through the cycle shown in figure. Then the change in the internal energy of gas from a to b and b to c is respectively :



(A) $\frac{9P_0V_0}{2}$, 6 RT_0 (B) $\frac{9P_0V_0}{2}$, 10 RT_0 (C) $\frac{15P_0V_0}{2}$, 6 RT_0 (D) $\frac{15P_0V_0}{2}$, 10 RT_0

***13.** q, W, ΔE and ΔH for the following process ABCD on an ideal monoatomic gas are (moles = 2) :



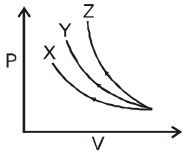
(A) $W = -2P_0V_0 \ln 2$, $q = 2P_0V_0 \ln 2$, $\Delta E = 0$, $\Delta H = 0$

(B) $W = -P_0V_0 \ln 2$, $q = P_0V_0 \ln 2$, $\Delta E = 0$, $\Delta H = 0$

(C) $W = -2P_0V_0 \ln 2$, $q = 0$, $\Delta E = -2P_0V_0 \ln 2$, $\Delta H = \frac{-10}{3} P_0V_0 \ln 2$

(D) $W = -2P_0V_0 (\frac{1}{4} + \ln 2)$, $q = 2P_0V_0 \ln 2$, $\Delta E = \frac{-P_0V_0}{2}$, $\Delta H = \frac{-5P_0V_0}{6}$

***14.** P–V plots for three gases (assuming ideal behaviour and similar condition) for reversible adiabatic compression are given in the figure below :



Plots X, Y and Z should correspond to respectively :

(A) CO_2, Cl_2 and Ne (B) SO_2, N_2O and He

(C) He, N_2 and O_3 (D) NH_3, H_2S and Ar

15. **Assertion :** The increase in internal energy (ΔE) for the vaporisation of one mole of water at 1 atm and 373 K is zero.

Reason : For all isothermal processes on perfect gases, $\Delta E = 0$.

(A) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

(B) Both Assertion and Reason are true but Reason is not correct explanation of Assertion.

(C) Assertion is true but Reason is false.

(D) Assertion is false but Reason is true.

16. When the gas is an ideal one and expansion process is isothermal, then the correct relation is/are :

(A) $P_1V_1 = P_2V_2$ (B) $\Delta E = 0$ (C) $W = 0$ (D) $\Delta H = 0$

17. An ideal gas undergoes adiabatic expansion against constant external pressure. Which of the following are correct :

(A) Internal energy of the gas remains unchanged

(B) Temperature of the system decreases.

(C) $\Delta E + P\Delta V = 0$

(D) Internal energy of the gas decreases.

Answers

RACE # 45

1. (B) **2.** (B) **3.** (C) **4.** (D) **5.** (A) **6.** (A) **7.** (D) **8.** (D) **9.** (B) **10.** (A)
11. (A) **12.** (A) **13.** (A) **14.** (B) **15.** (D) **16.** (ABD) **17.** (BCD)