DPP – 5 (Thermodynamics)

Video Solution on Website:- https://physicsaholics.com/home/courseDetails/60

Video Solution on YouTube:- https://youtu.be/CeDk07-SCXI

Written Solution on Website:- https://physicsaholics.com/note/notesDetalis/78

Q 1. Sixty per cent of given sample of oxygen gas when raised to a high temperature dissociates into atoms. Ratio of its initial heat capacity (at constant volume) to the final heat capacity (at constant volume) will be:

(a) $\frac{8}{7}$ (b) $\frac{25}{26}$

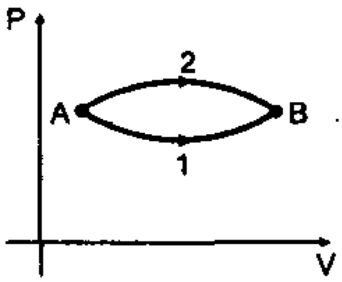
(c) $\frac{10}{7}$ (d) $\frac{25}{27}$

Q 2. P-V diagram of a diatomic gas is a straight line passing through origin. The molar heat capacity of the gas in the process will be:

(a) 4R (b) 2.5R

(c) 3 R (d) $\frac{4R}{3}$

Q 3. The figure shows two paths for the change of state of a gas from A to B. The ratio of molar heat capacities in path 1 and path 2 is:



(a) >1

(b)<1

(c) 1

(d) data insufficient

Q 4. The molar heat capacity in a process of a diatomic gas if it does a work of $\frac{Q}{4}$ when a heat of Q is supplied to it is :

(a) $\frac{2}{5}$R (b) $\frac{5}{2}$R

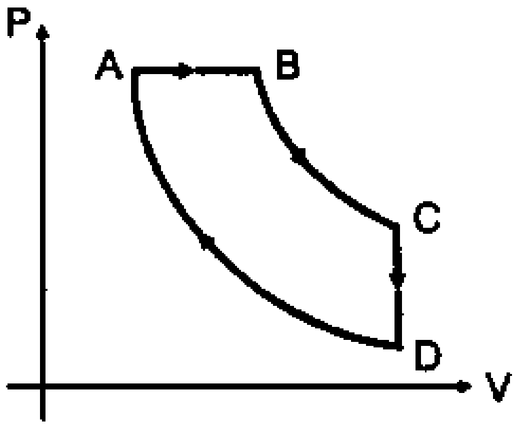
(c) $\frac{10}{3}$R (d) $\frac{6}{7}$R

Q 5. Ideal monoatomic gas is taken through a process dQ = 2dU. The molar heat capacity for the process is: (where dQ is heat supplied and dU is change in internal energy)

(a) 5 R (b) 3 R

(c) R (d) None

Q 6. n moles of a monoatomic gas undergo a cyclic process ABCDA as shown in figure. Process AD is isobaric, BC is adiabatic, CD is isochoric and DA is isothermal. The maximum and minimum temperature in the cycle are $4T_0$ and T_0 respectively. Then:



(a) $T_B > T_C > T_D$
(b) heat is released by the gas in the process CD
(c) heat is supplied to the gas in the process AB
(d) total heat supplied to the gas is $2nRT_0 \ln(2)$

Q 7. At ordinary temperatures, the molecules of an ideal gas have only translational and rotational kinetic energies. At high temperatures they may also have vibrational energy. As a result of this at higher temperatures : (C_V = molar heat capacity at constant volume)
(a) $C_V = 3/2R$ for a monoatomic gas
(b) $C_V > 3/2\ R$ for a monoatomic gas
(c) $C_V < \frac{5}{2}R$ for a diatomic gas
(d) $C_V > \frac{5}{2}R$ for a diatomic gas

Q 8. An ideal gas with adiabatic exponent (γ = 1.5) undergoes a process in which work done by the gas is same as increase in internal energy of the gas. The molar heat capacity of gas for the process is:
(A) C = 4R (B) C = 0
(C) C= 2R (D) C = R

Q 9. A mixture of ideal gasses N_2 and He are taken in the mass ratio of 14 : 1 respectively. Molar heat capacity of the mixture at constant pressure is.
(a) $\frac{19R}{6}$ (B) $\frac{6R}{19}$
(C) $\frac{13R}{6}$ (D) $\frac{6R}{13}$

Q 10. The molar heat capacity for an ideal gas
(a) cannot be negative
(b) must be equal to either C_V or C_p
(c) must lie in the range $C_V \le C \le C_p$
(d) may be zero

Q 11.

STATEMENT–1: The specific heat of a monatomic gas has value between 0 and ∞.

because

STATEMENT–2: $c_P = \frac{5}{2}R$ and $c_V = \frac{3}{2}R$ for a monoatomic gas.

Answer Key

Q.1 c	**Q.2 c**	**Q.3 b**	**Q.4 c**	**Q.5 b**
Q.6 a,b,c	**Q.7 a,d**	**Q.8 a**	**Q.9 a**	**Q.10 d**
Q.11 d				