DPP – 5

Video Solution on Website:- https://physicsaholics.com/home/courseDetails/59

Video Solution on YouTube:- https://youtu.be/9QIuCjSEkH4

Written Solution on Website:- https://physicsaholics.com/note/notesDetalis/33

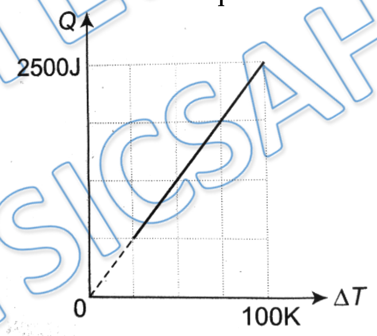
Q 1. Two moles of helium are mixed with n moles of hydrogen. If $\frac{C_p}{C_v} = \frac{3}{2}$ for the mixture, then the value of n is:

(a) 1 (b) 2
(c) 3 (d) 3/2

Q 2. Five moles of helium are mixed with two moles of hydrogen to form a mixture. Take molar mass of helium $M_1 = 4g$ and that of hydrogen $M_2 = 2g$. The equivalent of γ is:

(a) 1.49 (b) 1.63
(c) 1.56 (d) None

Q 3. One mole of a gas mixture is heated under constant pressure, and heat required Q is plotted against temperature difference acquired. Find the value of γ for mixture



(a) $\frac{3}{4}$ (b) $\frac{1}{4}$
(c) $\frac{3}{2}$ (d) $\frac{2}{3}$

Q 4. When 1 mole of monoatomic gas is mixed with 2 moles of diatomic gas, then find C_p, C_v, f and γ for the resulting mixture
(symbols have their usual meaning)

(a) $\frac{19}{6}R, \frac{13}{6}R, \frac{13}{3}, \frac{19}{13}$ (b) $\frac{13}{6}R, \frac{19}{6}R, \frac{19}{3}, \frac{13}{19}$
(c) $\frac{19}{3}R, \frac{13}{3}R, \frac{13}{3}, \frac{19}{13}$ (d) $\frac{19}{6}R, \frac{13}{6}R, \frac{13}{6}, \frac{19}{13}$

Q 5. The molar heat capacity of a gas at constant volume is C_v. If n moles of the gas undergo ΔT change in temperature, its internal energy will change by $nC_v\Delta T$

(a) only if the change of temperature occurs at constant volume
(b) only if the change of temperature occurs at constant pressure

(c) in any process which is not adiabatic
(d) in any process

Q 6. When one mole of monatomic gas is mixed with one mole of a diatomic gas, then the equivalent value of γ for the mixture will be (vibration mode neglected)
(a) 1.33
(b) 1.40
(c) 1.50
(d) 1.60

Q 7. The ratio $\frac{C_p}{C_v} = \gamma$ for a gas. Its molar mass is M. Its specific heat capacity at constant pressure is
(a) $\frac{R}{\gamma-1}$
(b) $\frac{\gamma R}{\gamma-1}$
(c) $\frac{\gamma R}{M(\gamma-1)}$
(d) $\frac{\gamma RM}{\gamma-1}$

Q 8. Each molecule of a gas has f degrees of freedom. The ratio $\frac{C_p}{C_v} = \gamma$ for the gas is
(a) $1 + \frac{f}{2}$
(b) $1 + \frac{1}{f}$
(c) $1 + \frac{2}{f}$
(d) $1 + \frac{(f-1)}{3}$

Q 9. A mixture of n_1 moles of mono atomic gas and n_2 moles of diatomic gas has $\frac{C_p}{C_v} = \gamma = 1.5$
(a) $n_1 = n_2$
(b) $2n_1 = n_2$
(c) $n_1 = 2n_2$
(d) $2n_1 = 3n_2$

Q 10. Find the specific heat capacity c_v (in J/gm-K) for a gaseous mixture consisting of 7.0 g of nitrogen and 20 g of argon. The gases are assumed to be ideal
(a) 0.22
(b) 15.2
(c) 0.42
(d) 23.55

Q 11. One mole of an ideal gas whose adiabatic exponent equals γ undergoes a process $P = P_o + \frac{\alpha}{V}$, where P_o and α are positive constants. Find molar heat capacity of the gas as a function of its volume
(a) $\frac{\gamma R}{\gamma-1} + \frac{\alpha V}{P_o R}$
(b) $\frac{R}{\gamma-1} + \frac{R}{P_o V}$
(c) $\frac{\gamma R}{\gamma-1} + \frac{\alpha R}{P_o V}$
(d) $\frac{(\gamma-1)R}{\gamma} + \frac{VR}{P_o \alpha}$

Answer Key

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