1. Two perfect gases at absolute temperature T_1 and T_2 are mixed. There is no loss of energy. Find the temperature of the mixture if the masses of the molecule are m_1 and m_2 and the no. of molecules in the gases are n_1 and n_2 respectively.
2. One mole of a monatomic gas is mixed with one mole of a diatomic gas. Find the value of ɣ of the mixture
3. Two moles of a gas A at 27^0 C are mixed with 3 moles of a gas B at 37^0C. If both monatomic ideal gases, what will be the temperature of the mixture
4. There is a soap bubble of radius 2.4×10^{-4} m in air cylinder at a pressure of $10^5 N/m^2$. The air in the cylinder is compressed until the radius of the bubble is halved. Calculate the new pressure of air in the cylinder. Surface tension of soap solution is 0.08N m^{-1}
5. Two perfect gases at absolute temperatures T_1 and T_2 are mixed. There is no loss of energy. Find the temperature of the mixture if masses of molecules are m_1 and m_2 and number of moles in the gases are μ_1 and μ_2 respectively
6. A gas has a molar heat capacity C = 37.55 J/mole/K, in the process PT = constant. Find the number of degree of freedom of the molecules of gas.
7. At what temperature will the rms speed of O_2 molecule will be sufficient for escaping from the earth. V_e = 11.2 Km/s, m = 2.76×10^{-26}Kg and $k_B = 1.38\times10^{-23} JK^{-1}$.
8. A nitrogen molecule at the surface of earth happens to have the rms speed for that gas at 0^0C. If it were to go straight up without colliding with other molecules, how high would it rise? Mass of the nitrogen molecule, m = 4.65×10^{-23}Kg, k = 1.38×10^{-23}J $molecule^{-1}K^{-1}$.
9. 8g of O_2, 14g of nitrogen and 22g of carbon dioxide are mixed in an enclosure of volume 10 litres and temperature 27^0C. Calculate the pressure exerted by the mixture; R = 8.3J/mole/K; Molecular weight of O_2; N; and CO_2 are 32, 28, and 44 respectively.
10. A vessel is filled with a gas at a pressure of 76 cm of Hg at a certain temperature. The mass of the gas is increased by 50% by introduced more gas in the vessel at the same temperature. Find out the resultant pressure of the Gas.
11. Two rigid boxes contains different ideal gases are placed on a table. Box A contains one mole of nitrogen at T_0, while box B contains one mole of He at $7/3T_0$. The boxes are then put into thermal contact with each other, and heat flows between them till the gases reach a common final temperature T_f. Ignore the heat capacity of boxes. Then find T_f in terms of T_0
12. One kg of diatomic gas is at a pressure of $8\times10^4 Nm^{-2}$. The density of gas is 4 kgm^{-3}. What is the energy of the gas due to its thermal motion