1. Dry air near sea level has the following composition by volume: N2, 78.02 %; O2, 20.94 %; Ar, 0.93%; and CO2, 0.05 %. The atmospheric pressure is 1.00 atm. Calculate the partial pressure of each gas in atm. PN2 = ? atm PO2=? atm PAr= ?atm PCO2= ?atm

Solution:

We have:

$$P = 1\ atm;\quad k_{N_2} = 78.02\%;\quad k_{O_2} = 78.02\%;\quad k_{Ar} = 78.02\%;\quad k_{CO_2} = 78.02\%$$

Lets suppose, that we have ideal gases. So, according to Dalton's Law:

$$P = P_{N_2} + P_{O_2} + P_{Ar} + P_{CO_2} \quad (1)$$

Obviously,

$$k_i = \frac{P_i}{P} \quad (2)$$

where P_i is the pressure of certain gas, k_i - coefficient (proportion) of certain gas. Hence,

$$P_i = k_i \cdot P \quad (3)$$

For our gases, we have (Answer):

$$P_{N_2} = 0{,}7802 \cdot 1\ atm = 0{,}7802\ atm;\ P_{O_2} = 0{,}2094 \cdot 1\ atm = 0{,}2094\ atm$$
$$P_{Ar} = 0{,}0093 \cdot 1\ atm = 0{,}0093\ atm;\ P_{CO_2} = 0{,}0005 \cdot 1\ atm = 0{,}0005\ atm$$