Answer on Question #77334, Chemistry / General Chemistry

A gas cylinder has v=0.04m³ contains helium .Its temprature is 230°c ,the pressure is 20atm.Find mass of xenon,if the mole fraction of hydrogen is 0.90

Solution

Note: there should be two gases in this task: helium and one more. It seems like mole fraction of helium (not hydrogen) is given.

V=0.04 m^3

T= 230^{0}C =230+273.15 = 503.15 K

P= 20 atm = 20·101325=2026500 Pa

χ(He) =0.90

Constants:

R = 8.314 m^{3}Pa mol^{-1}K^{-1}

m(Xe) - ?

We should use formula of Ideal Gas Law to find total amount of chemical substance of two gases:

PV=n$_{total}$RT

2026500 Pa·0.04 m^3 =n$_{total}$· 8.314 m^{3}Pa mol^{-1}K^{-1}·503.15 K

n$_{total}$= 19.38 mol

As $\chi_i = \frac{n_i}{n_{total}}$ then $n_i = \chi_i \times n_{total}$, and χ(Xe)= 1-χ(He), find n(Xe):

n(Xe)=χ(Xe)·n$_{total}$ =(1-χ(He))·n$_{total}$ =(1-0.9)·19.38= 1.938 (mol).

Fnd mass of xenon:

m= M·n,

as Ar(Xe)= 131 and Ar(Xe)=M(Xe) ,we have:

m(Xe) = 131·1.938 =253.9 (g)

Answer: 253.9 g