Question: What is the partial pressure of Ne in a mixture at a total pressure of 0.95 atm that contains 0.32 mol of He and 0.56 mol of Ne?

Concepts: To answer this question we need to understand the properties of gas mixtures with regards to partial pressure and mixture composition.

Connections:

What is given? We are given the total pressure of a mixture of gases and the amounts of each gas in the mixture.

What do I want to know? We want to know the partial pressure of neon in the mixture. Partial pressure is the pressure that one gas component of a mixture (in this case neon) would have it were the only gas present. We could calculate this using the ideal gas law, however we do not know the volume or temperature.

We could calculate the volume using the information given and then work through multiple steps, but it is more direct to remember that there is a relationship utilizing mole fraction! This is illustrated in equation:

$P_1/P_t = n_1/n_t = X_1$

Remember that mole fraction is the fractional amount of one gas in a mixture:

n_i/n_{tot}

Be sure you understand everything above before moving on to the solution below.

Solution:

We know the number of moles of each gas present in the mixture:

0.32 mol of He and 0.56 mol of Ne

We can therefore say that there are a total of 0.32 + 0.56 = 0.88 moles of gas

Since we are interested in neon we utilize equation:

$P_1/P_t = n_1/n_t$

We were given the total pressure in the problem:

$P_{Ne} = (n_{Ne}/n_t)P_t$

$P_{Ne} = (0.56/0.88)(0.95) = 0.60$ atm