

Answer on Question 84125 in General Chemistry

$$.n(\text{He}) = 4 \text{ moles}$$

$$.n(\text{H}_2) = 2 \text{ moles}$$

$$.n(\text{CO}_2) = 3 \text{ moles}$$

$$.n(\text{Ar}) = 5 \text{ moles}$$

$$.p(\text{total}) = 29000 \text{ mm}$$

$$.\phi(\text{gas}) = ?$$

$$.\phi(\text{gas \%}) = ?$$

$$.p(\text{gas}) = ?$$

Determine the mole fraction of each gas

$$.\phi(\text{He}) = \frac{n(\text{He})}{n(\text{He}) + n(\text{H}_2) + n(\text{CO}_2) + n(\text{Ar})} = \frac{4}{4+2+3+5} = 0.29$$

$$.\phi(\text{He \%}) = 0.29 \times 100 \% = 29 \%$$

$$.\phi(\text{H}_2) = \frac{n(\text{H}_2)}{n(\text{He}) + n(\text{H}_2) + n(\text{CO}_2) + n(\text{Ar})} = \frac{2}{4+2+3+5} = 0.14$$

$$.\phi(\text{H}_2 \%) = 0.14 \times 100 = 14 \%$$

$$.\phi(\text{CO}_2) = \frac{n(\text{CO}_2)}{n(\text{He}) + n(\text{H}_2) + n(\text{CO}_2) + n(\text{Ar})} = \frac{3}{4+2+3+5} = 0.21$$

$$.\phi(\text{CO}_2 \%) = 0.21 \times 100 \% = 21 \%$$

$$.\phi(\text{Ar}) = \frac{n(\text{Ar})}{n(\text{He}) + n(\text{H}_2) + n(\text{CO}_2) + n(\text{Ar})} = \frac{5}{4+2+3+5} = 0.36$$

$$.\phi(\text{Ar \%}) = 0.36 \times 100 \% = 36 \%$$

Determine the partial pressure of each gas in the mixture.

$$.p(\text{He}) = p(\text{total}) \times \phi(\text{He}) = 29000 \times 0.29 = 8410 \text{ mm}$$

$$.p(\text{H}_2) = p(\text{total}) \times \phi(\text{H}_2) = 29000 \times 0.14 = 4060 \text{ mm}$$

$$.p(\text{CO}_2) = p(\text{total}) \times \phi(\text{CO}_2) = 29000 \times 0.21 = 6090 \text{ mm}$$

$$.p(\text{Ar}) = p(\text{total}) \times \phi(\text{Ar}) = 29000 \times 0.36 = 10440 \text{ mm}$$

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