Air contains nitrogen at 599 mm Hg, oxygen at 154 mm Hg, argon at 6 mm Hg, and carbon dioxide gas. Assuming standard pressure, what is the partial pressure of carbon dioxide gas?

Solution:

According to Dalton's law for partial gases, total pressure of a mixture of non-reacting gases is equal to sum of their partial pressures:

$P_{air} = p_{nitrogen} + p_{oxygen} + p_{argon} + p_{carbon\ dioxide}$;

(where P – total pressure, p – partial pressure of gas).

Then, we can express pressure of carbon dioxide from equation above:

$p_{carbon\ dioxide} = P_{air} - (p_{nitrogen} + p_{oxygen} + p_{argon})$;

Standard atmospheric pressure is equal to 760 mmHg, so:

$p_{carbon\ dioxide} = 760\ mmHg - (599\ mmHg + 154\ mmHg + 6\ mmHg) = 1\ mmHg$;

Answer:

The partial pressure of carbon dioxide is equal to 1 mmHg.