

## Answer on Question # 60514 - Chemistry - Physical Chemistry

A gas mixture contains oxygen and nitrogen in the ratio of 1:4 by weight. The ratio of their number of molecules is?

### Solution

Let us assume we have 1000 g of the mixture. As the ratio  $m(\text{O}_2):m(\text{N}_2)=1:4$  and  $m(\text{O}_2)+m(\text{N}_2)=1000$ , the mass of oxygen is  $m(\text{O}_2)=200$  g and  $m(\text{N}_2)=800$  g. The amount of substance ( $n$ ) is related to a mass ( $m$ ) by a formula

$$n=m/M,$$

where  $M$  is the molar mass  $M(\text{O}_2)=32$  g/mol,  $M(\text{N}_2)= 28$  g/mol.

The number of molecules ( $N$ ) is proportional to the amount of substance ( $n$ ), therefore,

$$N(\text{O}_2):N(\text{N}_2) = n(\text{O}_2):n(\text{N}_2) = (200/32):(800/28) = 0.219.$$

**Answer: 0.219.**