Answer on Question #68929, Physics / Other

A compound of 10ml of nitrogen and oxygen mixtured with 30ml H_2 and get $H_2O(l)$ and nitrogen gas. if both reactants react properly then what is the molecular formula of compound?

Solution:

Gases occupying a volume at the same temperature and pressure have the same number of molecules. Hence, we can directly take out the ratio of moles that reacted:

Gas volume Ratio of the nitrogen oxide and H_2 is 10:30 or simplified, 1:3.

Hence, the mole ratio of the nitrogen oxide and H_2 is 1:3.

Assuming the reactants and products are in gas phase at RTP:

$$N_xO_y + 3H_2 \rightarrow yH_2O + \frac{x}{2}N_2$$

From equation for hydrogen

$$3{\times}2 = y{\times}2$$

Thus,

$$y = 3$$

For nitrogen

$$x = \frac{x}{2}2$$

$$x = x$$

Thus, x can be any even number.

$$x = 2$$

Answer: Dinitrogen trioxide N_2O_3