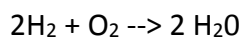


Question #76820 - Chemistry - General Chemistry

If you start with 5 moles of H_2 and react it with 2 moles of O_2 , in a closed container, what best describes the contents of the container after a complete reaction?



Solution

As is clear from the chemical equation, the molar ratio $\text{H}_2/\text{O}_2 = 2/1$.

$$n(\text{H}_2)/n(\text{O}_2) = 5/2 = 2.5$$

H_2 was taken in excess and some part of it remains unreacted. O_2 is limiting reactant, it reacts completely and 0 moles of O_2 remains unreacted.

Number of moles of H_2O produced may be calculated from the proportion:

$$1 \text{ mol } (\text{O}_2) - 2 \text{ mol } (\text{H}_2\text{O}) \text{ (according to the chemical equation)}$$

$$2 \text{ mol } (\text{O}_2) - X \text{ mol } (\text{H}_2\text{O})$$

$$X = 2 \cdot 2 / 1 = 4 \text{ mol of } \text{H}_2\text{O} \text{ are produced.}$$

Number of moles of H_2 reacted:

$$1 \text{ mol } (\text{O}_2) - 2 \text{ mol } (\text{H}_2) \text{ (according to the chemical equation)}$$

$$2 \text{ mol } (\text{O}_2) - Y \text{ mol } (\text{H}_2)$$

$$Y = 2 \cdot 2 / 1 = 4 \text{ mol}$$

Number of moles of H_2 remained:

$$5 - 4 = 1 \text{ mol of } \text{H}_2 \text{ remains}$$

Answer

After a complete reaction will be 4 mol of H_2O and 1 mol of H_2 in a closed container.