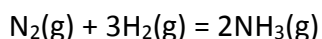


### Answer on Question #40491, Chemistry, Other

#### **Task:**

Nitrogen and hydrogen combine at high temperature, in the presence of a catalyst, to produce ammonia.



Assume 4 molecules of nitrogen and 9 molecules of hydrogen are present.

- 1) After complete reaction, how many molecules of ammonia are produced?
- 2) How many molecules of  $\text{H}_2$  remain?
- 3) How many molecules of  $\text{N}_2$  remain?
- 4) What is the limiting reactant?

#### **Answer:**

The ratio between nitrogen and hydrogen is 4/9, while the stoichiometric ratio is 1/3. Hence nitrogen is in excess, while hydrogen is the limiting reactant. Make the calculations:

$$n(\text{N}_2)_{\text{reacted}} = 1/3 * n(\text{H}_2) = 3 \text{ molecules}$$

$$n(\text{NH}_3)_{\text{produced}} = 2/3 * n(\text{H}_2) = 6 \text{ molecules}$$

The number of unreacted molecules of  $\text{N}_2$  is  $4 - 3 = 1$  molecule.

Hydrogen is the limiting reactant, so no hydrogen molecules remain unreacted.

- 1) 6 molecules
- 2) 0 molecules
- 3) 1 molecule
- 4) Hydrogen is the limiting reactant.