The reaction of hydrogen gas and nitrogen gas to form ammonia is given by the chemical equation:

$$N2(g) + 3H2(g) \rightarrow 2\ NH3(g)$$

How many molecules of ammonia can be formed from the reaction of 2.0 molecules of nitrogen gas and 6.0 molecules of hydrogen gas?

Solution.

The chemical equation gives that one(1.0) molecule of nitrogen gas react with three(3.0) molecules of hydrogen gas.

So, for two (2.0) molecules of nitrogen gas we need take $2.0 \cdot 3 = 6.0$ molecules of hydrogen gas.

$$1 \text{ molecule}(N_2) - \ 3 \text{ molecule}(H_2)$$

$$2 \text{ molecule}(N_2) - \ x \text{ molecule}(H_2)$$

$$x = \frac{2 \cdot 3}{1} = 6 \text{ molecule}(H_2)\ ;$$

It means, that 2.0 molecules of nitrogen gas react with 6.0 molecules of hydrogen gas completely.

The chemical equation gives that one (1.0) molecule of nitrogen gas to form 2.0 molecules of ammonia. Find how many molecules of ammonia can be formed from the reaction of 2.0 molecules of nitrogen gas.

$$1 \text{ molecule}(N_2) - \ 2 \text{ molecule}(NH_3)$$

$$2 \text{ molecule}(N_2) - \ y \text{ molecule}(NH_3)$$

$$y = \frac{2 \cdot 2}{1} = 4 \text{ molecules } (NH_3)\ ;$$

Answer: $4 \text{ molecules } (NH_3)$.