Answer on Question#39097 - Chemisry - Inorganic Chemistry

Question
How many grams of H_2 are needed to produce 10.71 g of NH_3?

Solution:
NH_3 can be produced by the reaction:

$$3H_2(g) + N_2(g) = 2NH_3(g)$$

Molar mass of H_2 equals:

$$M(H_2) = 2M(H) = 2 \cdot 1 = 2\frac{g}{mole}$$

Mass of 3 moles of hydrogen equals:

$$3 \cdot 2 = 6g$$

Molar mass of NH_3 equals:

$$M(NH_3) = M(N) + 3M(H) = 14 + 3 \cdot 1 = 17\frac{g}{mole}$$

Mass of 2 moles of NH_3 equals:

$$2 \cdot 17 = 34g$$

Then we make a proportion:

6 g of H_2 produce 34 g of NH_3

x g of H_2 – 10.71 g of NH_3

$$x = \frac{6 \cdot 10.71}{34} = 1.89\ g$$

Answer: $m(H_2) = 1.89$ g.