Answer on Question #43514 - Chemistry - Inorganic Chemistry

Question:

How many grams of ammonia will have the same number of molecules as 15g of benzene?

Solution:

1) Find molar mass of benzene (C_6H_6):

$$M(C_6H_6) = 6 \cdot M(C) + 6 \cdot M(H) = 6 \cdot 12.0 \frac{g}{mol} + 6 \cdot 1.0 \frac{g}{mol} = 78.0 \frac{g}{mol}$$

2) Find molar mass of ammonia (NH_3):

$$M(NH_3) = 1 \cdot M(N) + 3 \cdot M(H) = 1 \cdot 14.0 \frac{g}{mol} + 3 \cdot 1.0 \frac{g}{mol} = 17.0 \frac{g}{mol}$$

3) Find amount of substance in 15 g of benzene:

$$n(C_6H_6) = \frac{m(C_6H_6)}{M(C_6H_6)} = \frac{15\ g}{78.0\ \frac{g}{mol}} = 0.192\ mol$$

4) Amount of substance of ammonia is equal tj the value for benzene:

$$n(C_6H_6) = n(NH_3) = 0.192\ mol$$

5) Find mass of ammonia:

$$m(C_6H_6) = n(NH_3) \cdot M(NH_3) = 0.192\ mol \cdot 17.0 \frac{g}{mol} = 3.26\ g$$

Answer: $3.26\ g$.