

**Question:**

A compound has the formula  $M_3N$  Where M is a metal element and N is nitrogen. It contains 0.673 g of N per gram of M. Determine the relative atomic mass of M and thus its identity.

**Answer:**

The amount of moles of Nitrogen can be calculated:

$$n(N) = \frac{m(N)}{M(N)} = \frac{0.673g}{14g/mol} = 0.048mol$$

The amount of moles of metal is three times greater, as the compound contains three atoms of metal per one atom of Nitrogen.

$$n(M) = 3n(N) = 0.048 \times 3 = 0.144mol$$

Hence, the molar mass of metal can be calculated:

$$M(M) = \frac{m(M)}{n(M)} = \frac{1g}{0.144mol} = 6,94g/mol$$

This molar mass references to Lithium (Li). The unknown compound is lithium nitride,  $Li_3N$ .