Question:

What mass of magnesium hydroxide would be required for the magnesium hydroxide to react to the equivalence point with 558 mL of 3.18 M hydrochloric acid?

Answer:

The equivalence point, or stoichiometric point, of a chemical reaction is the point at which chemically **equivalent quantities** of **acid** and **base** have been mixed. In other words, the moles of acid are equivalent to the moles of base.

$$Mg(OH)_2 + 4HCl \rightarrow 2MgCl_2 + 2H_2O$$
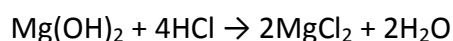
Molar concentration or molarity is defined as amount of solute per unit volume of solution:

$$c = \frac{n}{V} = \frac{m}{M * V}$$

Here, n is the amount of the HCl in moles, m is the mass of HCl, M is a molar mass of HCl (36.5 g/mol), V is the volume of solvent.

n = 3.18*558/1000 = 1.77 mol

From the chemical equation we can calculate the required mass of magnesium hydroxide

x grams of magnesium hydroxide – 1.77 moles of HCl

58.32 g/mol (molar mass of magnesium hydroxide) - 4 moles of HCl

Then **x** = 1.77*58.32/4 = **25.81 g**