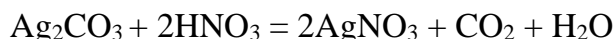
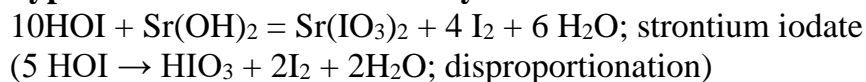


Write balanced equations for the following chemical reactions:

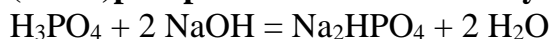
silver carbonate + nitric acid



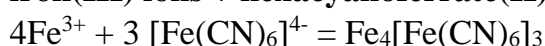
hypoiodous acid + strontium hydroxide



(ortho)phosphoric acid + sodium hydroxide (1 : 2 ratio)



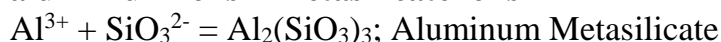
iron(III) ions + hexacyanoferrate(II) ions



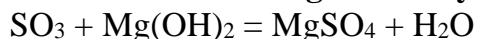
lead(II) oxide + dinitrogen pentoxide



aluminium ions + metasilicate ions



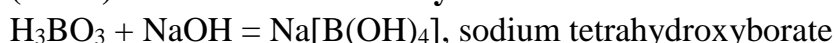
sulfur trioxide + magnesium hydroxide



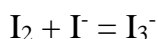
bismuth hydroxide + hydrobromic acid



(ortho)boric acid + sodium hydroxide



iodide ions + iodine molecules



Examples for calculations:

Example 1.

We need 0.12 mol ethyl alcohol (C₂H₅OH) in a reaction. Calculate the volume needed! Density: 0.789 g/cm³; M(ethanol): 46.07 g/mol

1 step: Calculation of the ethanol needed in grams (conversion of moles to grams):

$$1 \text{ mol ethanol} \rightarrow 46.07 \text{ g}$$

$$0.12 \text{ mol ethanol} \rightarrow m \text{ g}$$

$$m = n \cdot M = 0.12 \cdot 46.07 = 5.53 \text{ g}$$

1 step: Calculation of the volume based on the density:

$$0.789 \text{ g ethanol} \rightarrow 1 \text{ cm}^3$$

$$5.53 \text{ g ethanol} \rightarrow V \text{ cm}^3$$

$$V = 5.53/0.789 = 7.0 \text{ cm}^3 \text{ ethanol is needed.}$$

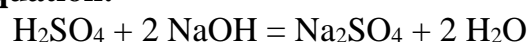
Example 2.

We have 25 cm³ sulfuric acid solution: 12 m/m % with a density of 1.08 g/cm³

How much 0.8 M NaOH is needed in the neutralization reaction (in cm³)?

M(H₂SO₄): 98,08 g/mol

Write the equation:



1 step: Calculate the amount of the H₂SO₄ solution in grams:

$$25 \text{ cm}^3, 1.08 \text{ g/cm}^3 \text{ solution is:}$$

$$25 \cdot 1.08 = 27 \text{ g}$$

2. step: Calculate the weight of sulfuric acid in this solution:

We have 12 m/m % solution, which means that we have 12 g sulfuric acid in 100 g water.

Calculation:

$$100 \text{ g solution} \rightarrow 12 \text{ g sulfuric acid}$$

$$27 \text{ g solution} \rightarrow x \text{ g sulfuric acid}$$

$$x = 27 \cdot 12/100 = 3.24 \text{ g H}_2\text{SO}_4$$

3. step: Convert the amount of sulfuric acid to moles:

$$n=m/M = 3.24/98.08 = 0.033 \text{ mol H}_2\text{SO}_4$$

4. step: Calculate the amount of NaOH needed:

Based on the reaction, 1 mole of sulfuric acid reacts with 2 moles of NaOH

Therefore, 0.033 mole H₂SO₄ reacts with **0.066 moles of NaOH**

5. step: Calculate the volume of the NaOH:

The concentration of the NaOH solution is 0.8M, which means that we have 0.8 moles in 1000 cm³ solution.

Calculation:

$$0.8 \text{ mol NaOH} \rightarrow 1000 \text{ cm}^3$$

$$0.066 \text{ mol NaOH} \rightarrow V \text{ cm}^3$$

$$V = 1000 \cdot n/c = 1000 \cdot 0.066/0.8 = 82.5 \text{ cm}^3 \text{ NaOH solution is needed.}$$