

Solve each of the following questions on a separate sheet of paper. Show all your work and include all units for full marks.

1. Calculate the mass of zinc chloride and the volume of hydrogen gas produced when 50g of zinc metal reacts with 50g of Hydrochloric acid (HCl) **(93.43g ZnCl₂, 15.34L H₂)**
2. Calculate the mass of sodium hydroxide and the volume of hydrogen gas produced when 35g of sodium metal reacts with 35g of water. **(60.8g NaOH, 17.02L H₂)**
3. 40g of sodium hydrogen carbonate reacts with 6.0g of sulphuric acid (H₂SO₄) according to the reaction below. Find the volume of CO₂ and the mass of water that will be produced. **$2\text{NaHCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O} + 2\text{CO}_2$ (2.69L CO₂, 2.16g H₂O)**
4. Find the mass of both products formed from the reaction of 100.0g of ammonium chloride with 50g of samarium hydroxide [Sm(OH)₃]. **(26.29g NH₄OH, 64.15g SmCl₃)**
5. Calculate the mass of each product formed from the reaction of 75g sodium sulphite with 80.0g of hydrogen bromide. **(40.6g H₂SO₃, 101.77g NaBr)**
6. 35.0g of potassium carbonate reacts with 11.5g of phosphoric acid (H₃PO₄) according to the reaction below. Calculate the volume of CO₂ and the mass of water that will be produced. **$3\text{K}_2\text{CO}_3 + 2\text{H}_3\text{PO}_4 \rightarrow 2\text{K}_3\text{PO}_4 + 3\text{H}_2\text{O} + 3\text{CO}_2$ (4.03L CO₂, 3.24g H₂O)**
7. 45.0g of Iron (II) sulphide and 30.0g of hydrochloric acid (HCl) are mixed. How many grams of each product will be formed? **(51.99g FeCl₂, 13.99g H₂S)**
8. Calculate the volume of Hydrogen gas and the mass of Aluminum sulphate produced when 5.0g of aluminum is mixed with 4.0g of sulphuric acid. **(4.45L Al₂(SO₄)₃, 0.9L H₂)**