

Molar Mass of Compounds

Aim

To investigate how molar mass affects the number of moles in equal masses of different compounds of sodium chloride (salt) and copper(II)carbonate.

Background

Molar mass is the mass of 1 mole of a substance (g/mol).

Different compounds have different molar masses. For ionic substances, these are based on their empirical formulas.

Equipment and Materials

- Balance
- Filter paper
- Spatula
- Periodic table
- Sodium chloride (NaCl)
- Copper(II)carbonate (CuCO_3)

Safety

- Avoid spills on floor (slip hazard)
- Wash hands after handling substances

Procedure

1. Accurately weigh out 5.00 g of sodium chloride.
2. Repeat for 5.00 g of copper(II)carbonate
3. Use the periodic table to calculate the molar mass of each substance.
4. Calculate the number of moles in each sample using:

$$n = \frac{\text{mass}}{\text{molar mass}}$$

Results

Substance	Formula	Mass (g)	Molar Mass (g/mol)	Moles (mol)
Salt	NaCl	5.00	_____	_____
Copper(II)carbonate	CuCO_3	5.00	_____	_____

Calculations

1. **Molar mass** of each substance:

Sodium chloride (NaCl) from your Periodic Table

Copper(II)carbonate (CuCO₃) from your Periodic Table

2. **Moles** of each 5.00g sample:

Sodium chloride:

$$n = \frac{\text{mass}}{\text{molar mass}}$$

Copper(II)carbonate:

$$n = \frac{\text{mass}}{\text{molar mass}}$$

3. **Particles** in each 5.00g sample:

Sodium chloride: $= n \times N_A$

Copper(II)carbonate: $= n \times N_A$

Discussion:

1. **Molar mass**

Compare the molar masses you calculated for copper(II) carbonate and sucrose. Which is larger?

2. **Moles in 5.00 g**

For your 5.00 g samples, which substance did you calculate to have a larger number of moles?

3. **Particles in 5.00g**

For your 5.00 g samples, which substance did you calculate to have a larger number of particles?

4. **Comparison:**

Explain how molar mass affects the number of particles in a fixed mass of different substances. Use your results from this experiment to support your answer.

Conclusion:

The substance with heavier individual particles will have _____ particles in the same mass.

The substance with lighter individual particles will have _____ particles in the same mass.