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:

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

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 ($CuCO_3$) from your Periodic Table

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

Sodium chloride:

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

Copper(II)carbonate:

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

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

Sodium chloride: = n x N_A

Copper(II)carbonate: = n x 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.