

## Lab: Counting Atoms

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### **Introduction:**

The mole is an important concept since it allows chemists to determine the number of atoms or molecules of substances involved in chemical reactions. In chemistry, the mole represents a very large number ( $6.022 \times 10^{23}$ ) of atoms or molecules

### **Objectives:**

1. To calculate the number of atoms from weighing the mass of a solid
2. To produce a gas and calculate the number of atoms of gas produced
3. To create salt-water solutions of varying concentrations

### **Procedure:**

#### **Part I: Sugar vs. Salt**

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Procedure:

1. Weigh out a spoonful of sugar using a scoopula, weigh boat and scale.
2. Record the value in the data table provided.
3. Return the sugar to the original container.
4. Using a different weigh boat, weigh out a spoonful of salt.
5. Record the value in the data table provided.
6. Return the salt to the original container.
7. Turn off the scale.

#### **Part II: Gas Production**

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Procedure:

1. Take the piece of provided magnesium metal and place it in the wire that is attached to the rubber stopper. Make sure it is secure by bending the wire or bending the magnesium metal.
2. Pour out a small portion (at least 10 mL) of 6.0M HCl acid into a small beaker.
3. Using a dropper pipette and graduated cylinder, measure 10.0 mL of the acid.
4. Discard any unused HCl down the sink with lots of water.
5. Add a few drops of food colouring to the acid in the graduated cylinder.
6. Over the sink, carefully transfer the acid from the graduated cylinder into the eudiometer.
7. Rinse out the graduated cylinder.
8. Fill a medium size beaker with water.

9. Over the sink, tip the eudiometer at an angle and slowly pour water from the beaker into the eudiometer until it is completely full.
10. Over the sink, place the rubber stopper into the mouth of the eudiometer so that the magnesium is in the solution.
11. Ensure that the rubber stopper is secure.
12. Slowly invert the eudiometer and place it in a medium beaker partially filled with water.
13. Rest the eudiometer in the ring stand.
14. Continue to observe the reaction until the amount of gas produced remains constant.
15. Record the mL (to 2 decimal places) of gas produced in the data table provided.
16. Remove the rubber stopper and carefully pour the contents of the eudiometer down the sink.

### **Part III: Solution Concentration**

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Procedure:

Solution I:

1. Calculate the mass of salt required to prepare a 40.0 mL solution of 0.200 M NaCl
2. Weigh out the calculated amount of salt using a scoopula, weigh boat and scale
3. Fill a medium beaker with 40.0 mL of water
4. Pour the measured amount of salt into the water and stir until the salt is **fully** dissolved
5. Place ONE drop of food colouring into your 0.200 M NaCl solution and mix

Solution II:

6. Repeat steps 1-5 to prepare a 40.0 mL solution of 4.85 M NaCl; use a different colour of food colouring to distinguish the two separate solutions
7. Slowly pour Solution II along the side of the beaker into Solution I. Do not mix!
8. Record your observations