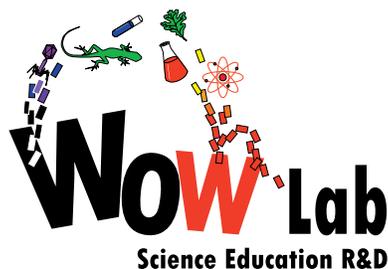


Student Handout

In the following handout, students will be required to:

- Develop a method to mix solutions accurately to desired molarities
- Calculate the required mass of various metal halides to create the desired experimental solutions
- Collect data in a consistent manner using a table and proper scientific documentation

Provided in this document are sample answers (pages 2-4) and a blank handout (pages 5-7). The blank handout should be made available to each group prior to the activity.



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Glowing Veggies - Handout Answers

Student Handout - Answers

Making Mixtures:

This experiment requires the preparation of 4 M halide solutions. Unfortunately, all elements and compounds have different molar masses and no device is available to measure the quantity of moles. Instead, balances are available to measure weight, and devices such as graduated cylinders and pipettes can measure volume. How can the required amount of halide required for a certain volume of water be measured in order to accurately prepare the solutions?

As a hint, here are some useful concepts:

- Molarity:
 - *The molarity of a solution is the number of moles of solute per 1 litre of solution. In this case, the solute is the halide and the solution is the water-halide mixture.*
- Moles of solution required for a certain volume of solution = (molarity)*(volume)

Brainstorm:

Try to brainstorm some equations that could be used to find the mass in grams of halides required to make a solution of molarity 4 mol/L for a certain volume of solution.

Molarity = Moles of solute per 1 L of solution

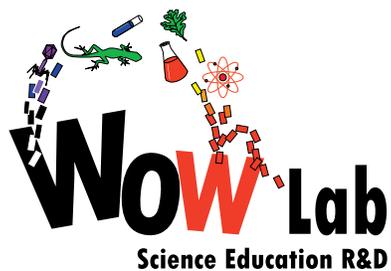
Moles required for a solution = Desired Molarity of Solution*Desired Volume of Solution

Grams required for a solution= Molar Mass*Moles required for a solution

Calculations:

Now that you have a set of equations, use them to fill in the table on the next page. Include all calculations here or on another sheet of paper:

Space for calculations--No set answers, only the table needs to be checked.



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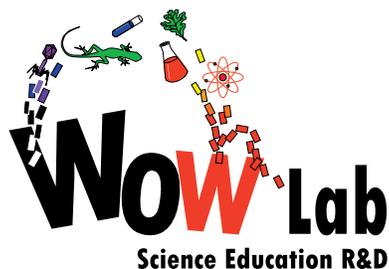
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Glowing Veggies - Handout Answers

(Space for calculations continued)

Mixture table:

Halide	Molar Mass (g/mol)	Volume of Solution (L)	Molarity of Solution (mol/L)	Amount of Halide required (moles)	Amount of Halide required (g)
<i>Sodium Chloride</i>	584	04	4	1.6	9344
<i>Lithium Chloride</i>	424	04	4	1.6	6784
<i>Magnesium Chloride</i>	95.2	04	4	1.6	152.32
<i>Potassium Chloride</i>	74.5	04	4	1.6	119.2
<i>Copper (II) Chloride</i>	170.5	04	4	1.6	272.8



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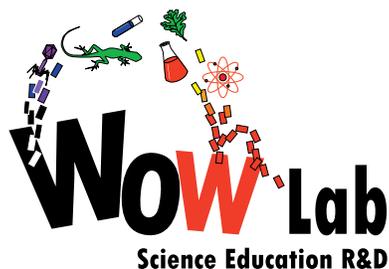
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Glowing Veggies - Handout Answers

Experiment Data Collection:

Fill in the following table with your observations as each vegetable is tested:

Vegetable Type	Metal Ion	Glowing Colour	Other Observations
Cucumber or Potato	Sodium	Yellow/Orange	These could include how the colour of the vegetable affects the perceived colour, if at all, and any other physical observations.
	Lithium	Red	
	Magnesium	Pure White	
	Potassium	Pale Mauve	
	Copper (II)	Blue	



Student Handout

Making Mixtures:

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As a hint, here are some useful concepts:

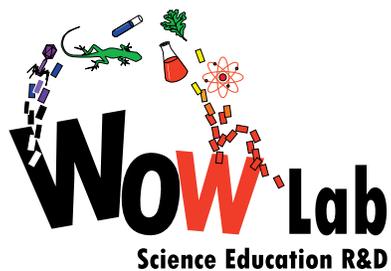
- Molarity:
 - *The molarity of a solution is the number of moles of solute per 1 litre of solution. In this case, the solute is the halide and the solution is the water-halide mixture.*
- Moles of solution required for a certain volume of solution = (molarity)*(volume)

Brainstorm:

Try to brainstorm some equations that could be used to find the mass in grams of halides required to make a solution of molarity 4 mol/L for a certain volume of solution.

Calculations:

Now that you have a set of equations, use them to fill in the table on the next page. Include all calculations here or on another sheet of paper:



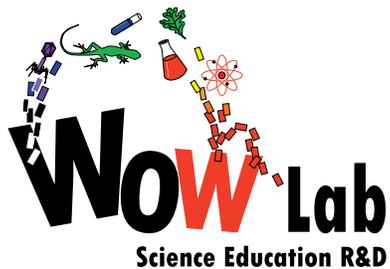
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Glowing Veggies - Student Handout

(Space for calculations continued)

Mixture table:

Halide	Molar Mass (g/mol)	Volume of Solution (L)	Molarity of Solution (mol/L)	Amount of Halide required (moles)	Amount of Halide required (g)



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Glowing Veggies - Student Handout

Experiment Data Collection:

Fill in the following table with your observations as each vegetable is tested:

Vegetable Type	Metal Ion	Glowing Colour	Other Observations