## Unknown Silver Nitrate Laboratory Simulation

- Google "chemcollective.org"
- Under the "Resources by Topic", click on Stoichiometry > Gravimetric Analysis > Determine the concentration of the unknown silver nitrate
- This should take you to a virtual lab
- In this experiment, you are trying to determine the mass of $\mathrm{AgNO}_{3}$ that is present in "Solution 3".

1. Based on what you have learned about precipitation reactions in AP Chemistry, what would be the best way to determine the amount of $\mathrm{Ag}\left(\mathrm{NO}_{3}\right)$ in the dissolved solution?

- Click on Stockroom > Solutions > Click on "Solution 3".
- Choose the substance (either Distilled $\mathrm{H}_{2} \mathrm{O}, \mathrm{NaCl}$, or $\mathrm{AgNO}_{3}$ ) that is consistent with your answer to \#1 to add directly into the Solution 3.
- Add the substance into Solution 3 a small amount at a time. The mass of the product of the reaction will be listed on the left-hand side in the Information Pane.

2. Write the balanced net-ionic reaction for the reaction that proceeded.
3. Calculate the following:
(a) The moles of product.
(b) The moles of $\mathrm{Ag}^{+}$in the product.
(c) The moles of $\mathrm{Ag}^{+}$in Solution 3.
(d) The moles of $\mathrm{AgNO}_{3}$ in Solution 3.
(e) The mass of $\mathrm{AgNO}_{3}$ in Solution 3.

Place your mass of $\mathrm{AgNO}_{3}$ at the bottom to see if you are correct.

## Gravimetric Analysis Practice:

Answer the following questions relating to gravimetric analysis.
In the first of two experiments, a student is assigned the task of determining the number of moles of water in one mole of $\mathrm{MgCl}_{2} \cdot n \mathrm{H}_{2} \mathrm{O}$. The student collects the data shown in the following table.

| Mass of empty container | 22.347 g |
| ---: | :--- |
| Initial mass of sample and container | 25.825 g |
| Mass of sample and container after first heating | 23.982 g |
| Mass of sample and container after second heating | 23.976 g |
| Mass of sample and container after third heating | 23.977 g |

a) Explain why the student can correctly conclude that the hydrate was heated a sufficient number of times in the experiment.
b) Use the data above to
(i) calculate the total number of moles of water lost when the sample was heated, an
(ii) determine the formula of the hydrated compound.
c) A different student heats the hydrate in an uncovered crucible, and some of the solid spatters out of the crucible. This spattering will have what effect on the calculated mass of the water lost by the hydrate? Justify your answer.

In the second experiment, a student is given 2.94 g of a mixture containing anhydrous $\mathrm{MgCl}_{2}$ and $\mathrm{KNO}_{3}$. To determine the percentage by mass of $\mathrm{MgCl}_{2}$ in the mixture, the student uses excess $\mathrm{AgNO}_{3}(a q)$ to precipitate the chloride ion as $\mathrm{AgCl}(s)$.
d) Starting with the 2.94 g sample of the mixture dissolved in water, briefly describe the steps necessary to quantitatively determine the mass of the AgCl precipitate.
e) The student determines the mass of the AgCl precipitate to be 5.48 g . On the basis of this information, calculate each of the following.
(i) The number of moles of $\mathrm{MgCl}_{2}$ in the original mixture
(ii) The percent by mass of $\mathrm{MgCl}_{2}$ in the original mixture

