

CHAPTER 7	Investigation 7.B: Determining the Concentration of a Solution	BLM 7.2.6
HANDOUT		

You will now use your knowledge of how to analyze stoichiometric data of precipitation reactions to determine the concentration of a solution. Your teacher will give you a sample of a solution, $\text{Mg}(\text{NO}_3)_2(\text{aq})$. You will need to express the concentration of your solution as:

- (a) a mass of $\text{Mg}(\text{NO}_3)_2(\text{aq})$ dissolved in 100 mL of solution
- (b) a molar concentration

Question

What is the molar concentration of a $\text{Mg}(\text{NO}_3)_2(\text{aq})$ solution?

Safety Precautions



If you spill any $\text{Mg}(\text{NO}_3)_2(\text{aq})$ or $\text{Na}_3\text{PO}_4(\text{aq})$ on your skin, flush with plenty of cool water and inform your teacher immediately. Once you have completed this investigation, wash your hands.

Materials

- 50 mL of a $\text{Mg}(\text{NO}_3)_2(\text{aq})$ solution of unknown concentration
- 50 mL of 0.200 mol/L $\text{Na}_3\text{PO}_4(\text{aq})$
- deionized water
- 150 mL beaker
- 50 mL volumetric pipette
- 250 mL Erlenmeyer flask
- funnel
- retort stand
- wash bottle
- drying oven (if available)
- stirring rod
- ring clamp or funnel rack
- filter paper
- large watch glass
- electronic balance

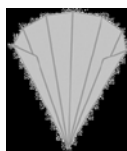
Procedure

- 1 Fold a piece of fluted filter paper.

- a) Fold the filter paper in half.



- b) Make creases in the half to divide it into eight sections of equal size.



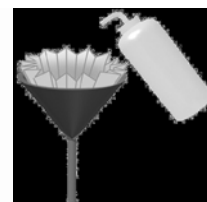
- c) Flip the piece over. Make a fan shape by folding each section in the direction opposite to the previous direction.



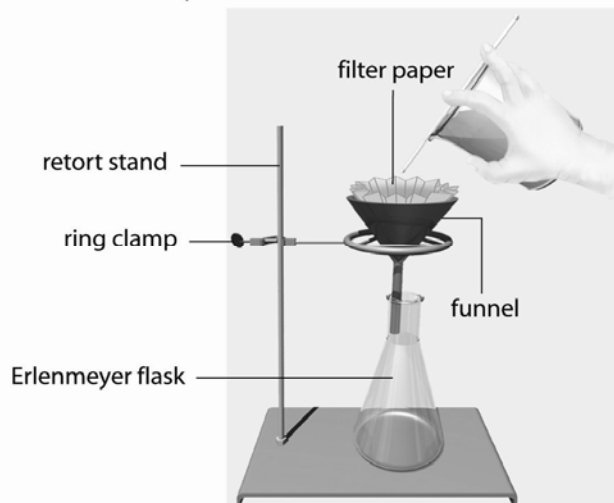
- d) Open up the two halves. You have now "fluted" your filter paper.



- 2 Place your fluted filter paper in the plastic funnel. Use your wash bottle to add a little distilled water to the centre of the filter paper so that it will stay in place.



- 3 Set up the filtration apparatus as shown. The diagram also shows how to pour the liquid down a stirring rod to ensure no product is lost.



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Observations

- Using a volumetric pipette, measure 50.0 mL of the $\text{Mg}(\text{NO}_3)_2(\text{aq})$ solution into a 100 mL beaker.
- Slowly add the $\text{Na}_3\text{PO}_4(\text{aq})$ to the solution in small amounts while swirling the beaker. Continue until no more precipitate is formed upon adding small amounts of $\text{Na}_3\text{PO}_4(\text{aq})$.
- Set up your filtration apparatus, as shown on the previous page. Record the mass of your filter paper in the table below. Be sure to record the mass of the filter paper before folding and wetting it.

Mass of filter paper	
Mass of filter paper and precipitate	
Mass of precipitate	

- Filter the mixture through the filter paper and record the color of the precipitate. Wash the precipitate with small amounts of deionized water.
- Remove the filter paper with the precipitate and place it on a watch glass.
- Leave the sample to dry (one hour in an oven at 70 °C or overnight on the counter).
- When the sample is dry, determine the mass of the filter paper with precipitate. Record the mass.

Analysis

- Use the data you collected to calculate the following values. Show all your calculations:
(a) the mass of dissolved $\text{Mg}(\text{NO}_3)_2$ in the solution you were given

(b) the concentration of the solution in mass of solute per 100 mL of solution

(c) the molar concentration of the solution (mol/L)

