

Precipitate Lab

Name: _____ partner: _____

Purpose: To determine the identities of five *unknown* solutions based on how they react with four given *known* solutions.

Skill builder #1 (Review): Use your ion sheet to write the correct formulas for each of the following ionic compounds (remember to balance charges, sodium sulfate is done for you as an example).

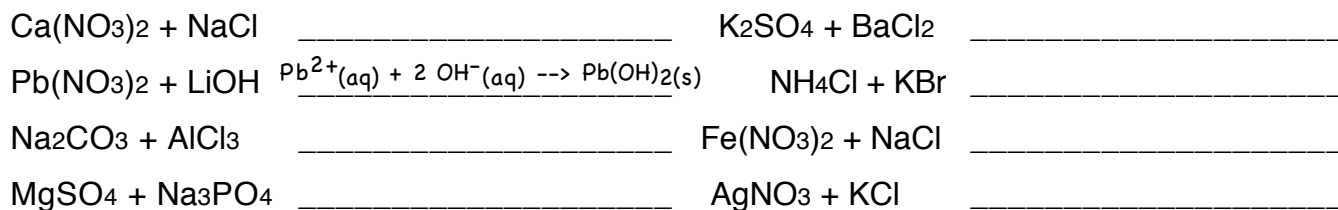
- 1) barium sulfate _____ 2) sodium sulfate Na_2SO_4 3) potassium chloride _____
4) lead(II) iodide _____ 5) calcium nitrate _____ 6) silver phosphate _____
7) ammonium phosphate _____ 8) magnesium bromide _____ 9) aluminum carbonate _____

Skill builder #2: Using your solubility rules, predict whether each of the above ionic compounds will be **soluble** or **insoluble**. Circle all those that would be soluble (Hint: you should end up with **five** of the compounds circled).

Skill builder #3: For the five soluble compounds above, write balanced equations that show their dissolving in water. (sodium sulfate, which should be your first soluble compound, is done for you as an example:

1. $\text{Na}_2\text{SO}_4(\text{s}) \rightarrow 2 \text{Na}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$ 2. _____
3. _____ 4. _____
5. _____

Skill builder #4: Using your solubility rules, predict whether each of the following reactions will go (a precipitate forms) or whether it will not (everything remains in solution). For those reactions that **do** go, **write the net ionic equation**, for those that do not go, write "NR" for no reaction. (Hint: one is done for you. You should end up with four more reactions and three NR's).



The lab: In this lab you will be given four different known solutions:

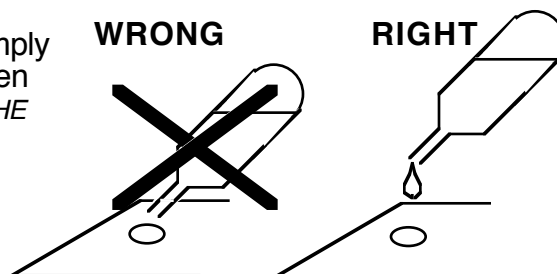
1 = NaOH 2 = Na₂SO₄ 3 = NaI 4 = AgNO₃

and you will use them to try to determine the identity of five different unknown solutions (labelled A, B, C, D and E). These five different unknown solutions correspond with:

Pb(NO₃)₂ CaCl₂ NH₄Cl KNO₃ MgCl₂

but not necessarily in that same order! Your task is to figure out which letter goes with which solution!

If you want to see whether two solutions will react or not, simply place a drop of one of them on the plastic spot plate and then add to a drop of the other solution. **DO NOT CONTAMINATE THE SOLUTIONS BY STICKING THE TIP OF ONE PIPET INTO THE DROP OF ANOTHER. INSTEAD, LET THE DROP FALL AS SHOWN IN THE DIAGRAMS AT RIGHT.**



Data table: Fill in the grid below with the observations. Be as descriptive as possible. Note: some reactions might take a little longer than other; some might be more pronounced than others.

	1- (NaOH)	2- (Na ₂ SO ₄)	3- (NaI)	4- (AgNO ₃)
A				
B				
C				
D				
E				

Based on the data you collected, match up the five unknown solutions to their appropriate identities: Pb(NO₃)₂, CaCl₂, NH₄Cl, KNO₃ & MgCl₂. Consider, for example, how you would expect Pb(NO₃)₂ to react with each of the test solutions (NaOH, Na₂SO₄, NaI & AgNO₃). Now look at your data table and see which solution, A thru E, reacted the way you think Pb(NO₃)₂ would react... When you have figured out the correct match ups, write them in the spaces to the left of the letters in the grid below. Then in each box of the grid, write the net ionic equation that was happening to produce the precipitates you saw. Your net ionic equations should look just like the example given in the skill builder #4: $Pb^{2+}(aq) + 2 OH^{-}(aq) \rightarrow Pb(OH)_2(s)$

	NaOH	Na ₂ SO ₄	NaI	AgNO ₃
_____ = A				
_____ = B				
_____ = C				
_____ = D				
_____ = E				



This is where you write in your results for the lab: what you determined each of the five solutions to be.

Follow-up questions: (Answer on a separate sheet of paper)

- How can two clear solutions mix and produce a cloudy precipitate -- what is going on?
- For the mixtures you considered NR (no reaction). Is it possible a reaction is happening? Explain.
- Look back at the skill builder #4 example in which Pb(NO₃)₂ reacted with LiOH to make Pb(OH)₂. In this reaction, the Li⁺ and the NO₃⁻ are called "spectator ions." Why this name is appropriate?
- Are the precipitates you formed solutions, colloids, suspensions, or some combination? Explain.
- One of your precipitates had a very distinct color. Which one was it, and what was its color?

*6. (bonus) As a follow-up activity, you are given five solution labelled P, Q, R, S and T which you are told correspond with Pb(NO₃)₂, CaI₂, LiNO₃, NaCl and K₃PO₄. You have to figure out which is which, but you can only react them with each other. You collect the data at right. Determine which is which!

* Bonus

	P	Q	R	S	T
P	X	NR	NR	NR	NR
Q	X	X	ppt	yellow ppt	ppt
R	X	X	X	NR	NR
S	X	X	X	X	ppt