

% Composition by Mass—THE UNKNOWN HYDRATE


name: _____

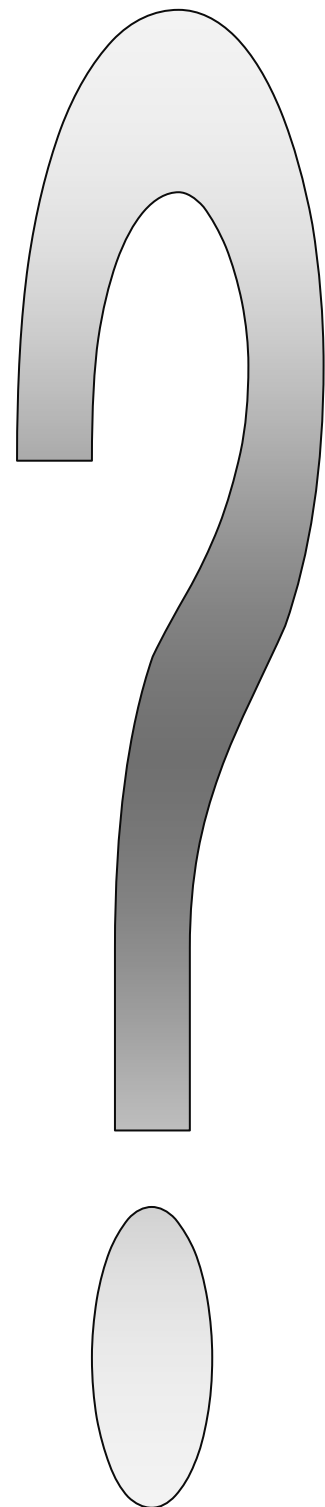
(40/1200 minutes)

A hydrated ionic compound is an ionic compound with a certain amount of hydrate (which means WATER) loosely bonded to it. By heating this hydrate over and over until it stops changing mass (all water becomes a gas) we can determine the percent composition of water by mass of that hydrated compound.

Today we have some white crystals of an UNKNOWN HYDRATE. Fill the evaporating dishes up with more than 2.50 grams but less than 5.00 grams of this hydrate. Use the scales very carefully. The unknown hydrate could be any one of the 7 listed in the table on page 3.

Fill in the data table accurately. Using this data you will be able to determine what the compound it is.

	Data Table	
A	Mass of empty crucible	
B	Crucible + hydrate	
C	Mass after first heating	
D	Mass after 2nd heating	
E	FINAL MASS	
F	Mass hydrate alone (B - A =)	
G	Mass of Salt alone (E - A =)	
H	Mass of missing water (F - G =)	



You will meet 2 odd things in the lab. The first is that 2 compounds have a lot of water, DODECAHYDRATE means 2 + 10 or 12 water molecules attached to each ionic compound. Next is a compound with 2 metal cations at the same time. Usually the cation and the anion transfer enough electrons to be in “balance”. That ratio is sometimes 1:1, or 2: 1, or whatever.

In the 2nd possible reactant in this lab, called stuff is called aluminum potassium sulfate dodecahydrate. Here, the two metal cations combine to a +4 cation charge together (they don’t bond together, they transfer a total of 4 electrons to the anions). The Al^{+3} and the K^{+1} make a +4 cation combo, which requires two sulfate anions (each SO_4^{-2} accepts 2 electrons each). So what? It’s weird but hardly outside your comprehension. Just deal with this and don’t sweat it.

Do ALL of the work on LOOSE LEAF PAPER.

- This lab requires a cover sheet with a single sentence explaining the point of the lab 1 point
- Ten questions below x 2 each = 20 points
- Conclusion: describes the concept of % composition by mass, the steps you took in lab, and how you determined your percent comp by mass. Finally, explain what “heating to a constant mass” is. 4 points

Questions for Lab - SHOW ALL WORK - PAPER IS CHEAP, KNOWLEDGE IS VALUABLE.

Round all of the water % Comp to 3 SF!

1. Calculate the % comp by mass of water in the compound: barium chloride dihydrate
2. Calculate the % comp by mass of water in the compound: aluminum potassium sulfate dodecahydrate
3. Calculate the % comp by mass of water in the compound: sodium sulfate dodecahydrate
4. Calculate the % comp by mass of water in the compound: potassium fluoride dihydrate
5. Calculate the % comp by mass of water in the compound: calcium sulfate dihydrate
6. Calculate the % comp by mass of water in the compound: sodium acetate trihydrate
7. Calculate the % comp by mass of water in the compound: iron (III) hexahydrate
8. Calculate the % comp by mass of water in your UNKNOWN SAMPLE.
9. Of the seven choices, which compound did you use in the lab today?
10. How do you know it was “that” one? What was your percent error (it better have SF and a sign!)

Fill in this chart, but DO ALL WORK NEATLY on LOOSE LEAF PAPER

The math for this page ARE questions # 1-8 in the lab. Don't do them twice, once is enough!

	Compound name	Compound Formula	Molar mass g/mole	% comp by mass of water (round to 3 SF)
1	Barium chloride dihydrate			
2	Aluminum-Potassium Sulfate dodecahydrate			
3	Sodium sulfate dodecahydrate			
4	Potassium fluoride dihydrate			
5	Calcium sulfate dihydrate			
6	Sodium acetate trihydrate			
7	Iron (III) chloride hexahydrate			
8	THE UNKNOWN HYDRATE	?	?	