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CHM. 121.004
Inst. Mark Novak
Lab Report – Experiment 9
11/9/17

95

How? -5

Experiment Objective

The objective of this experiment was to find two unknowns, one being a Cation, and one being an Anion. After testing other known elements, we could then compare our unknown element to the known elements and find our unknown. After doing these tests, we could then also see the solubility trends for both the alkaline earths family and the halogens family.

Conclusion

Once we gathered our unknows, Cations, and Anions, we began to test the solubility for the Cations. After testing all of the Cation and our unknown, we concluded that Cation unknown #63 is $Mg(NO_3)_2$. Because our unknown did not correspond with matching Cations, we did not have to do the flame test on our unknown. At this point we began to test the Anions. After we tested all the Anions and our unknown, we concluded that Anion unknown #59 is Cl or $AgCl_{(s)}$. When we were comparing our unknown with the other samples that we had, we saw that both the color and solubility in NH_3 solution were the same, thus giving us our unknown. When it came time to find with Anion was slightly soluble and insoluble, we ran into some trouble. While we were using the centrifuge, one of the two test tubes broke while spinning. Because of this, we are not exactly sure which Anion is soluble and insoluble. However, because of the solubility trend for that group, I am predicting that Br will be slightly soluble and I will be insoluble.

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ADVANCE STUDY ASSIGNMENT

1) Calcium hydroxide is slightly soluble (2 g/L) in water, while barium hydroxide is moderately soluble (28 g/L). Would you expect magnesium hydroxide to be more soluble or less soluble than strontium hydroxide?

a) less soluble (Put down "More soluble" or "less soluble")

b) Why? Specifically for the hydroxides, as you go down the group the hydroxides become more soluble. Because magnesium is above Strontium in the Periodic table, we can assume that magnesium will be less soluble according to the trend.

2) Palladium oxide (PdO), palladium polonide (PdPo), palladium selenide (PdSe), palladium sulfide (PdS), and palladium telluride (PdTe) are precipitated out as solids. Each solid compound is shaken with increasing concentration of ammonia, until all but one of the compounds has dissolved. The results are listed below.

PdO dissolved in 3M ammonia

PdS dissolved in 6M ammonia

PdPo didn't dissolve at all

PdTe dissolved in 12M ammonia

PdSe dissolved in 9M ammonia

From these results, list the **neutral elements** (O, Po, Se, S, Te) of Group VIA in order of **decreasing solubility** of their palladium compounds. In other words, list the most soluble, or the one that dissolves in the lowest concentration of ammonia, first. The palladium compounds contain the negative ions of the neutral elements.

O > S > Se > Te > Po

Most soluble insoluble

Name _____

 Name George Iaffas

DATA, OBSERVATIONS AND CONCLUSIONS:

A. Data And Observations:

Complete each chart below.

Part I Chart Cations (Positive Ions):

Cation Unknown #: 63

		H_2SO_4	Na_2CO_3	$(NH_4)_2C_2O_4$	Flame color if applicable
$Ba(NO_3)_2$	Ba^{2+}	(1) p	(6) p	(11) p	
$Ca(NO_3)_2$	Ca^{2+}	(2) s	(7) p	(12) p	
$Mg(NO_3)_2$	Mg^{2+}	(3) s	(8) p	(13) s	
$Sr(NO_3)_2$	Sr^{2+}	(4) p	(9) p	(14) p	
Unknown	Unk^{2+}	(5) s	(10) p	(15) s	

Part II Chart Anions (Negative Ions):

Anion Unknown #: 59

S = soluble in 6M NH_3; SS = soluble in 15M NH_3; IS = insoluble in NH_3

	$AgNO_3$ + NaBr $AgBr_{(s)}$	$AgNO_3$ + NaCl $AgCl_{(s)}$	$AgNO_3$ + NaI $AgI_{(s)}$	$AgNO_3$ + Unk $AgUnk_{(s)}$
Color	(1) Cream	(2) white	(3) yellow	(4) white
Solubility in NH_3 solution	(1) SS	(2) S	(3) IS	(4) S

Name _____

 Name George Pappas

B. Conclusions

1) For Part I, list the four alkaline earth **ELEMENTS** (Not the ions!) in the order of decreasing solubility (for elements that have equal solubility list alphabetically). Start with the one that is the most soluble and form a soluble oxalate ($C_2O_4^{2-}$).

Mg Ca Ba Sr ✓

2) For Part II, list the **diatomic halogen elements** (X_2, not the ions!) in the order of decreasing solubility. Start with the most soluble silver halide, but don't put down the silver halides. Put down the diatomic halogen elements.

Cl Br I ✓

3) Cation Unknown Number: 63 Flame Color: _____

Cation: Mg^{+2}

For the cation, write down one of the four cations, Ba^{+2}, Ca^{+2}, Mg^{+2}, or Sr^{+2}.

Anion Unknown Number: 59

Anion: Cl^{-1}

For the anion, write down one of the three anions, Cl^{-1}, Br^{-1} or I^{-1}.

Name _____