Precipitation and Water Purity

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&

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Course Evaluation!
5 min

Goals for Experiment

- Part 1: precipitation rxn & filtration
- Part 2: Designated cations groups I & II precipitation trends with designated anions
- Part 3: Effect of cations & anions concentration on precipitation. Q_{sp} trends relative to K_{sp}
- Part 4: Solubility of salts with polar & non-polar solvents: I. $CaCl_2$ & II. $K_2C_2O_4$ solubilities in H_2O, Acetone, & Hexane.
- Part 5: Omit.
- Complete report during lab work.

Cations (8)

Anions (6)

$BaCl_2$
NaOH

6 Dry tubes & Filtration paper @ Front Desk
Acetone & Hexane @ Side Countertops
$CaCl_2$ & $K_2C_2O_4$ @ Side Countertops

Part 1: What is a Precipitate?

$CuSO_4$ & $BaCl_2$
5 mL each in Beaker

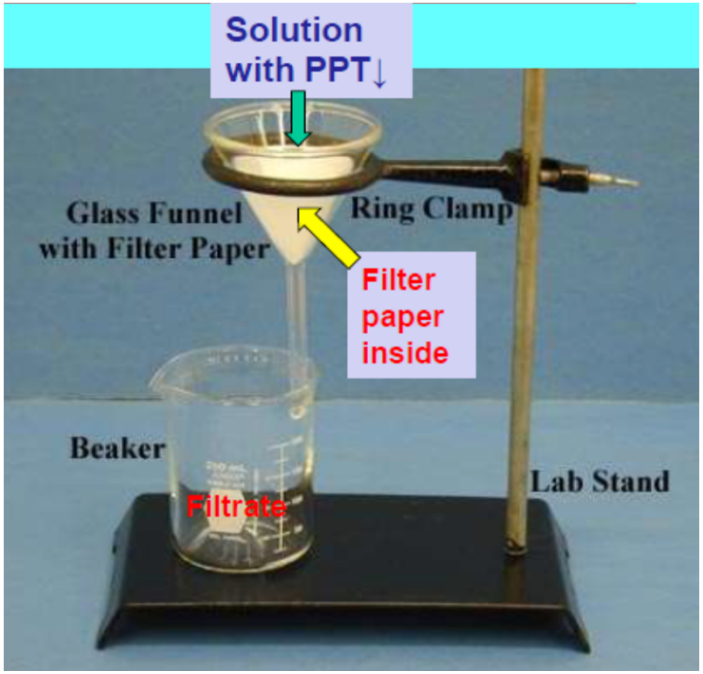
→

Settle >30 min
NO stirring!

→

Filtration
Gravity

Demo



2 Stud.

Part 2: Predictable?

Cation & Anion

2 drops in tubes

→

Use the A4 Table

Record!!!

Tabl1: *CATION GROUPS TO PRECIPITATE* (0.10 M nitrate salts for each cation), p52 manual.

GROUP I	Na^+	Ba^{2+}	Mg^{2+}	Co^{2+}	Ni^{2+}	Cu^{2+}	Al^{3+}	Pb^{2+}
GROUP II	K^+	Mn^{2+}	Ca^{2+}	Sr^{2+}	Cr^{3+}	Fe^{3+}	Zn^{2+}	Ag^+

Table 2: *ANION GROUPS PRECIPITATING REAGENTS*: (0.10 M sodium salts for each anion), p52 manual. **SELECT CATION GROUP I OR GROUP II BUT NOT BOTH, THEN ADD YOUR OBSERVATIONS ON THE TABLE ACCORDING TO INSTRUCTIONS & USING GROUP II EXAMPLE for Ag^+ (CAUTION: COLORS MAY NOT BE AS SHOWN). COMPARE YOUR RESULTS WITH THE OTHER GROUP I/II. Clear means no ppt.**

CATION GROUP I 2drops	CATION GROUP II 2drops	REF 2drops	Cl^- 2drops	CrO_4^{2-} 2drops	I^- 2drops	$C_2O_4^{2-}$ 2drops	S^{2-} 2drops	SO_4^{2-} 2drops	SPCTR GROUP I	SPCTR GROUP II
Na^+	K^+	clear								
Ba^{2+}	Mn^{2+}	clear								
Mg^{2+}	Ca^{2+}	clear								
Co^{2+}	Sr^{2+}	clear								
Ni^{2+}	Cr^{3+}	clear								
Cu^{2+}	Fe^{3+}	clear								
Al^{3+}	Zn^{2+}	clear								
Pb^{2+}	Ag^+	clear	White ppt↓	Brown ppt↓	Yellow ppt↓	White ppt↓	Black ppt↓	White ppt↓		

Odd #: Group I
Even #: Group II

4 Stud.

Part 3: Conc. & Precip.

Design

- 3 Cations
- NaOH & 1 other anion
  (1 drop w/ or w/o 9 drops of DI)

In Tubes

→ Record!

Reaction #	Reactant #1	Reactant #2
II-1	0.10M $Pb(NO_3)_2$	0.10M NaOH
II-2	0.10M $Pb(NO_3)_2$	1.0M NaOH
II-3	0.01$Pb(NO_3)_2$	0.01M NaOH
IV-1	0.10M $ZnSO_4$	0.10M NaOH
IV-2	0.10M $ZnSO_4$	1.0M NaOH
IV-3	0.01M $ZnSO_4$	0.01M NaOH
V-1	0.10M $CaCl_2$	0.10M $K_2C_2O_4$
V-2	0.01M $CaCl_2$	0.01M $K_2C_2O_4$

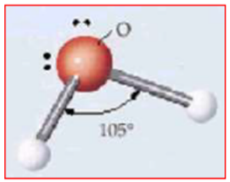
4 Stud.

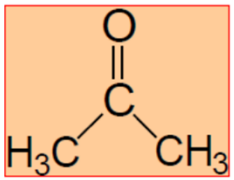
Part 4: Solvent

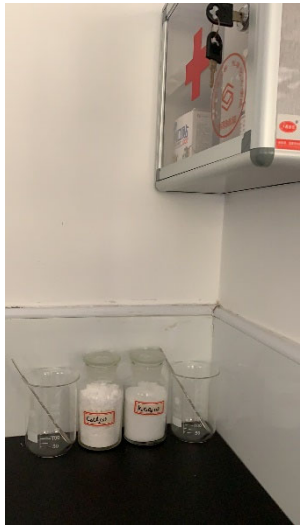
Aqueous
Organic (dry tubes)
Solid @ side countertop
~2 mL by counting drops

→ Record!

- Water (H_2O) is very polar.
- Hexane (C_6H_{14}) is nonpolar.
- Acetone (CH_3COCH_3) is moderately polar.







4 Stud.

Report

PLE: Pre-lab Report (p18-19) *Individual*

- Part 2.A., A4 Table w/ plastic cover
  (Hypothesis and predications for question 4 can be included in the A4 table)
- Prepare your own data sheet & team assessment form

PLQ: Team Report (p20-22) *Group & Individual*

- Omit Part 2.A. Data Analysis (p21)
- Omit Part 2.B. (p21)
- Omit Part 5 (p22)
- 'class data', two groups working on the two sides of one counter complete a whole test set and the data can be considered as class data.
- Data sheet will be graded individually

ALR: Individual Report *Individual*

- 4 parts: Intro., Procedures, Discussion (p23 1-5), and Reference.
- Procedure, briefly summarize the operation steps.