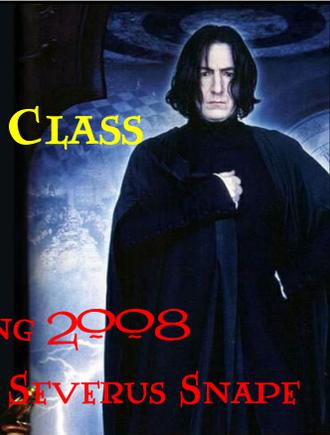


CH204
POTIONS CLASS

SPRING 2008
PROFESSOR SEVERUS SNAPE

A portrait of Professor Severus Snape from the Harry Potter series, wearing his signature black robes and a dark hood, standing in a dimly lit room with a blue glow in the background.

LAST WEEK IN THE
POTIONS LABORATORY

SEPARATED MIXTURES BASED ON DIFFERING
PHYSICAL AND CHEMICAL PROPERTIES

USED EXCEL TO CALCULATE AVERAGE, STANDARD
DEVIATION, AND WEIGHT PERCENTS

Q-TEST IN ACTION!

BÜCHNER FILTERING

EXPERIMENT 3
QUALITATIVE CHEMICAL ANALYSIS

“QUANT” VS “QUAL”

QUANTITATIVE – HOW MUCH IS THERE?

QUALITATIVE – WHAT IS IT?

YOU WILL IDENTIFY THE CHEMICAL IDENTITIES OF 5 UNKNOWN SOLUTIONS BASED ON HOW THEY REACT (OR DON'T REACT) WITH ONE ANOTHER.

PREVIOUS YEARS

GORGON'S BLOOD

LIQUID GOLD

VITREOUS HUMOR OF A BLIND MULE

2008

ACIDS

BASES

INORGANIC SALTS

TWO-PART LAB

- **PART 1:** MIX ELEVEN KNOWN SOLUTIONS AND RECORD THE RESULTS OF THE REACTIONS
- **PART 2:** MIX YOUR FIVE UNKNOWN AND COMPARE THE RESULTS WITH WHAT YOU SAW IN PART ONE.

BE EXACT!

THE MORE ACCURATELY YOU RECORD
YOUR OBSERVATIONS, THE EASIER IT
WILL BE TO IDENTIFY YOUR
UNKNOWN.

WHAT ARE WE LOOKING FOR?

***EXPLOSIONS**

***SUPERNATURAL CREATURES**

***RASHES, MUTATIONS,
TRANSFORMATIONS**



WHAT ARE WE ^{REALLY} LOOKING FOR?

PRECIPITATES.

[SEE THE SOLUBILITY TABLE IN APPENDIX 2.]

DON'T EXPECT TO SEE ANY ACID-BASE ACTION.

**WRITE CHEMICAL EQUATIONS FOR ALL OF THE
REACTIONS THAT FORM A PRECIPITATE.**

THE KNOWN SOLUTIONS

ACIDS: HCl H₂SO₄ HNO₃

BASES: NaOH Na₂S Na₃PO₄

SALTS: Ba(NO₃)₂ AgNO₃ K₂CrO₄
Fe(NO₃)₃ Ni(NO₃)₂

ALL SOLUTIONS ARE 0.10 OR 0.20 M.

RIDDLE ME THIS

WHAT DO YOU GET WHEN YOU CROSS
HYDROCHLORIC ACID WITH SILVER NITRATE?

BALANCED CHEMICAL EQUATION



ADD THE PHYSICAL STATES OF EACH COMPOUND

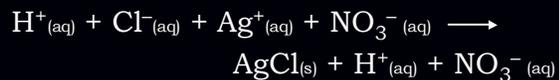


THIS IS CALLED A MOLECULAR EQUATION.

LET'S GET REAL



WRITE AQUEOUS COMPOUNDS AS INDIVIDUAL IONS:

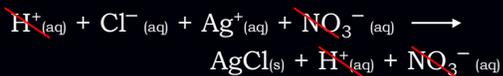


THIS IS A TOTAL IONIC EQUATION.

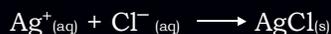
LOTS OF SPECTATOR IONS.

TIME TO CLEAN HOUSE

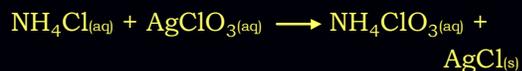
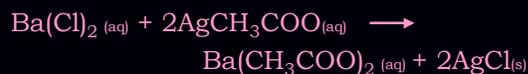
CROSS OUT SPECTATOR IONS



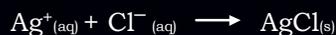
THIS LEAVES US WITH A NET IONIC EQUATION



THE NET IONIC EQUATION



ALL OF THESE REACTIONS HAVE THE SAME NET IONIC EQUATION:



SIMPLE IS GOOD

- THE NET IONIC EQUATION DESCRIBES THE CHEMICAL REACTION THAT OCCURS, AND DOES NOT INCLUDE ANY IONS THAT DO NOT TAKE PART IN THE REACTION, EVEN THOUGH THOSE IONS ARE PRESENT IN SOLUTION.
- HOW DO WE KNOW WHICH IONS WILL REACT AND WHICH ONES WON'T?

SOME QUICK SOLUBILITY RULES

* ALL COMPOUNDS CONTAINING ALKALI METALS AND AMMONIUM ION ARE SOLUBLE.



* ALL COMPOUNDS CONTAINING NITRATE, CHLORATE, PERCHLORATE, AND ACETATE ARE SOLUBLE.



SOME QUICK INSOLUBILITY RULES

* ALL COMPOUNDS CONTAINING PO_4^{3-} CO_3^{2-} OR SO_3^{2-} ARE INSOLUBLE, EXCEPT THOSE THAT CONTAIN ALKALI METALS OR NH_4^+ .

* ALL COMPOUNDS CONTAINING OH^- OR S^{2-} ARE INSOLUBLE, EXCEPT THOSE THAT CONTAIN ALKALI METALS OR NH_4^+ AND SOME GROUP II METALS.

* WHEN IN DOUBT, Ag^+ Pb^{2+} AND Hg COMPOUNDS TEND TO BE INSOLUBLE.

IN THE POTIONS LABORATORY

* CREATE AN ARRAY OF REACTIONS IN THE MICROWELL PLATE SIMILAR TO THE ONE IN THE LAB MANUAL.

* USE ONLY 2 DROPS OF EACH REACTANT.

* **DO NOT** TOUCH THE TIPS OF THE DROPPER BOTTLES TO THE SOLUTIONS IN THE MICROWELL PLATE OR YOU WILL DIE A MOST PAINFUL DEATH.

VILE, HIDEOUS FLUIDS!

EMPTY YOUR USED MICROWELL PLATES
INTO THE DISGUSTING PLASTIC TRAY IN THE HOOD.

RINSE THE PLATES IN THE SINK,
THEN STACK THEM IN THE HOOD.

LAB REPORT

MOLECULAR EQUATIONS FOR
15 PRECIPITATION REACTIONS.

NET IONIC EQUATIONS FOR
15 PRECIPITATION REACTIONS.

15 * 15 is 30 EQUATIONS ALTOGETHER.

WARNING! DARK MAGIC!

FIVE REACTIONS WILL TURN CLOUDY
EVEN THOUGH NO SOLID SHOULD BE FORMED.



THESE PRECIPITATES ARE DUE TO UNAVOIDABLE TRACE
CONTAMINANTS IN THE SOLUTIONS (POLYSULFIDES IN
 Na_2S AND CARBONATE ION IN NaOH).

SIMPLE LAB, MONSTER WRITE-UP

THE REPORT AND POST-LAB FOR THIS EXPERIMENT TAKE A LOT OF TIME AND THOUGHT.

ANSWER POST-LAB QUESTIONS 2 AND 3 USING ONLY THE REAGENTS USED IN THIS EXPERIMENT OR YOUR TA WILL MARK THEM WRONG!

GO TO THE [FREEBIES](#) PAGE OF THE CLASS WEB SITE FOR A HINT SHEET TO HELP YOU WITH THE DISCUSSION AND POST-LAB QUESTIONS.

NEXT WEEK

EXPERIMENT 4: ACID-BASE TITRATION

- MORE INVOLVED THAN THIS LAB.
- REQUIRES MORE PREPARATION THAN OUR PREVIOUS LABS FOR BOTH THE PRELIMINARY WRITE-UP AND THE PRE-LAB.
- START PREPARING EARLY

PRE-LAB QUESTION 1: THE ANSWER IS NOT 71!

FINAL EXAM, PART 2

* YOU WILL NEED A CALCULATOR EVERY WEEK (EXCEPT NEXT WEEK).

* MAKE SURE YOU KNOW YOUR SECTION NUMBER AND YOUR TA'S NAME!
