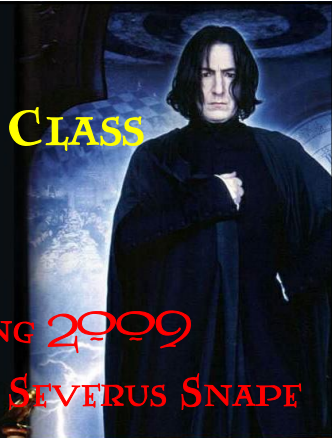


CH204
POTIONS CLASS

SPRING 2009
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

QUALITATIVE ANALYSIS

WHAT ARE SOLUTIONS A-F?

YOU WILL IDENTIFY WHAT THESE
CHEMICALS ARE BASED ON
HOW THEY REACT
(OR DON'T REACT)
WITH ONE ANOTHER.

TWO-PART LAB

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

WHAT ARE WE 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.

BE EXACT!

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

THE KNOWN SOLUTIONS

ACIDS: H_2SO_4 HNO_3

BASES: NaOH Na_2S Na_3PO_4

SALTS: NaCl $\text{Ba}(\text{NO}_3)_2$ AgNO_3

$\text{Fe}(\text{NO}_3)_3$ $\text{Ni}(\text{NO}_3)_2$ K_2CrO_4

ALL SOLUTIONS ARE 0.10 OR 0.20 M.

NAMING IONIC COMPOUNDS

IF THE CATION FORMS ONLY ONE KIND OF ION, NAME THE CATION, THEN THE ANION. DON'T USE PREFIXES LIKE MONO- OR DI-, JUST NAME THE IONS.

BaCl_2 - BARIUM CHLORIDE

K_2CO_3 - POTASSIUM CARBONATE

$\text{Al}(\text{NO}_3)_3$ - ALUMINUM NITRATE

NAMING IONIC COMPOUNDS

IF THE CATION CAN FORM MORE THAN ONE KIND OF ION, PUT THE POSITIVE CHARGE IN ROMAN NUMERALS:



NAMING IONIC COMPOUNDS

MONATOMIC ANIONS: IDE ENDING



POLYATOMIC ANIONS: LEARN THE NAMES!



SEE THE TABLE ON PAGE A-5 OF THE LAB MANUAL

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

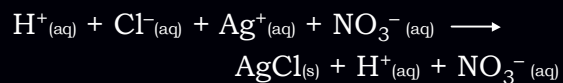


THIS IS CALLED A MOLECULAR EQUATION.

LET'S GET REAL



WRITE AQUEOUS COMPOUNDS AS INDIVIDUAL IONS:

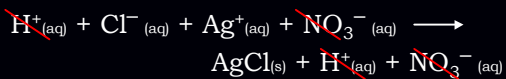


THIS IS A TOTAL IONIC EQUATION.

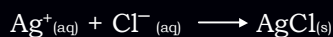
LOTS OF SPECTATOR IONS.

TIME TO CLEAN HOUSE

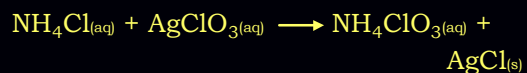
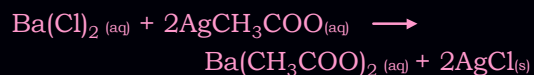
CROSS OUT SPECTATOR IONS



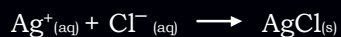
THIS LEAVES US WITH A NET IONIC EQUATION



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 GROUP I AND 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 INTO THE TRAY, THEN STACK THEM IN THE HOOD.

LAB REPORT

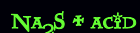
MOLECULAR EQUATIONS FOR 15 PRECIPITATION REACTIONS.

NET IONIC EQUATIONS FOR 15 PRECIPITATION REACTIONS.

15 * 15 is 30 EQUATIONS ALTOGETHER.

WARNING! DARK MAGIC!

FOUR 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!

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

NEXT WEEK

QUIZ 3: MAKE SURE YOU CAN NAME IONIC
COMPOUNDS IF I GIVE YOU THE FORMULA,
AND CAN WRITE FORMULA IF I GIVE YOU
THE NAME. (SEE POST-LAB PROBLEMS 1, 3,
AND 4.) ALSO KNOW SOME GENERAL
SOLUBILITY RULES.

EXPERIMENT 4: ACID-BASE TITRATION

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!
