

3/16/15

L

Group A ions are insoluble as chloride (Ag<sup>+</sup>, Pb<sup>2+</sup>, Hg<sub>2</sub><sup>+</sup>)

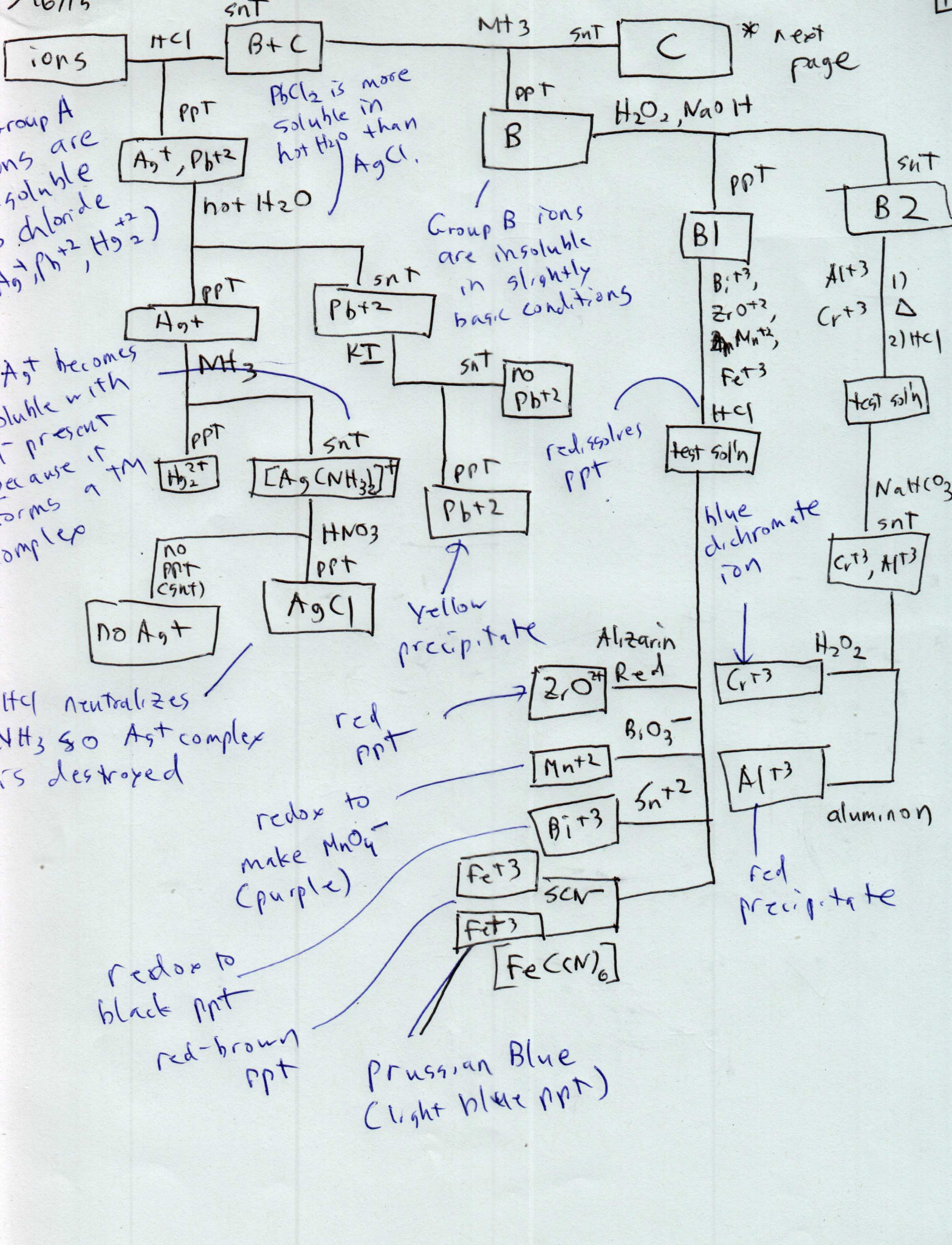
Ag<sup>+</sup> becomes soluble with Cl<sup>-</sup> present because it forms a TM complex

HCl neutralizes NH<sub>3</sub> so Ag<sup>+</sup> complex is destroyed

redox to black ppt  
red-brown ppt

redox to make MnO<sub>4</sub><sup>-</sup> (purple)

Prussian Blue (light blue ppt)



PbCl<sub>2</sub> is more soluble in hot H<sub>2</sub>O than AgCl.

Group B ions are insoluble in slightly basic conditions

redissolves ppt

yellow precipitate

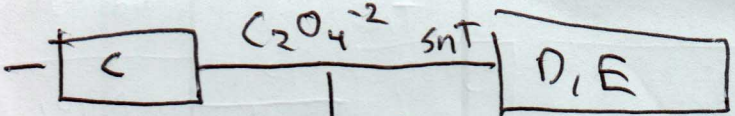
red ppt

blue dichromate ion

red precipitate

aluminum

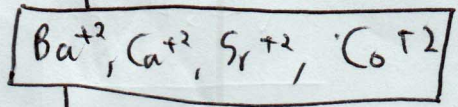
\* next page



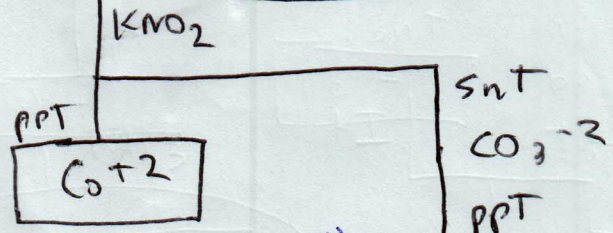
Group C ions are insoluble as oxalates

Destroy oxalate and red. dissolve cations

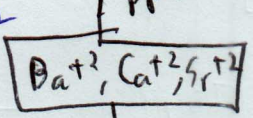
PPT  
1)  $\Delta, HNO_3$   
2)  $HCl$



Yellow ppt  $Co(NO_2)_2$

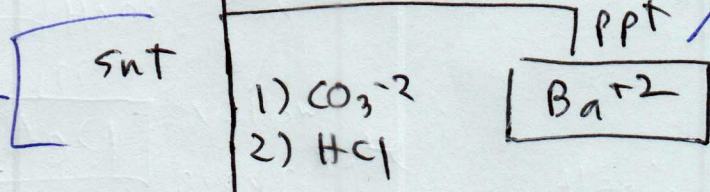


precipitate + red. dissolve to ensure only  $Ca^{+2}, Sr^{+2}$  are present

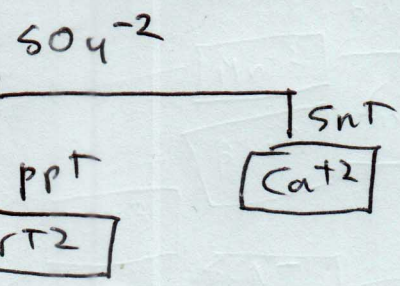
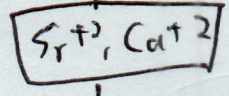


$CH_3COOH, CrO_4^{-2}$

white precipitate



$SrSO_4$  less soluble than  $CaSO_4$



Colligative properties

Review - electronegativity + VSEPR  $\rightarrow$  IMF

Phase changes - KE vs. IMF

Concentration - molarity, molality, mass %, ppm

Electrolytes - extent of dissociation (i)

Freezing point depression + Boiling point elevation -

$$\Delta T = k \cdot m \cdot i$$

vapor pressure - cause (molecular energy distribution)

- relationship to BP

heat of sol'n - molecular solids (solute vs solvent)  
 - ionic solids (hydrations vs lattice)

dissolve vs dissociate

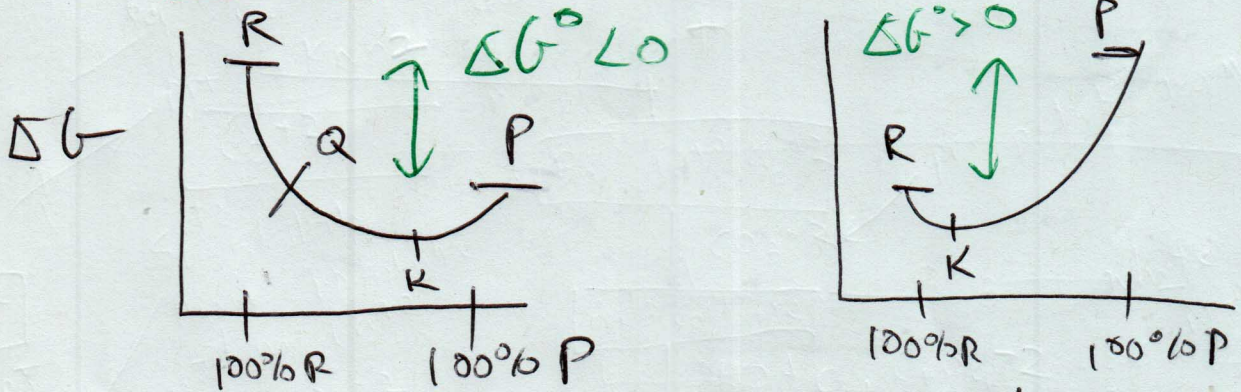
solubility - relationship to  $\Delta G$  vs  $\Delta H$

osmotic pressure

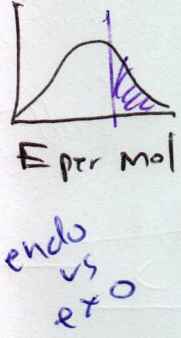
Equilibrium - rate forward = rate reverse

$Q$  change in [reactants] = change in [products]

$\Delta E = 0$   
not [reactants] > [products]



$K_{sp}$  - conversion between g/mL +  $K_{sp}$   
 $Q_{sp}$  vs  $K_{sp}$       solid  $\rightarrow$  ions  
 selective precipitation



endo vs exo

Buffers - what is a buffer? range? capacity?

$K_a$

ICE - when can simplifications be made?  
(when concentrations change very little as equilibrium is reestablished)

V30

Henderson-Hasselbalch  $\Rightarrow$   $pH = pK_a + \log_{10} \frac{[A^-]}{[HA]}$

Calculate pH of a buffer

Calculate quantity of acid or its conjugate

Calculate change in pH due to neutralization

Titration -

Draw titration curve - buffer range

monoprotic, diprotic, polyprotic

$\frac{1}{2}$  equivalence point

indicators

### Electrochem

oxidation state vs formal charge

balancing redox rxns

standard electrode

standard state

voltic cell

concentration cell

standard reduction potential

half rxns

identifying stronger oxidizing or reducing agent

Nernst equation

### Transition metal complexes

crystal field theory - d-orbital splitting

stereochemistry + complex geometry

ligands - mono vs ~~bi~~ vs polydentate

strong vs weak field ligands

transition metals + electron configuration