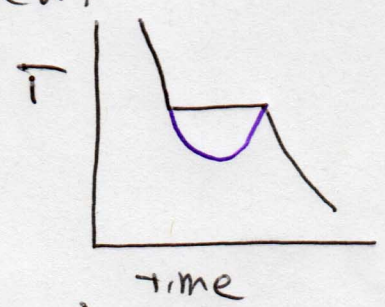


# Freezing point depression

- What determines freezing point (KE vs IMF)
- What changes the melting point (weakening of IMF)
- How was the freezing point measured?
  - Initial formation of crystals
  - Temperature vs time  $\longrightarrow$
  - Supersaturation
- Ice/salt/water bath
  - Depended on ice melting (endothermic)
  - Salt lowered freezing point of sol'n so it would be cold enough for the sol'ns being measured



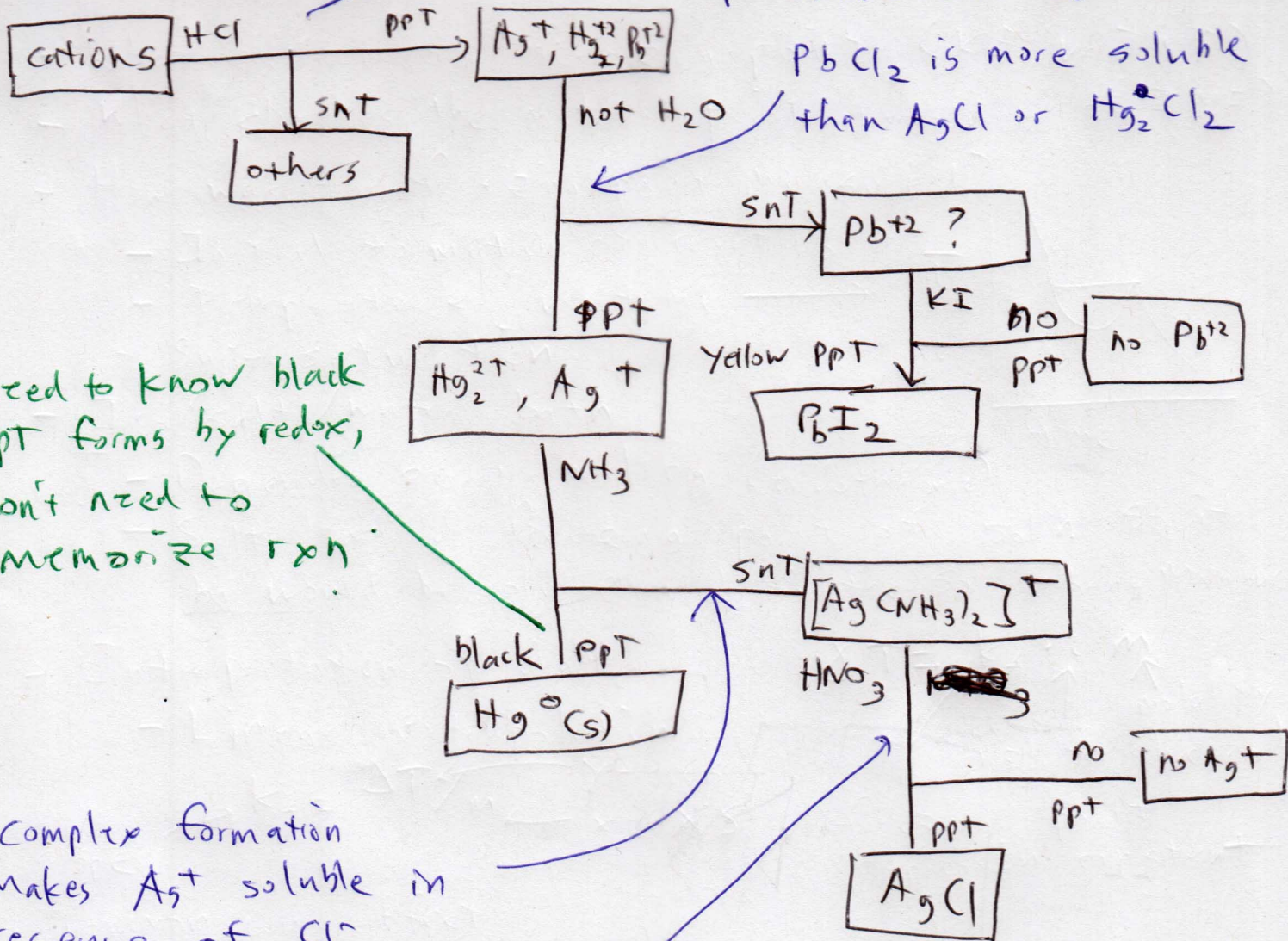
- Interpretation of data
    - Linear extrapolation
- $$k_f = \frac{\Delta T}{m}$$
 where  $\Delta T$  is the y-axis and  $m$  is the x-axis. The slope is labeled as  $k_f$ .

$$\Delta T = k_f \cdot i \cdot m$$
 where  $i$  is the van't Hoff factor (labeled as  $i=1$  for glycerol) and  $m$  is the molality.  $k_f$  is the freezing point depression constant.

## Common ion effect

- goal of Part A ( $K_{sp}$ ) and Part B (CIE)
  - sol'n from  $H_2O$       sol'n from  $Ca(NO_3)_2$  (aq)
- preparation of  $Ca(IO_3)_2$  (s)
- determination of  $[IO_3^-]$ 
  - primary + secondary standards ( $KIO_3$ ,  $S_2O_3^{2-}$ )
  - why standardize ( $S_2O_3^{2-}$  is deliquescent)
  - stoichiometry  $\longrightarrow M_1 V_1 = 6 M_2 V_2$
  - endpoint + starch
- calculating  $K_{sp}$ ;  $K_{sp} = \frac{1}{2} [IO_3^-]^3$
- demonstrate the CIE

# Qualitative analysis



3 ions not soluble in presence of  $\text{Cl}^-$

$\text{PbCl}_2$  is more soluble than  $\text{AgCl}$  or  $\text{Hg}_2\text{Cl}_2$

need to know black ppt forms by redox, don't need to memorize rxn

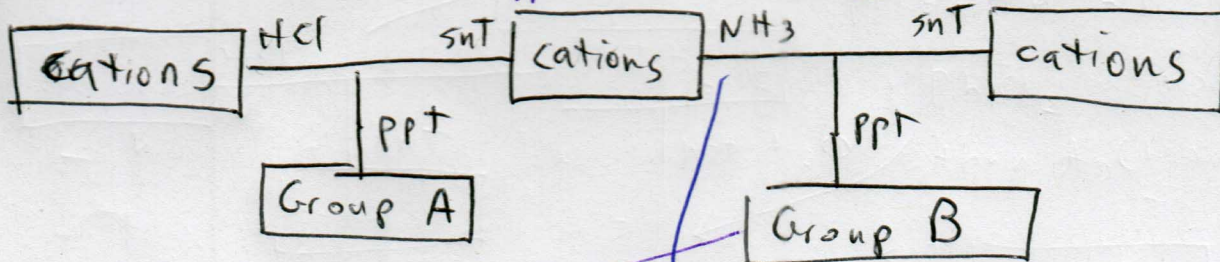
Complex formation makes  $\text{Ag}^+$  soluble in presence of  $\text{Cl}^-$

neutralizes  $\text{NH}_3$ , exposing  $\text{Ag}^+$  to  $\text{Cl}^-$  (ppt)

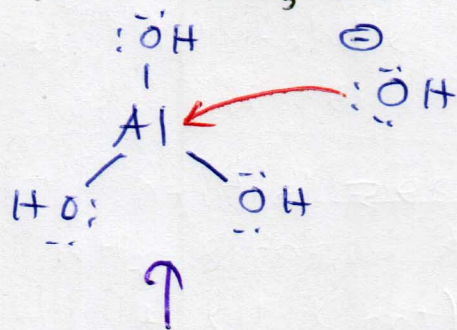
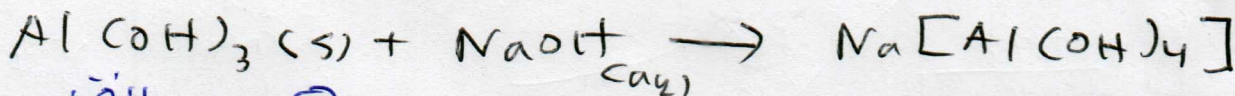
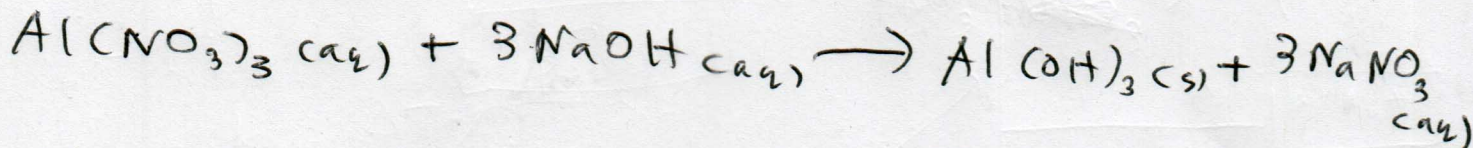
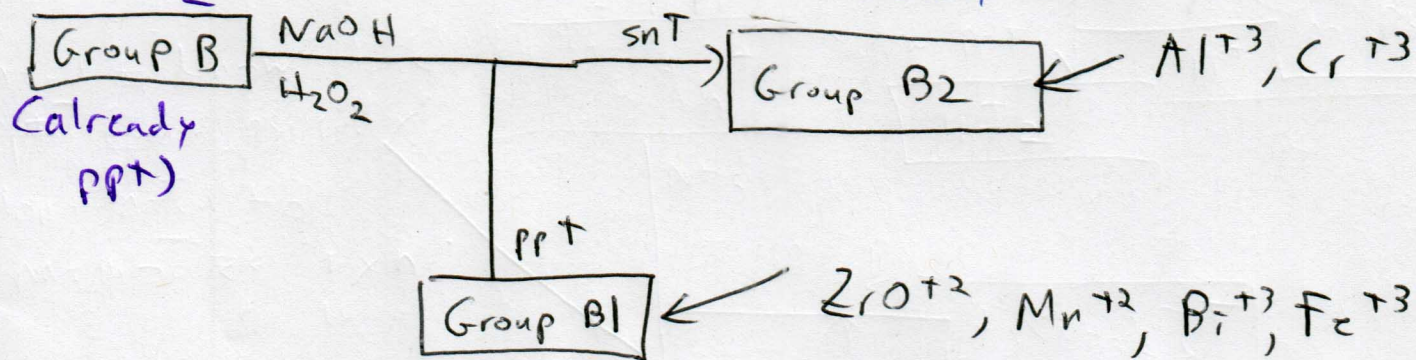
Group B

\* Start here

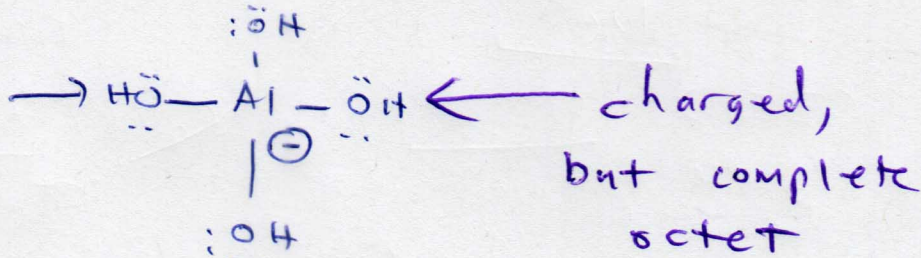
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Group B ions are insoluble in weakly basic solutions



neutral, but incomplete octet



charged, but complete octet