1) A solution is in equilibrium with solid $PbCl_2$. Some NaCl is added.
   a) Will the concentration of Cl^- in solution **increase** or decrease?
   b) Will the concentration of Pb^{+2} increase or **decrease**?

2) Consider a solution in equilibrium with solid $CaSO_4$.
   a) If some solid $NaNO_3$ is added, will the solubility of $CaSO_4$ **increase** or decrease?
   b) If some solid Na_2SO_4 is added, will the solubility of $CaSO_4$ increase or **decrease**?
   c) If some solid $CaSO_4$ is added, will the solubility of $CaSO_4$ increase or decrease? **Unchanged**

3) After an excess of $Ag(NO_3)$ has been added to an aqueous solution containing K(SCN)
   a) Is the charge on the surface of colloidal Ag(SCN) **positive** or negative?
   b) What ion is the source of this charge?
      Ag^+, NO_3^-, K^+, SCN^-
   c) Which ion predominates in the solution layer next to the particle?
      Ag^+, **NO_3^-**, K^+, SCN^-

4) A mixture of two chemicals was spilled in the ground. When the area was later analyzed, neither chemical was found at the original site and the two chemicals had separated. Which chemical is more soluble?

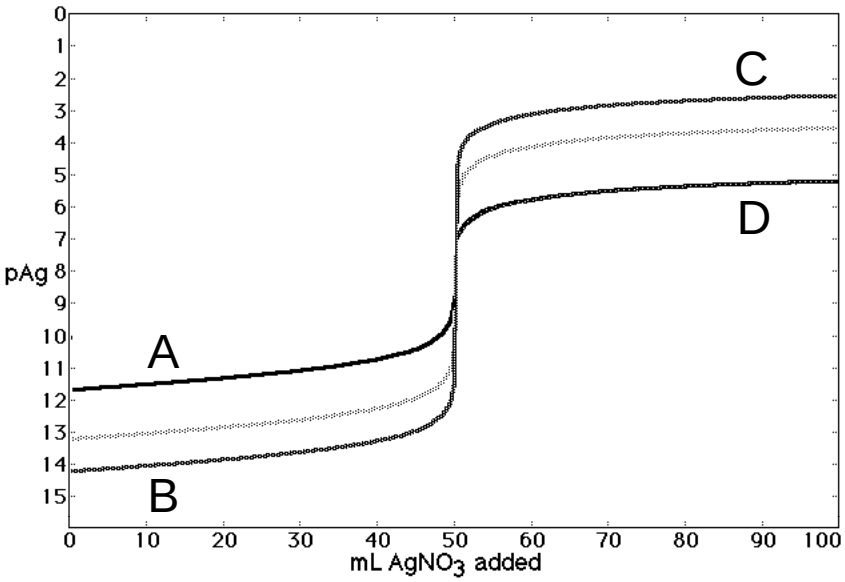
Original Later

   A, **B**, neither

5) Which will give a better separation?
   1 extraction with 100 mL
   2 extractions with 50 mL
   5 extractions with 20 mL

6) The center titration curve shows the precipitation titration of X^- with Ag^+.

$$Ag^+ + X^- \rightleftarrows AgX(s)$$



a) How will the titration curve change when the Ksp is larger (such as a change from 10^{-9} to 10^{-7})?
A, B, or no change
C, D, or **no change**

b) How will the titration curve change when the solutions are more concentrated?
A, **B**, or no change
C, D, or no change

7) Consider a pH titration of CH_3COOH in a flask with KOH from a buret. What is the primary species that controls the pH in the flask
a) at the start? **CH_3COOH**, CH_3COO^-, K^+, OH^-, H^+
b) about halfway to the equivalence point?
CH_3COOH, **CH_3COO^-**, K^+, OH^-, H^+
c) at equivalence? CH_3COOH, **CH_3COO^-**, K^+, OH^-, H^+
d) after equivalence? CH_3COOH, CH_3COO^-, K^+, **OH^-**, H^+

8) When standardizing a pH meter, what pH buffer solution do you use first? 4, **7**, 10

9) You have available HCl, NaOH, CH_3COOH, and CH_3COOK. What possible *pairs* can be used to make a buffer?
HCl and NaOH
HCl and CH3COOH
HCl and CH3COOK
NaOH and CH3COOH
NaOH and CH3COOK
CH3COOH and CH3COOK

10) Which will be the better indicator to use when titrating HOCl (Ka = 3.0×10^{-8}) with KOH?

thymolphthalein (pKa 9.9)
bromothymol blue (pKa 7.10), or
bromocresol green (pKa 4.66)