

ABOUT THE STANDARD

- ◆ This standard is broken in to a few key parts
 - ◆ Solubility
 - ◆ Acids and bases
 - ◆ Buffers
 - ◆ Titrations curves
 - ◆ Species in solution

STRATEGIES FOR SUCCESS

◆ Learn why you are doing the maths:

This standard has far and away the most maths involved out of any chemistry standard and this can tend to freak people out a little bit from time to time. The worst thing to do is to try and memorise all the steps to solving a problem like solving for the solubility of pH. For example, trying setting the K_s equal to $4s^3$ without really thinking about why that is. The exact same goes for pH calculations.

- ◆ If you just guess at the reasons why you are doing things without knowing the reasons, if NZQA decides to throw a curveball (which they have been known to do) then you might be out of luck.
- ◆ Always keep $c = n/v$ and $n=m/M$ in mind throughout this whole paper. Quite often you will have to convert between concentration, number of moles and mass and back again so remembering that you have these options is a must do!
- ◆ Re-read the question at the end! Have you given them what they asked for? Quite often the calculations you do spit out a concentration but they may need you to convert that to a mass or number of moles so be careful.

◆ Write out your reactions:

Quite often the questions are going to be presented in a paragraph format and just like in maths where you take a word problem and turn it into an equation, we have to take this paragraph and turn it into one or more chemical equations that are going to be necessary to answering the questions.

- ◆ For example if we are asked to calculate the pH of a 0.1 molL^{-1} solution of NH_4Cl then we need to write reactions that are going to help us. In this case since ammonium chloride is a salt when we first put it into water it's going to dissociate into its ions.



- ◆ Then since the NH_4^+ is an acid this and only this will go on to react with water



- ◆ These two equations are really important because then we can go on and do things like construct an equilibrium constant expression or talk about the relative amounts of the species in solution. Almost no matter what in this standard start by writing an equation!

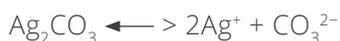
◆ Solubility all comes back to Le Chatelier's principle:

One common question is describing how the solubility of a salt might change under different conditions, for example changing pH, having another salt already dissolved in the solution or even using a solvent other than water. Well the first thing you need to do is write an equation and from there you just need to relate it back to Le Chatelier's principle.

- ◆ Recall from last year that Le Chatelier's principle is "Whenever you make a change to a system the system will try and do the opposite to counteract the change"

- ◆ Let's take silver carbonate for example: Ag_2CO_3

First our equation



- ◆ If we were to lower the pH by introducing some acid it will react with the carbonate ions (which are bases). This will decrease the carbonate concentration which shifts our equilibrium to the right meaning more silver carbonate will dissolve at lower pH. It all just comes back to Le Chatelier's principle.

- ◆ One thing they have liked asking about every now and again is complex ions. There are some others but the ones they like the most are silver amine complex $[\text{Ag}(\text{NH}_3)_2]^+$ and the zinc hydroxide complex $[\text{Zn}(\text{OH})_4]^{2-}$. This means that if we were to try and dissolve our silver carbonate from before in ammonia instead of water the solubility would increase. Some of the Ag^+ in solution will react to form the complex ion, reducing the amount of Ag^+ in solution moving the equilibrium to the right just as before.

OVERALL

- ◆ Most of this standard comes down to maths and tiny little conversions when doing the maths so make sure you are reading the question and know why you are doing things.
- ◆ Write equations for everything! They form the basis of your argument 90% of the time so having them there to talk about is really important.
- ◆ We've covered some important strategies and things to remember, but we haven't covered everything.
- ◆ We really recommend going through the last 3-4 years of exam papers, and also using the StudyTime Walkthrough Guide and Checklist to really check and consolidate your knowledge and feel 100% prepared!