

AQUEOUS SYSTEMS

CHEMISTRY

LEVEL 3

Strategy Guide

This is a very maths heavy standard for chemistry - which can freak a bunch of people out! Luckily, when you investigate closely, there are really only a few different types of calculations you need to be comfortable in this standard. So grab your calculator, make yourself comfortable, and let's see how everything works!

OVERVIEW OF THE STANDARD/STRUCTURE OF THE EXAM

This standard is broken into a few key points:

1. pH calculations
2. Species' in solution
3. Solubility
4. Titration curves

CONCEPTS AND SKILLS TO FOCUS ON

Although every aspect of the exam is equally important, here are some key concepts to focus your study on:

pH calculations:

If you are comfortable with calculating pH of both weak acids and bases then you are already ahead of the game in this standard! You can guarantee you will be doing at least 1 each year - and most of the time, it's a free merit mark! Be sure that you don't get too lazy though - always remember to write when you are making your assumptions and give your answer to the correct number of significant figures.

Titration curves:

Titration curves are a pretty confusing element of this standard - and there is a lot of information contained with each graph. Make sure you are on top of all the important points in each graph, where they show up, why they are there - and more importantly, why the pH is what it is at that point. It can help to think about the species that are in solution at each point in the titration.

Maths:

pK_a , K_a , pK_b and K_b can all be inter-converted without any extra information - which you will need to do this at least once in the exam. Get comfortable with these processes, as, if you can do these without a second thought - then you can spend more of that precious brain power working through the rest of the question. It's also a good idea to get reacquainted with K_w calculations too - as they can stump a lot of people.

COMMON MISTAKES:

From the NCEA gods themselves:

This standard has a lot of small extra calculations, and a few familiar formulae (which are not given to you) are used over and over again. For example, a common question is to calculate the mass of substance that would need to be added to a solution. Your initial working will spit out the required concentration, but you then have to convert by going through some $c=n/V$ and $n=m/M$ steps to get to the final answer. It is important to read the question at the end to make sure you give them what they want.

Solubility vs solubility constant:

Solubility is the maximum concentration of the compound - whereas the solubility constant is another name for K_s . These sound annoyingly similar, so it is important you know which one you are trying to calculate at the outset.

Always draw reactions:

Reactions are super helpful throughout this standard - whether it is helping you come up with equilibrium constant expressions or explaining why a solution is conductive.

Pay attention to volumes:

When two solutions are mixed together, the concentration of the species in that solution will change. This will change your answer if you don't account for it, and is one of the main problems that students don't account for.

OVERALL STUDY AND EXAM STRATEGY:

A decent grade is definitely achievable for this paper with a bit of hustle and grind. The key is to not rote learn, but try to understand the patterns. Pay careful attention to the wording of your explanations, and use the NCEA exemplars and marking schedules, as well as our walkthrough guides to get that M/E-level wording.

