

Science 1.5 AS 90944 Demonstrate understanding of aspects of acids and bases

Writing Excellence answers to pH, Universal indicator and ions questions

pH, Universal Indicator and ions QUESTION	
<p>Question: A beaker contains sodium hydroxide solution and 5 drops of universal indicator. Sulfuric acid was added to the beaker until no more changes were observed.</p> <p>Describe how the indicator colour changes as the sulfuric acid is added to the beaker, AND explain what this tells you about the changing pH of this solution.</p> <p>Explain the relationship between the changing pH of the solution and the ions in the solution as the sulfuric acid is added to the beaker.</p> <p>Explain the advantages of using universal indicator compared to litmus paper.</p>	
ANSWER	
1. state the overall reaction that is occurring naming the acid and base and the product formed.	When sulfuric acid is added to sodium hydroxide the solution turns from base to a neutral solution where a salt and water are made. When more sulfuric acid is added the solution will become more acidic.
2. compare the colour and relative concentration of H^+ and OH^- ions in beaker at the start and link to pH	Step 1: When no acid has been added, the solution is purple and has a pH of 12–14 and there is an excess of OH^- ions and very few H^+ ions. This solution will be a strong base.
3. describe the colour change, pH range and concentration of H^+/OH^- ions as more acid added.	Step 2: When a small amount of acid has been added, the solution is blue and has a pH of 8–11 and there is still an excess of OH^- ions, but less than when no acid was added and few H^+ ions. This solution will be a weak base
4. describe the colour change, pH and concentration of H^+/OH^- ions as yet more acid added to form a neutral solution	Step 3: When more acid has been added, the solution becomes neutral and is green and has a pH of 7, there will be an equal amount of OH^- ions and H^+ ions.
5. describe the colour change, pH range and concentration of H^+/OH^- ions as more acid added past neutral	Step 4: When more acid has been added, the solution will turn orange/yellow and has a pH of 6–3 and there is now an excess of H^+ ions and less OH^- ions than that. This solution will be a weak acid
6. describe the colour change, pH range and concentration of H^+/OH^- ions as more acid added to make a strong acid solution	Step 5: When even more acid has been added, the solution will turn red and has a pH of 1–2 and there is now a large excess of H^+ ions and very few OH^- ions. This solution will be a strong acid.
7. describe the colour changes of litmus (red and blue) linked to acid, base or neutral	Litmus paper is useful to tell us if a solution is acidic, basic or neutral. (When blue litmus turns red and red litmus stays red, this tells us the solution is acidic. When both blue and red litmus papers stay the same, this tells us the solution is neutral. When red turns blue, this tells the solution is basic)
8. describe the colour changes of Universal indicator linked to pH	Universal indicator has many different colours that not only tell us if a solution is acid, base or neutral but allows us to tell the pH of the solution
9. complete final statement	Universal Indicator tells us more information about a solution's pH than <u>Litmus paper</u> and tells us how acidic, basic a solution is or if it is <u>neutral</u> . Litmus is <u>limited</u> as it only tells us if it is acid, basic, or neutral whereas Universal Indicator tells us how acidic or basic it is.

NOTE: The white column is how your answer would appear on your test paper so make sure you **write out complete sentences**. The grey area is just to help you structure your answer and would not appear in the question.