



STEM clubs

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RAINBOW REACTION

Focus: Chemistry

Universal Indicator is used to show whether something is acid or basic. By changing colour, it can measure pH from 1 to 14. Hydrochloric acid causes the indicator to turn red. The sodium carbonate solution is a base, so it causes the indicator to turn blue. The sodium carbonate is more dense than the hydrochloric acid. You may have already completed an experiment in class where you have observed that an acid can be neutralised by an alkali of equal strength. This activity demonstrates a neutralisation reaction.



To illustrate the pH scale for acids and alkalis.

Equipment:

- 50cm³ burette with bung
- syringes to dispense up to 20cm³
- 0.1mol dm⁻³ sodium hydroxide solution (irritant)
- 0.1mol dm⁻³ hydrochloric acid (irritant)
- 0.1mol dm⁻³ sodium carbonate solution
- universal indicator solution (flammable)
- eye protection

Instructions:

1. Wear eye protection
2. Make sure that the tap of your burette is closed.
3. Add around 10cm³ of sodium hydroxide solution to the burette followed by a few drops of universal indicator. Insert the bung and carefully invert the burette once to mix the indicator.
4. Add around 20cm³ of hydrochloric acid followed by around 1cm³ of sodium carbonate solution. Insert the bung and carefully turn the burette upside down, while holding on to the bung. Be careful as gas will form and could spray over you.
5. You should see rainbow colours ranging from deep purple through blue and green to orange and red. But if you don't, turn the burette upside down again (carefully). You might need to adjust the volumes of hydrochloric acid and sodium carbonate solution to get the desired effect.

Discuss:

1. Which volumes of hydrochloric acid and sodium carbonate gave the best colour range?
2. What do you think would happen if you used more concentrated acid/alkalis?
3. What do the different colours throughout the solution show?
4. Were you able to see every pH number?



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chemistryforall@ljmu.ac.uk



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