

Teaching observational skills with a microscale neutralisation and precipitation reaction – technician notes

Education in Chemistry

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Hone your students' observation skills by asking them to follow the integrated instructions for two microscale reactions and observe what happens

Kit

Per student/group:

- 2 dropping pipettes
- 2 microspatulas
- practical sheet, laminated or in plastic wallet
- paper towel for clearing up
- universal indicator solution
- water
- citric acid, a few crystals (irritant)
- anhydrous sodium carbonate, a few crystals (irritant)
- lead(II) nitrate(V), a few crystals (harmful and toxic)
- potassium iodide, a few crystals

Reaction 1: Precipitation of lead iodide

1. Add a few crystals of potassium iodide to the left-hand small circle.
2. Add a few crystals of lead(II) nitrate(V) to the right-hand small circle.
3. Add 10 drops of water into the large central circle.
4. Carefully push the crystals into the edges of the drop of water.
5. Observe the dissolution of the crystals and the formation of lead iodide.

The potassium iodide and lead(II) nitrate(V) crystals will dissolve into the water. Yellow lead(II) iodide crystals will form in the centre of the drop over time as the ions diffuse towards each other.

Reaction 2: Neutralisation of citric acid

1. Add a few crystals of anhydrous sodium carbonate to the left-hand small circle.
2. Add a few crystals of citric acid to the right-hand small circle.
3. Add 10 drops of water into the large central circle.
4. Add 1 drop of universal indicator solution to the central drop of water.
5. Carefully push the crystals into the edges of the drop of water.
6. Observe the dissolution of the crystals, the change in colour of the indicator, and the formation of carbon dioxide bubbles.

The sodium carbonate will dissolve into solution, turning the green indicator to blue/purple. The citric acid will dissolve into solution, turning the green indicator orange/red. Where the solutions meet, neutralisation will occur, and bubbles of carbon dioxide gas will form over time.

Health and safety

- Lead(II) nitrate(V) is harmful and toxic. Sodium carbonate is irritant. Citric acid is irritant. Only very small quantities of the solids are being used, reducing the risk.
- Indicator solutions can be flammable depending on the solvent used.
- Check CLEAPSS/SSERC or another reputable source for full risk assessment guidance.

Disposal

Wipe down the laminated sheet/plastic wallet with a paper towel and dispose of the towel in normal refuse. Rinse and dry the laminated sheet/plastic wallet.