

Practical contexts and scenarios

This resource accompanies the article **The AI experiment** in *Education in Chemistry* which you can view at: rsc.li/4iTkGVW

How to use

Use this table to help contextualise practicals and relate everyday scenarios to the chemistry experiments you do in your lessons. Teachers created this table using suggestions generated by Claude.ai in an RSC Education teacher support session.

Practical	Context	Scenario
Chromatography	Plant pigments	An analytical lab needs help comparing solvent mixtures to find out which is best at separating out photosynthetic plant pigments.
	Environmental science and water pollution	Students test water samples from different bodies of water for chlorophyll, investigating links to algal blooms like the issue in Lough Neagh.
	Safety in food colouring	A confectionery company analyses various coloured sweets to determine which ones contain banned or unsafe food dyes.
	Forensic ink analysis	Forensic scientists analyse inks from different pens to link an incriminating note to a specific pen in a crime scenario.
	Identifying unknown substances in pharmaceuticals	A pharmacist needs to identify an unknown powder, commonly found in people's medicine cabinets, by comparing it to known painkillers like aspirin, paracetamol and Anadin.
	Crime investigation	Police use chromatography to investigate the writer of a note, analysing black inks from pens linked to different suspects.
Displacement of metals	Metal recovery from scrap	Explore how industry uses scrap iron to recover copper from copper sulfate solutions, mimicking industrial copper recovery techniques.
	Repairing railway lines	Students simulate how train companies use metal displacement reactions, like thermite, to repair broken railway tracks quickly and efficiently.

Electrolysis	Electroplating for restoration of objects	Based on the TV show <i>The Repair Shop</i> , students electroplate an old, rusty and much-loved object as part of a restoration project.
	Electroplating to prevent corrosion and clean metal objects	Garry's Garage is restoring cars and wants to use chemistry to electroplate metal parts to prevent corrosion.
	Renewable energy generation	A coastal town is looking to reduce its carbon footprint and become more energy independent. They decide to invest in a hydrogen fuel cell system to power their public transportation. To produce the hydrogen, they opt for electrolysis using renewable energy sources. How would you go about this?
	Jewellery cleaning business setup	A small business owner wants to start a jewellery cleaning service using electrolysis. Students should recommend the most appropriate methods and equipment.
	Wastewater treatment to remove toxic substances and heavy metals	Environmental scientists use electrolysis to treat contaminated water from chemical plants, reducing levels of heavy metals and other pollutants. Students devise a system for treating local polluted water.
	Aesthetic treatment for permanent hair removal	An aesthetics studio plans to create a leaflet to explain how they use electrolysis to remove body hair by applying electrical currents to destroy hair follicles. What information should they include?
Ion testing	Identifying ions for fireworks	A fireworks factory has mislabelled its products, so students must identify ions (e.g. lithium for red, sodium for yellow) and correct the labels for each firework colour.
	Environmental contamination	A factory denies releasing waste into a local river after heavy rainfall. Students must test the water for harmful ions to confirm or refute the factory's claims.
	Optimising soil for plant growth	Students test the mineral content in different soils to determine which is best for promoting the growth of various plants, focusing on essential nutrients like NPK.

Making salts	Sodium citrate as an acidity regulator in food	A food manufacturer wants to devise the safest method for making sodium citrate, which they use as an acidity regulator in dairy products.
Mass of water in hydrated crystals	Plant water storage gels or building materials	Students investigate which brand of plant water storage gels holds the most water. Alternatively, they could test the water content in gypsum to ensure its safety for construction use.
	Quality control of sodium carbonate in laundry detergents	A quality control chemist at a laundry detergent manufacturing plant tests the company's use of hydrated sodium carbonate (washing soda) as an important ingredient in its products. Too much water could result in less sodium carbonate in the product, making it less effective. Too little water may make the detergent too abrasive.
Reactions of acids	Identifying unknown liquids	A lab technician suspects a mix-up with bottles containing acid, water or alkali. Students conduct reactions to identify which liquid is in each bottle.
Titration	Determining the concentration of ethanoic acid in weedkiller	Students carry out titrations to determine the concentration of ethanoic acid in different brands of weedkiller to find which is the safest or most effective.
	Determining acidity of food products	A local juice company needs help determining the concentration of citric acid in its lemon juice to meet food safety regulations.
Rates of reaction	Investigating effectiveness and safety of weedkillers	Students use rates of reaction to find which ethanoic acid-based weedkiller has the most active ingredient or which is the safest by comparing to weedkillers that contain glyphosate.
Temperature changes	Product testing for winter accessories	Experiment with different chemical reactions to find the best combination for a new hand warmer to get through the winter months.
	Product testing for medical and sports use	Students determine the best concentrations and quantities for creating a new instant ice pack, focusing on the chemicals that provide the most efficient cooling.