The PREP ROOM

Compiled by Jodi Clements

Easy food tests

Tracy Black writes:

Here is an easy version of the food test practical that is not messy and gets the desired results, good for low ability students but has also been used for higher ability students so that they have to follow the method without intervention from the teacher. It is a bit time-consuming to set up, but pays off when the washing up comes back!

We set up one tray for a pair of students to share, but 3 or 4 students could all use one tray and still have some hands on experience. Each tray contains: crushed biscuit, milk, 'Lucozade', 0.05 M iodine solution, Benedict's solution and Biuret solution, a pestle and mortar, test tube rack, test tubes, spatulas, filter paper, pipettes and a spotting tile.

We use full fat (blue top) milk. The 'Lucozade' is a glucose solution, coloured orange with any standard food colouring. The biscuit is a cheap one that contains glucose syrup. The Biuret solution is the bought pre-mixed version, which usually contains 0.1 M sodium hydroxide and 0.01 M copper sulfate and is low hazard; however, you must check the concentrations of your particular stock and label and risk assess accordingly. We do test it out on the milk before each use to make sure that it works. Feedback from teachers is always favourable when they follow this method, and it could easily be adapted to suit other settings and/or abilities. The most common mistake is using Benedict's instead of Biuret, but that is a learning opportunity, a chance to talk about reading instructions and labels correctly and selecting the correct equipment.

You will be testing milk, biscuit and Lucozade for starch, protein, sugar and fat. Never be tempted to taste food in a laboratory.

1. Collect your tray of equipment. Everything that you need to test the 3 different foods is in the tray. Wear safety spectacles.

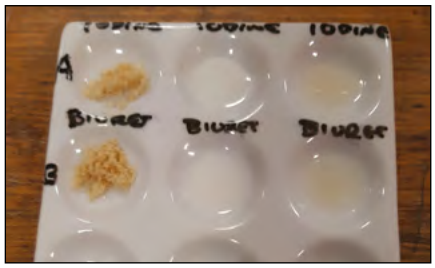
2. Crush the biscuit in the mortar using the pestle.

3. Take the spotting tile and label one row 'A' and one row 'B'. Row A is for iodine solution, so label as so, and row B is for Biurets. Label the tile using a sharpie or similar type of marker, or a chinagraph pencil. Place a small spatula full of the crushed biscuit in one dimple in row A and one dimple in row B.

4. Using the pipette, put 3 drops of milk in the next dimple along in row A and do the same in row B.

5. Using another pipette, put 3 drops of Lucozade in the third dimple in row A and repeat in row B.

6. Your tile should look like this now.



7. Put 3 drops of iodine solution (0.05 M) in each of the foods in row A. What colour does it go? Black indicates that starch is present. Orange indicates that starch is not present.

8. Put two drops of Biuret solution in each of the foods in row B. What colour

does it go? Mauve/light purple indicates that protein is present. Pale blue indicates that protein is not present.

9. Take the beaker with three test tubes in. Add a spatula full of crushed biscuit to the tube marked 'biscuit'. Add a pipette of milk to the tube marked 'milk'. Add a pipette of Lucozade to the tube marked 'Lucozade'.

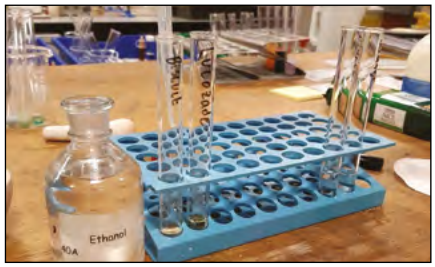
10. Add 10 drops of Benedict's solution (irritating to eyes and skin) to each test tube.

11. Put approximately 100 ml of hot water from the kettle into the beaker. Your teacher will help you with this.

12. Leave the test tubes in the hot water for 3 minutes or more and observe the colour changes. An orange colour indicates that sugar is present. A blue colour indicates that no sugar is present.

13. Take the test tube rack with 4 test tubes in. Place 1 spatula of biscuit in test tube labelled 'biscuit'. Place 1 pipette of Lucozade in test tube labelled 'Lucozade'.

14. Add 1 pipette of ethanol (highly flammable – no naked flames) to test tube labelled 'biscuit' and 1 pipette of ethanol to test tube labelled 'Lucozade'.



15. Wait 2 minutes, then add biscuit and ethanol mix to one of the test tubes

labelled 'water'. Add Lucozade and ethanol mix to second test tube labelled 'water'. Observe the colour changes. If it goes cloudy white, then fat is present.

16. Take a piece of filter paper and pipette 1 drop of milk onto it. Allow the milk to dry. Does it leave a greasy mark on the paper? If yes, fat is present. If no, fat is not present.

Sample results

Tracy Black RSciTech works at St. Aldhelm's Academy, Poole.

Technicians' cleaning hacks

Ana Gurkan

Being a school science technician is a hands-on job, the kind where you learn as you go. It is a rather lonely job, as most of us work in small teams, and many juggle all the work by themselves. Networking with other techs is the best way to learn valuable hacks that make our job easier.

When I started, I struggled to find cleaning tips. I decided to gather advice from seasoned techs and create a document to share with others. As simple as it might seem, I am confident that it will come in handy, especially for people who are new to the role and have no previous lab experience. I have listed some hacks below. Depending on the nature of the stain, you might

have to increase the concentration of the cleaning agent. Start from the lowest concentration and work your way up, bearing in mind that, with an increased concentration, risks increase. If the cleaning agent is hazardous, wear eye protection, but wear goggles if the cleaning agent is corrosive.

1. Limewater residue comes off after rinsing with 0.1 M HCl.
2. Keep a set of crucibles/test tubes for the same dirty practicals.
3. Sodium thiosulphate removes iodine stains.
4. Oxalic acid removes iron stains. Solid and most solutions are harmful to skin, eyes and if swallowed.
5. Wear gloves when washing anything with traces of $KMnO_4$ or $AgNO_3$.
6. Eosin stains come out with 0.5 M sodium hydroxide. It may need a few repeat applications. NaOH solutions above 0.5 M are corrosive.
7. 0.5 M HCl removes yellow/red fehlings/Benedict's stains.
8. To clean rust stains from glassware, soak it in 0.5 M oxalic acid (irritant to skin and eyes) or 0.5 M citric acid (solutions greater than 0.5 M are irritant to skin and eyes). If the sink is stained, scrape all the solid off and leave the acid overnight.
9. 20 vol H_2O_2 (irritant to eyes) and 0.5 M HCl remove permanganate and methylene blue stains on glassware.
10. Silver mirror residue is easily removed with 1 mol/dm³ HNO_3 (corrosive to skin and eyes, avoid inhaling fumes). HNO_3 may be reused until it stops working. It is worth keeping some of it labelled for this purpose.
11. Burnt-on sugar lifts with 1 M NaOH (corrosive) or with a soak in 20 vol H_2O_2 (irritant to eyes).
12. Swish around a few copper turnings or a sink plug chain in round-bottom flasks to scour stains off. Keep hold of the end of the chain to remove it after the flask is clean.
13. Check the benches for stains after using $AgNO_3$. 0.5 M nitric acid (irritant to eyes and skin, avoid inhaling, may produce toxic fumes) or 0.5 M sodium thiosulphate remove fresh stains. They will appear as a pinkish-brown stain initially, but eventually darken to black. Magic sponge removes older stains, but it is hard work.
14. Squirt a bit of washing up liquid in a test tube to remove re-solidified molten sulfur fused to its bottom. It will lift off after about 24 hours. You might need a minimal amount of test tube brushwork after the soaking.
15. To remove green algae from distilled water containers, swirl around a piece of cotton wool and some water in them. This also works on some other inaccessible deposits in glassware.
16. To remove potassium permanganate stains from glassware and work surfaces, use 0.5 M sulphuric acid (irritant to skin and eyes) and 10 vol H_2O_2.
17. Keep a bottle of 1 M HCL for cleaning cloudy glassware. This can be used several times before disposal.
18. For cleaning soot marks from the outside of glassware, soapy water and a scourer work fine.
19. Wear gloves to handle ninhydrin bottles to avoid getting purple fingers.
20. To avoid staining sinks with Gram's staining, use staining racks (two stirring rods joined at their ends with rubber tubing) over ice cream tubs. Pour the content of the tub carefully down the plughole.
21. Use a ziplock bag or wrap magnets in clingfilm before using them with loose iron filings.
22. Clean sublimed iodine crystals off the inside of flasks by swilling with a bit of KI solution. Save the resultant iodine solution for food tests.
23. To find out which metal strip is zinc, drop the piece of metal on the floor and listen to it. Only zinc makes a flat sound.
24. Label glassware with permanent markers. This will not rub off with fingers but comes off easily with a wet scrubber sponge or with a bit of ethanol (highly flammable, no naked flames).
25. Avoid masking tape or duct tape on glass or plastic, as it is hard to remove.
26. Blue painter's tape is best for removable labels on plastic.
27. If you carry out microscale experiments, create permanent sets of glass vials for solids or squeezy dropper bottles for liquids. Label them with printer labels covered with clear tape.
28. Use a damaged spring (used for Hooke's Law) as a drying rack for microscope slides.
29. Keep the ethanol used for the Testing Leaves for Starch experiment in a bottle for cleaning purposes. Even though it is green, it will be very useful around the lab.

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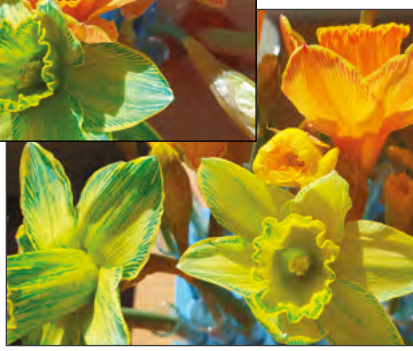
Primary-secondary transition

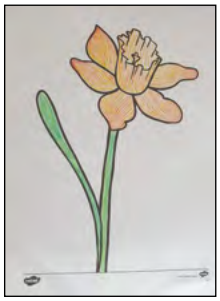
Tracy Black

Primary school liaison is currently a big focus within our Multi Academy Trust and as the main feeder primary school for our secondary is in the same Trust, it seemed right to start forging some stronger links. Since the pandemic began, there has been no formal transition day and open evenings have been virtual, so many of the potential Year 7 (age 12) students of the future have not had a chance to visit. Hopefully this will all be back to normal in 2022 but, in the meantime, our science department has started to think of ways to encourage our feeder schools to get involved. One planned event was a visit from Year 3 (age 8) in March to come to do some science in the labs for British Science Week. We had planned to use the theme of growth to plant cress in different media and begin some investigative skills with them. Sadly, due to staff shortages at both schools (will Covid ever let us be normal again?) and a lack of volunteers to help walk Year 3 pupils to our school, we had to do a last-minute rethink.

It was decided that I would go to the primary school to introduce myself, talk about British Science Week and do some activities with them. I wanted to keep the theme of growth and March lent itself to doing one of my favourites, dyeing daffodils to show water uptake. We sourced some suitable worksheets from the Internet and set about assembling equipment that could be easily transported and would be safe to use in a primary school classroom. There was a slight moment of panic when the daffodils I had bought were still in tight bud on the morning of the visit, but my lovely colleague saved the day and did a dash to the local supermarket, where she found some beautiful open ones. Putting neat food colour (YPO Messy Play in blue and red) into test tubes with bungs in the top and then transporting them in racks to distribute around the classroom was a great idea – no chance of spillage, no hands or uniforms stained with dye, but an opportunity to talk about the names of some scientific equipment and for them to use it. We packed some beakers and pipettes and got the children to draw up water to dilute the food colour in the test tubes, so another skill was learnt, and they really enjoyed it. For such a simple activity, it was so lovely to see the excitement on their faces and to hear their thoughts on predicting what would happen. We put one daffodil just in water, which gave an opportunity to talk about controls. I also took along the daffodils that were still in bud, so we discussed if they thought that they would take up the dye or not and if there would be any differences in the results. All good science!

As luck would have it, the day of the visit was a warm spring morning and both classrooms that I worked in had large sunny windowsills as well as very hot radiators. I am not sure who was the most excited as we saw the daffodils changing colour in front of our eyes. They certainly made a lovely display by the time I left, as the photographs show. I left the children blank daffodil pictures to colour in once they had seen the results. The teacher sent some through to me, saying that she was amazed at the detail they had included and that the children had absolutely loved the whole experience. We both agreed that me going out to them was a great introduction and that the children will feel even more excited about coming to the labs because of it.





Primary liaison is certainly enjoyable, definitely worthwhile and is also a great opportunity to raise the profile of the technician.

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