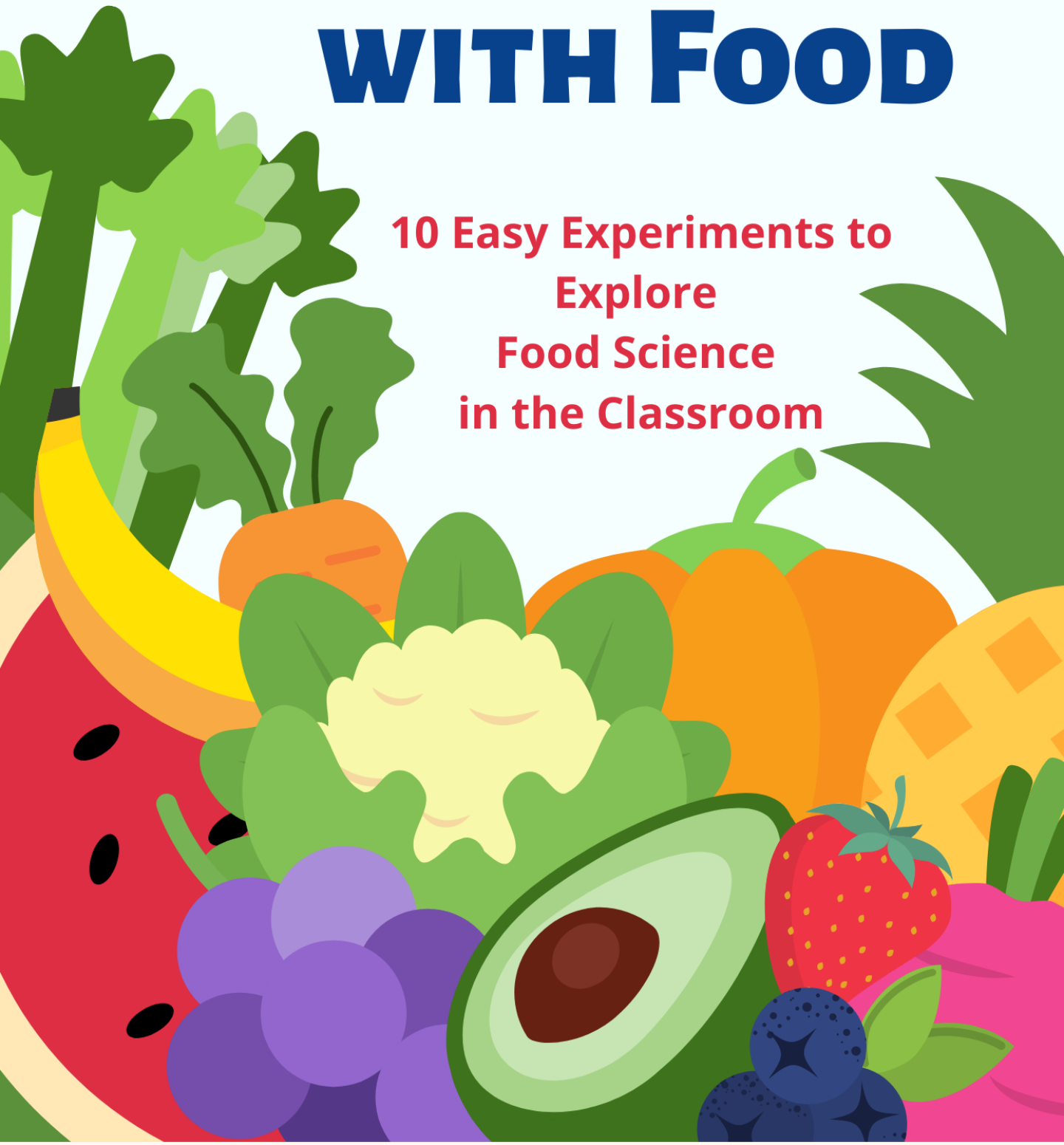
Refresh.ED

Science Fun with Food

10 Easy Experiments to Explore Food Science in the Classroom



INTRODUCTION

Refresh.ED proudly supports the theme of National Science Week 2021 *Food: Different by Design* as well as honouring the Food and Agriculture Organization (FAO) of the United Nations International Year of Fruits and Vegetables.

This digital resource has been developed to help teachers integrate food & nutrition into science education, providing inspiring ideas for kindergarten through to year 10 classrooms. Each experiment has been designed and developed with a focus on economy and accessibility whilst also being complimentary to Refresh.ED's comprehensive catalogue of resource material.

ACKNOWLEDGEMENT

Refresh.ED gratefully acknowledges ECU student Mikaela Giumelli for her work on developing this resource during practicum placement.

CONTENTS

For detailed lesson plans & curriculum reference/ linkage for each individual experiment please visit our website.

https://www.refreshedschools.health.wa.gov.au/

YEAR K - PP

Fruit & Veg Rainbows

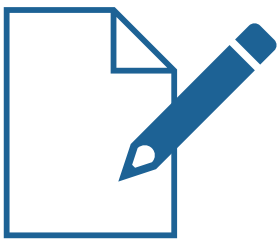
40 mins

MATERIALS

- Rainbow worksheet (1 per child).
- Assortment of shopping catalogues/ food magazines.
- Crayons for colouring.
- Scissors.
- Glue sticks.

METHOD:

1. Colour the rainbow worksheet in the appropriate colours.



2. Cut out pictures of fruits & vegetables in all the colours of the rainbow.

3. Glue the cut-out pictures of the fruits & vegetables onto the matching colour of the rainbow on the worksheet.

WHY?

Fruits & vegetables contain chemicals in their cells called pigments. These pigments can be lots of different bright colours and give the fruit or vegetable its colour that we can see.

HPE Science English Technology Visual Arts

YEAR 1 - 2

Purple Pickled Eggs

1 -2 days

MATERIALS

- 2 cups of water (divided into single cups).
- 1 medium fresh beetroot, peeled & diced.
- 1 cup apple cider vinegar.
- 1/3 cup sugar.
- 2 teaspoons sea salt.
- 12 hard boiled eggs, peeled & cooled.
- Salt & pepper for serving.

WHY?

Fruits & vegies contain chemicals in their cells called pigments which give them their colours. Reddish - yellow pigments are named Betalains. These pigments are water soluble and red beetroot contains the pigment Betanin.

METHOD:

1. Prior to beginning boil the eggs, peel & cool ready for pickling.

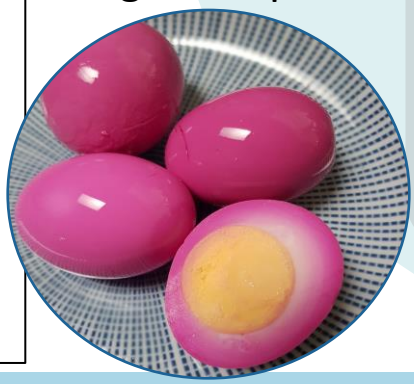
2. Mix 1 cup of water and the chopped beetroot in a small pot & bring to a simmer. Cook until tender, 15 mins approx.

3. Strain the mixture, reserving the liquid and beetroot pieces.

4. Return the liquid to the pan & add the vinegar, remaining 1 cup water, sugar & salt and simmer until the sugar is dissolved.

5. Remove from heat & leave to cool.

6. Transfer the brine to a large glass jar/bowl and add your boiled eggs. Making sure they are fully covered. Chill overnight. The eggs will intensify in colour the longer they are pickled for and will store in the fridge for up to 1 week.



7. To serve cut the eggs in half and season with salt & pepper as desired.

YEAR 2 – 3

Magic Milk

40 mins

MATERIALS

- Full fat cows milk.
- Water.
- 2 x shallow dish.
- Liquid dishwashing detergent.
- Cotton bud sticks.
- Liquid food dyes in assorted colours.

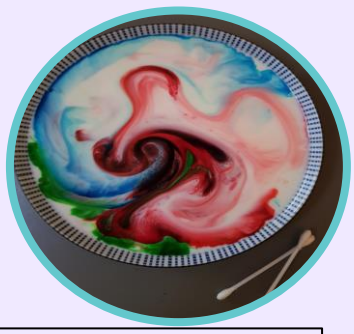
METHOD:

1. Pour the milk into 1 dish & water into the other.

2. Place drops of the various food colourings into the centre of the milk & water.

3. Place some of the detergent onto a plate/bowl and dip a cotton bud stick in it until the end is well covered.

4. Tap the cotton bud stick gently on the surface of the water. Repeat with the milk and observe the magical results.



WHY?

The reason the colourful dyes move so magically around in the milk when detergent is applied is because of surface tension. Surface tension is like an elastic web of liquid molecules on top of the liquid and when they are disturbed they move around & then reform. The detergent also reacts with the fat in the milk to make many mini chemical reactions within the milk which keep the liquid molecules moving for longer.

YEAR 4 +

Ricotta

40 mins

MATERIALS

- 1 L Full fat cows milk.
- A saucepan.
- 50 ml lemon juice or white vinegar.
- A clean Chux cloth/ cheesecloth.
- Strainer/ colander.
- Cracker biscuits.
- Olive oil, salt & pepper to serve.

METHOD:

1. Pour the milk into the saucepan and bring to a gentle boil over heat. Alternatively microwave/ Thermomix the milk until it reaches 80 -90℃.

2. Remove the saucepan from the heat and whilst stirring slowly add the lemon juice or vinegar (the acid) to the mixture.

3. Leave the mixture to stand and observe the milk solids separating from the liquid (the curds from the whey).

4. Line the strainer with the Cloth and strain the mixture.

5. Squeeze out any excess liquid and leave the cheese to cool for approx 15 mins. Top with a drizzle of olive oil, salt & pepper and serve on crackers.

WHY?

Cheese is made by separating the proteins in milk (casein & whey proteins) from the liquids present in the milk. Heat is applied in order to denature the proteins and an acid is introduced in order to coagulate (stick/ clump together) the proteins which eventuates in the separation of the milk into curds and whey.

YEAR 5 - 6

Sink or Float Soda Cans

40 mins

MATERIALS

- 1 can 375ml soda.
- 1 can 375ml diet soda.
- Large clear bucket or tub.
- Water to fill the tub.
- Digital scales.
- 1 empty favourite drink from home.

METHOD:

1. Fill the tub with tap water.

2. Place the two cans into the water.

3. Make your observations.

4. Remove the cans from the water. Dry and weigh each can.

5. Weigh out the sugar and determine how many teaspoons are in each can.

WHY?

The difference between the amount of sugar used in regular soda versus the amount of sweetener used in diet soda causes a difference in the density of the liquids. Artificial sweeteners are much stronger/ sweeter than sugar so only a small amount is needed to sweeten the soda. This creates a difference in the mass of the cans even though they are the same volume and in the same packaging.

YEAR 6

Potato Power

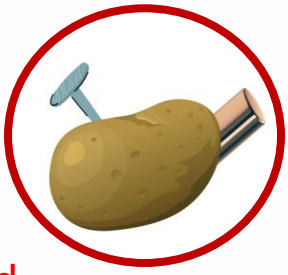
40 mins

MATERIALS

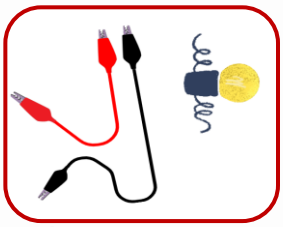
- 1 potato per group.
- 1 LED.
- 1 zinc plated nail (galvanized nail).
- 1 piece of copper sheet/ a copper nail.
- Copper wire/ alligator clamps.

METHOD:

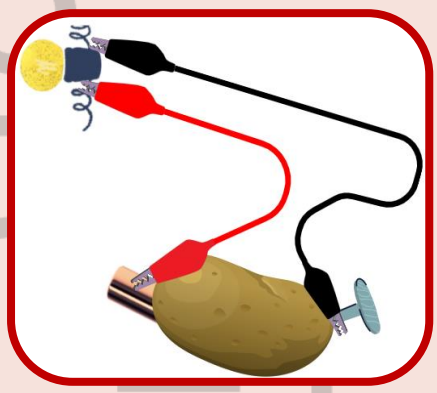
1. Push the nail into one end of the potato & push the copper metal into the opposite end of the potato.



2. Attach the end of the Red alligator clamp to the copper (+) and the **Black** alligator clamp to the zinc nail (-).



3. Connect the Red alligator clamp to the long arm of the LED & **Black** alligator clamp to the short arm.



4. Observe your LED, if more power is required try making a bigger circuit by adding more potatoes.

WHY?

Potatoes contain vitamins, minerals, water, carbohydrate, protein & fibre. It is the presence of the water, sugars and acid within the potato that allows electrons to flow between the metals to form an electrical current. The copper & zinc react effectively forming electrodes, the zinc acts as the electron rich anode (- neg) whilst the electron poor copper acts as the cathode(+ positive).

YEAR 7 - 8

Bouncy Eggs

1 – 2 days

MATERIALS

- 1 raw egg per student/ group.
- 1 – 2 cups white vinegar.
- Container/ glass to house the egg & vinegar.

METHOD:

1. Place the egg into a suitable container.

2. Cover with white vinegar & leave overnight.

3. Remove the egg from the vinegar and rinse under running water whilst rubbing off the shell.

4. When bouncing your egg use a shallow dish in case of breakage.

WHY?

An egg is comprised of several layers: the shell, an inner membrane, the egg white (Albumen) & the yolk. It's shell consists mostly of calcium and is porous. When placed into the vinegar (an acid) the acid reacts with the calcium carbonate of the shell, dissolving the shell & producing Carbon Dioxide gas whilst the inner membrane s intact.

YEAR 7 - 8

Eggy Osmosis

1 – 2 days

MATERIALS

- 1 bouncy/ shell less egg.
- 1 cup golden syrup or corn syrup per egg.
- Container/ glass to house the egg & syrup.

METHOD:

1. Place your bouncy egg into a container that will hold enough syrup to cover the egg (approx. 1 cup).

2. Cover with the syrup of your choice and leave overnight.

3. Remove the egg from the syrup & make your observations.

WHY?

Osmosis is the movement of a solvent (liquid) across a semipermeable membrane. As the egg does not have a shell its cellular membrane is exposed, encasing the contents/ solvent of the egg. When the egg is then placed into an environment where there is a difference between the concentration gradient of the egg's internal liquid and the liquid outside of its membrane, the liquid travels across it in attempt to equalize the solute concentrations on both sides.

YEAR 8

Cabbage Litmus Paper

40 mins +

MATERIALS

- ½ a red cabbage chopped.
- 500ml cold water.
- Blender/ Juicer.
- Chux cloth (for lining colander).
- Colander/ Fine Mesh Strainer.
- Large bowl (1-2 L).
- Paper kitchen towel.
- Scissors.

METHOD:

1. Place the chopped cabbage & 500ml of water into the blender and blitz.

2. Line a colander or strainer with the Chux and strain, reserving the liquid.

3. Quickly soak the paper towel in the reserved liquid & leave to dry.

4. Once dry cut into strips. The paper is now ready to test solutions like soapy water, tap water or lemon juice to see if they are basic or acidic.

WHY?

Pigment molecules give fruit & vegetables their colour & the pigment in red cabbage is called Anthocyanin. Anthocyanin is special in that it is known as an acid-base indicator. When exposed to either an acid or base Anthocyanin molecules change shape which causes them to absorb light differently. This effects what colour our eyes perceive and is why we will see purple for neutral, red/pink for an acid or green/blue for a base.

YEAR 9

Hello Gluten

40 mins

MATERIALS

- 1 cup Wheat flour (2 types of flour).
- ½ cup water.
- 1 food processor/ bowl & mixing spoon.
- 1 mesh sieve/ colander.
- Sink/ access to running tap water.
- Chux cloth.

METHOD:

1. Combine 1 cup flour with the ½ cup water to make a dough. Knead for 2 - 3 mins and set aside . Repeat with the other flour.

2. Using a mesh strainer lined with Chux wash your dough to remove any starch under running water. When done the water will run clear.

3. Remove your gluten from the water, dry on paper towel, weigh and make your observations on the worksheet .

4. Compare your results and record your observations.

WHY?

Wheat flour contains the proteins Glutenin and Gliadin which bond together in the presence of water to form an elastic network. This network of proteins is then called Gluten. Gluten has the ability to trap air as the protein network swells with starch granules and gas which happens as a result of chemical reactions occurring within the dough. This causes the dough to rise and forms the basis of baking. The protein content of wheat flour determines the amount of gluten produced and informs its baking purpose/choice.

YEAR 10

Deconstructing Denaturation

MATERIALS

- 4 raw eggs per group.
- 4 clear beakers/ containers.
- kettle/urn
- measuring jug
- 100 ml water.
- 100 ml boiling water.
- 100ml white vinegar.
- 100 ml methylated spirits.

WHY?

Denaturation is a process of modifying the molecular structure of a protein by the application of an external stressor/ compound such as heat, acid or organic solvent. The chemical bonds that are responsible for the highly ordered structure of the protein in its natural state break, changing their shape. Denatured proteins have a looser, more random structure, most are insoluble.

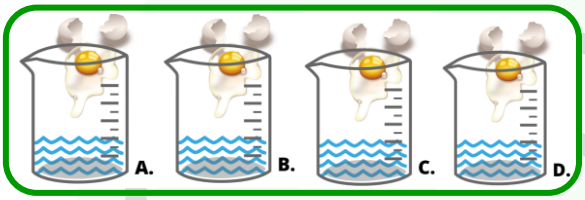
METHOD:

40 mins

1. Label each container: **A.** control water (room temp),**B.** hot water, **C.** vinegar and **D.** methylated spirits.

2. Crack an egg into the control container & add 100ml of room temp water, recording your immediate observations & setting the timer for 2 mins.

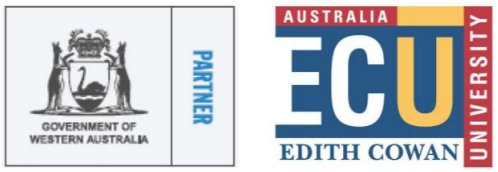
3. Crack each raw egg into each beaker & fill with the labelled 100ml solution, recording any immediate observations & setting each timer for 2 mins. Repeat until all beakers are set up.



4. After the 2 mins have elapsed record your observations and set the timers for a further 3 mins.

5. At the 5 mins mark record your observations & set the timers again for another 5 mins.

6. After the 10 mins have elapsed record your observations for the final time.



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