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***Why do apples go brown?***

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Teacher notes (LONG version - 20 mins)

**WORKING SCIENTIFICALLY:** Comparative fair testing / Looking for naturally occurring patterns & relationships / Identifying and classifying things

**Resources:** knife & chopping board (for the teacher), apples, plastic petri dishes or small plates, small bottles of milk, water, lemon juice.

**Starter (5 mins)**

* *What happens when you cut open an apple and leave it for a few minutes?* It goes brown.
* *Why? What makes it go brown?* A chemical reaction is taking place; oxygen in the air is reacting to an enzyme in the apple.
* *Why doesn’t the apple go brown before we bite it?* The skin of an apple keeps the air out.

**MAIN TASK (15 mins)****Working Scientifically – ‘comparative fair testing’ - recording results**

You are food scientists working for a company which makes healthy, ready to eat snacks and desserts.

You would like to make your salad from local, seasonal fruit, and in September in the UK there are lots of apples. But there is a problem - when the apples are cut into pieces they go brown. Although this doesn’t do you any harm, it doesn’t look very nice to eat.

You must carry out an experiment to find out what we can add to the apples to stop or slow down the browning.

**Instructions**

Place a piece of cut up apple into each of the 4 petri dishes and pour a different liquid on each one to see if it stops or slows down the browning.

1. Water
2. Milk
3. Lemon juice
4. Nothing (the ‘control’)

Wait 5-10 minutes and observe the results – verbally and/or record on a table.

*Whilst you are waiting, you can discuss plant classification & math in nature: ask students to guess which plant family the apple belongs to - show them 3 different plants e.g. daisy, rose, cabbage (Answer - Rosaceae, or rose. Pronounced rose – ay – see – eye!). Cut an apple cross-ways to show them the 5 pointed star inside – and then show them this star on the rose plant (it’s easy to demonstrate with the 5 sepals where a flower has been, you can also show where the fruit emerges behind these sepals).*

**(10 mins) Feedback & conclusions**

* *Which stopped the browning a) the most? b) the least?*
* *Did each group get the same result? (opportunity to discuss fair testing, sample sizes etc).*

**Conclusion** – The lemon juice slows down the browning the best. Doing nothing slows it the least. *Why?* Lemons contain ascorbic acid (vitamin C) which the oxygen reacts with first, before the enzyme in the apple. Even the apple with lemon juice will go brown eventually. *Optional extension* – Discuss pH. Ascorbic acid has a lower pH than the enzyme in the apple.