



## Candy Coatings

### How do beetles help to make certain sweets?

Stock items	Consumables
Bin bags	Jelly Beans
Plastic cups	Skittles
	Shellac
	Carnauba Wax
	An apple

### Presenting ideas

Show your *edible explorer* the apple.

- Apples have a shiny exterior. Can you think of any other foods which have this?
- Do you think it's natural or do you think it's man-made?
- What purpose do you think it serves?

Invite your *edible explorer* to try a Jelly Bean and a Skittle.

- Do you think the coatings on these are similar to that found on the apple?
- What do you think they're made of?

Fill one plastic cup with shellac and one with carnauba wax.

- Do you know the link between the two sweets and the two waxes?
- Do you think they're natural or do you think they're man-made?
- Why do some sweets have a shiny coating?
- Can you think of anything else that has a similar coating and why might it have this?

### What's the chemistry?

Fruit and vegetables produce their own natural waxy coating, called the cuticle. It's their barrier to the outside world, keeping moisture in and water out. But some of the fruit and vegetables we buy in the supermarket has this wax removed. When the produce is washed, it's not just the dirt that's eliminated. Its protective envelope is stripped off too. So another one has to be reapplied.

This new wax minimises moisture loss and prolongs shelf life. It's also purely for cosmetic reasons. A shiny apple looks more appealing than a dull one. The



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composition of these coatings is a closely-guarded secret but they're chemically very similar to the coatings on Jelly Beans and Skittles.

One commonly applied wax is called carnauba wax. It originates from the leaves of the *Copernicia prunifera*, a palm tree grown only in Brazil. The wax is beaten off the dried palm fronds, refined and bleached. It is a complex mixture of aliphatic esters, hydroxyl esters and cinnamic aliphatic diesters, along with free acids, free alcohols, hydrocarbons and resins.

Carnauba wax is common in many cleaning products. It's found in shoe polish, car wax, surfboard wax and furniture polish, giving a high gloss shine to surfaces. Some pills are coated in carnauba wax to make them easier to swallow. It's the waxy coating found on dental floss and it's used in many cosmetics where it gives a smooth application and glossy finish. It's found in mascara, lipgloss, eyeliner, lipstick, foundation, eye shadow, moisturisers, sun creams and many more!

Not only is it found in lots of household products, it's also what makes Skittles shine.

Another common wax is shellac. It's another naturally occurring resin but comes from an unlikely source. A bug native to Asia called *Kerria lacca*, or the lac beetle holds the answer. The female lac beetle sucks the sap of the host tree and secretes a wax which forms protective tunnels, allowing her to move around the tree without being eaten. The coated branches are cut down, crushed and sieved. This crude material still contains bark and bits of insects so it's then further purified by soaking in sodium carbonate and dried to produce shellac. The exact chemical composition of shellac is unknown but it appears to be composed of hydroxy fatty acid esters and sesquiterpene acid esters; aleuretic acid, r-butolic acid, shellolic acid and jalaric acid are the major constituents.

Shellac is also a high-gloss varnish and is the primary ingredient in a 'french polish' – a way of giving wood a high shine. It's also commonly found in primers, which is the coating you apply before you paint to give an even and professional finish. Due to its durability, shine and water-repellent properties, shellac is now the chief component in fake nails.

This same beetle secretion is also what gives Jelly Beans their glossy coating!

## Jo's Top Tips



You can buy carnauba wax and shellac online. You'll only use them for reference, so they'll be a one-off purchase.

Some cheaper versions of Jelly Beans aren't coated with carnauba wax, so check the back of the packet to make sure.

Reassure your audience that these waxes are perfectly natural and completely safe. But be prepared that they may never look at a Jelly Bean in the same way again!



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