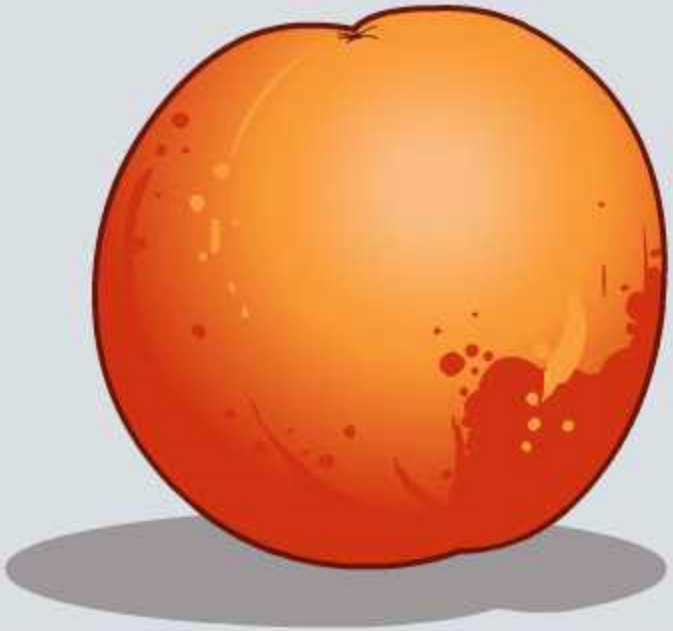
Everyday Chemical Reactions



Everyday reactions

Chemical reactions happen all around us, not just in the lab.

cooking

sticking

burning

making materials

rusting

living

Can you think of more everyday chemical reactions?

The chemistry of food

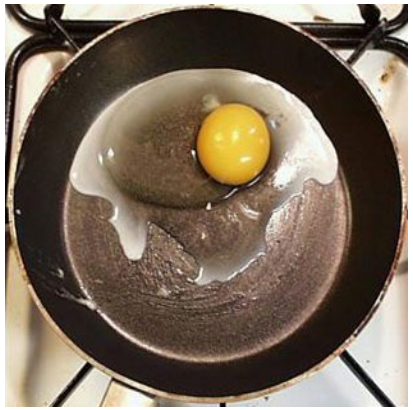
There are many chemical reactions involved in our food: how many can you think of?

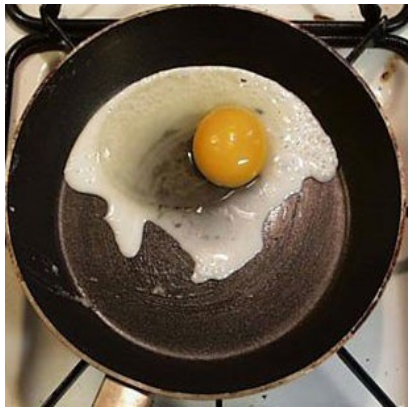
- cooking
- ripening fruit
- food going moldy
- making fertilizers and pesticides
- photosynthesis for plants to grow
- digestion when you eat food
- fermentation to make bread.

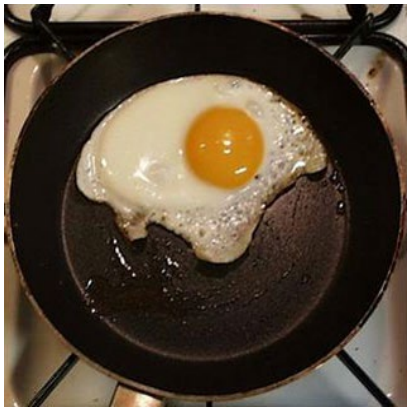
Cooking

Cooking involves chemical reactions. Changes in color, taste and texture are due to the molecules in food joining together in new ways.

Cooking an egg changes its texture from runny to firm.







Eggs contain a protein called albumen. The protein molecules are long chains of amino acids folded into a ball shape.

When eggs are heated, some of the proteins break apart and the molecules unfold. These molecules then join to other nearby protein molecules until they are all linked in a network.

Making bread

Yeast is a living organism that carries out the chemical reactions that are used for making bread.

Yeast uses oxygen from the air for **aerobic respiration**.

sugar	+	oxygen	→	carbon dioxide	+	water
$C_6H_{12}O_6$		$6O_2$		$6CO_2$		$6H_2O$

What effect do you think the carbon dioxide gas has on the bread?

Yeast can also carry out respiration without oxygen. This is called **anaerobic respiration**, or **fermentation**. This is used to produce alcohol.

Ripening fruit

The ripening of fruit is a complex collection of chemical reactions. Take apples as an example:

- Starch is broken down into sugars, increasing sweetness.
- Acids are neutralized, making the apples less sour.
- Chlorophyll (green) changes to anthocyanin (red).
- Pectin, a chemical that makes apples hard, is broken down, making the apples softer.

Why do food producers and supermarkets need to know about the conditions and reactions involved in ripening fruit?

What causes ripening?

The ripening of all fruit and vegetables involves similar chemical reactions.

The speed of ripening is affected by the temperature and by the presence of a chemical called **ethene**, C_2H_4.

Food scientists can tell producers and supermarkets the best conditions for slowing down or speeding up the ripening process so that fruit and vegetables arrive in the grocery store perfectly ripe.

Food spoilage

The changes that take place as food ‘spoils’ are also caused by chemical reactions.

For example, peeled apples turn brown when exposed to the air because they react with the oxygen in the air.

Knowing what causes this reaction can help to slow it down.

Placing sliced apples in water prevents browning because the apples are no longer exposed to air.

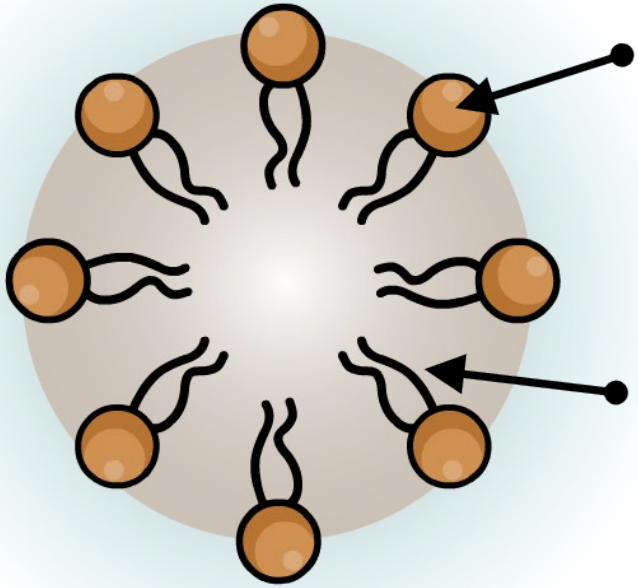
The chemical ascorbic acid (vitamin C), which is found in lemon juice, is also known to prevent the browning reaction.

Chemistry and cleaning

Grease and oil on clothing, cutlery, skin and hair are difficult to remove with just water, because oil and water do not mix.

Adding soap allows the oil and water to mix.

Soap molecules have two ends: one end is attracted to the water molecules; the other end is attracted to the oil molecules.



head of molecule bonds to water molecules

tail of molecule bonds to oil molecules

Chemistry and cosmetics

The ingredients in cosmetics like makeup, shampoo and fake tanner are made by chemical reactions. Many of the ingredients in these products are made from crude oil.

Is it sustainable to use ingredients like these?

ammonium lauryl sulfate, tetrasodium EDTA, cocamide DEA, PEG-5 cocamide, cocamidopropyl betaine, ammonium xylenesulfonate, glycerol stearate, glycol distearate, sodium chloride, glycerine, propylene glycol, DMDM hydantoin, imidazolidinyl urea, isothiazolinone, sodium benzoate, 2-bromo-2-nitropropane-1,3-diol, sodium citrate...

Chemistry and medicine

The medicines that we take are all made by chemists. Many medicines started out as natural products, which came from living things:

- aspirin – from the bark of willow trees
- penicillin – from mold
- morphine – from poppies
- digoxin – from foxgloves.

Do you know what these medicines are used for?

What do you think might be the advantages and disadvantages of using drugs from plants and molds?

Chemistry and computers

Materials scientists are chemists who research new materials for things like computers.

screen – to give out light

casing – made of tough, moldable plastic

paints and inks – for the letters on the keys

electric wires – to carry electricity

silicon chips – to store and transfer information

Chemical reactions quiz

Are these statements about chemical reactions true or false?

Can you tell which statements about everyday chemical reactions are true, and which are false?

Click "**start**" to try this true-or-false quiz.

start