

OCR 21st Century Core Science – Chemistry C3

FOOD MATTERS

C3.1 What is the difference between intensive and organic farming?

- recall that many chemicals in living things are natural polymers (limited to carbohydrates and proteins);
- recall that cellulose, starch and sugars are carbohydrates which consist of carbon, hydrogen and oxygen;
- recall that amino acids and proteins consist mainly of carbon, hydrogen, oxygen and nitrogen;
- understand that there is continual cycling of elements through consumption of living organisms and decay;
- **describe the main stages of the nitrogen cycle;**
- understand that where crops are harvested, elements such as nitrogen, **potassium and phosphorus**, are lost from the soil so that the land becomes less fertile unless these elements are replaced;
- recall and explain the methods used by organic and intensive farmers to maintain the fertility of soils used to grow crops;
- understand that yields from crops may be reduced by pests and disease;
- understand that organic and intensive farmers use different methods to protect crops against pests and diseases, and that these can have different effects on the environment;
- understand that farmers have to follow the UK national standards if they want to claim that their products are organic;
- when provided with information about the methods used in farming:
 - can identify the groups affected and the main benefits and costs of a course of action for each group;
 - can explain the idea of sustainable development, and apply it to specific situations;
 - show awareness that scientific research and applications are subject to official regulations and laws;
 - **can distinguish between what can be done (technical feasibility) from what should be done (values);**
 - **can explain why different courses of action may be taken in different social and economic contexts.**

C3.2 Why are chemicals deliberately added to food?

- recall that food colours can be used to make processed food look more attractive;
- recall that flavourings enhance the taste of food;
- understand that artificial sweeteners help to reduce the amount of sugar in processed foods and drinks;
- recall that emulsifiers and stabilisers help to mix ingredients together that would normally separate, such as oil and water;
- understand that preservatives help to keep food safe for longer by preventing the growth of harmful microbes;
- understand that antioxidants are added to foods containing fats or oils to prevent them deteriorating by reaction with oxygen in the air;
- understand that additives with an E number have passed a safety test and been approved for use in the UK and the rest of the EU;
- understand that there are health concerns about the use of some additives.
- Understanding of how emulsifiers and stabilisers function is not required.

C3.3 How can we make sure that our food does not contain chemicals that may be harmful to health?

- recall examples of natural chemicals in plants which may be toxic, cause harm if not cooked properly, or may give rise to allergies in some people (for example, poisonous mushrooms, uncooked cassava, gluten in wheat, peanut allergy);
- recall an example of a harmful chemical in food, produced by moulds that contaminate crops during storage (for example aflatoxin in nuts and cereals);
- understand that chemicals used in farming such as pesticides and herbicides may remain in the products we eat;
- understand that harmful chemicals may form during food processing and cooking;
- understand the steps that people can take to reduce their exposure to harmful chemicals;
- understand how food labelling can help consumers decide which products to buy;
- understand the role of the scientific advisory committees which carry out risk assessments to determine the safe levels of chemicals in food;
- understand the role of the Food Standards Agency as an independent food safety watchdog set up by an Act of Parliament to protect the public's health and consumer interests in relation to food;

- in the context of stages in the 'food chain':
 - show awareness that scientific research and applications are subject to official actions and laws;
 - can explain why it is impossible for anything to be completely safe;
 - can identify examples of risk which arise from new scientific or technological advances;
 - can suggest ways of reducing specific risks;
 - can interpret and discuss information on the size of risks, presented in different ways;
 - **can identify, or propose, an argument based on the precautionary principle.**

C3.4 Why does what we eat affect our health?

- understand that digestion breaks down natural polymers to smaller, soluble compounds that are absorbed and transported in the blood (illustrated by the breakdown of starch to glucose sugar and proteins to amino acids);
- recall that cells grow by building up amino acids from the blood into new proteins;
- recall that these parts of the body consist mainly of protein: muscle, tendons, skin, hair, haemoglobin in blood;
- recall that excess amino acids are broken down in the liver to form urea, which is excreted by the kidneys in urine;
- understand that high levels of sugar, common in some processed foods, are quickly absorbed into the blood stream, causing a rapid rise in the blood sugar level;
- recall that there are two types of diabetes (type 1 and type 2), and that it is particularly late-onset diabetes (type 2) which is more likely to arise because of poor diet;
- understand that obesity is one of the risk factors for type 2 diabetes;
- understand that type 1 diabetes arises when the pancreas stops producing enough of the hormone, insulin; but that type 2 diabetes develops when the body no longer responds to its own insulin or does not make enough insulin;
- recall that type 1 diabetes is controlled by insulin injections and that type 2 diabetes can be controlled by diet and exercise;
- in the context of diet and health:
 - **can discuss a given risk, taking account of both the chance of it occurring and the consequences if it did;**
 - can suggest benefits of activities that have a known risk;
 - can offer reasons for people's willingness (or reluctance) to accept the risk of a given activity;
 - can discuss personal and social choices in terms of a balance of risk and benefit.