

GCSE

SCIENCE A

Science A Unit 4 Ideas in Context

Pre-release Material

To be opened immediately

For issue to candidates on or after

DATE MARCH YEAR

H **A214/02**

This version is for HIGHER tier candidates who will be entered for A214/02.

Sufficient time should be allowed for study of the material in the classroom.

INSTRUCTIONS TO CANDIDATES

- Take the article and read it through carefully. Spend time looking up any technical terms or phrases you do not understand. You are **not** required to do more research of your own on this topic.
- For the examination you will be given a fresh copy of this article, together with the question paper. You will not be able to take this original copy into the examination with you.

This Pre-release paper consists of 4 printed pages.

Answer all questions.**Question 1****Is "Bird Flu" coming our way?****What is bird flu?**

Bird flu was thought only to infect birds until the first human cases were seen in Hong Kong in 1997.

Humans can catch the disease through close contact with live infected birds.

Bird flu produces similar symptoms to other types of flu such as fever, sore throats and coughs.

The World Health Organisation said that, by the end of January 2005, there had been 55 confirmed cases of bird flu and 42 deaths in Asia.

There are signs that bird flu can be passed from person to person.

In Thailand a girl who had the disease may have passed the virus to her mother. They both died. The girl's aunt, who was also infected, survived the virus.

Fortunately the normal virus only seems to pass to close relatives and spreads no further.

What really worries experts is if the virus could exchange genes with a human flu virus.

If the modified virus is able to pass easily between humans the results could be catastrophic. Worldwide experts predict anything between 2million and 50million deaths could occur.

The Government plan for bird flu

In a normal year between 12 000 and 18 000 people die in Britain from normal flu.

The British government has started preparing for an epidemic of modified bird flu.

They have produced a plan to buy 14.6 million courses of an antiviral drug called Tamiflu.

Experts say that the government should order supplies of the vaccine against the normal bird flu that is present in Asia.

Of course this might not work against a modified bird flu virus.

Another difficulty at the moment is that the main vaccine factory in Britain has been having problems.

It was closed for a while because microorganisms were contaminating the vaccine.

Animal-rights protesters have also been targeting the factory.

How bird flu vaccine is made

Bird flu virus is first weakened.



It is then grown on hens' eggs.



Genetic material from the virus is extracted and mixed with genetic material from other known strains.



The vaccine is then tested on animals.

Human testing then takes place.

How serious is the threat?

death rate	number of people who will die in Britain		
	if 10% are infected	if 25% is infected	if 50% are infected
1.0	56 700	141 800	283 700
1.5	85 100	212 800	425 500
2.0	141 800	354 600	709 300

Question 2

This newspaper article is about a food scare that occurred in February 2005:

Carcinogenic dye causes food scare

More than 400 well-known processed foods have been removed from sale because they are contaminated with an illegal red dye which can cause cancer.

The bright red dye (Sudan 1) had been used to colour a batch of chilli powder used as an ingredient in a brand of Worcester sauce. The sauce in turn was sold on to hundreds of food companies for manufacture into famous brands of food and supermarket ready meals

The Food Standards Agency warned that the crisis was likely to get worse, as it came under attack for failing to prevent the lapse in food safety and for taking too long to make the information public.

Some flavours of crisps were removed from supermarket shelves

This table shows how the crisis developed.

28 January 2005	Sudan 1 contamination of chilli powder is discovered by a laboratory in Italy.
1 February 2005	Sudan 1 is found in a brand of Worcester sauce. Environmental health officers are notified.
7 February 2005	Further tests finally confirm presence of the dye.
10 February 2005	The F S A demands a list of companies supplied the Worcester Sauce for use in other products.
14 February 2005	The list of 200 companies is received by the FSA. The FSA begins ringing the companies.
15 February 2005	The FSA begins telling the companies and supermarkets that they are planning a recall.
18 February 2005	Britain's largest food recall is launched, with more than 400 products withdrawn from supermarket shelves.

Banned in 2003 under European Union rules, the harmful Sudan dye, also known as 'scarlet red', has been found in a range of chilli powders and curry powders, as well as more than 200 food products ranging from pesto sauce to chicken tikka masala.

The FSA said that over 300 food companies were involved in the effort to trace how far the Worcester sauce had spread. Companies involved include all of the leading supermarkets, and top brand owners such as crisp makers. The FSA said it could not guarantee that there was not more adulterated chilli in circulation.

"The big supermarkets are all using the same manufacturers, so if there is a problem it spreads very quickly," said a leading food critic.

The food chain is now both highly industrialised and highly centralised. The main supermarket groups depend on a handful of suppliers to provide the ingredients for their processed meals. The use of sauces containing additives to bolster the flavour of factory food is widespread. The result is not just that many ready meals taste the same but also that any breakdown in safety is instantly multiplied.

Sudan 1 is an azo dye, which has been shown to cause liver cancer in animal tests. It has not been shown to cause cancer in humans. It was first used in the US in 1918 but withdrawn from food use the same year. Sudan 1 is not permitted as a dye for foods in the EU but is meant to be used as a colour for boot polish, industrial solvents and petrol.

"At the levels present the risk is likely to be very small but it is sensible to avoid eating any more. There is no risk of immediate ill-health," said the chief executive of the FSA.

A further difficulty is that by the time the contaminated chilli has been used in other ingredients such as Worcester sauce it is present only in parts per billion making it virtually undetectable. Public analysts have had to devise new tests to detect it, according to one food safety officer.

Question 3

X-Rays – seeing the ‘invisible’

Discovery of X-rays

In the late 19th Century many scientists were investigating the way an electric current was carried through a gas in a glass tube.

The gas inside the tube glowed when an electric current passed through.

Wilhelm Röntgen was a German scientist. In November 1895 he was investigating the glowing gas when he made an unexpected observation.

Some fluorescent material, the other side of the room, was glowing. The gas tube was covered with a dark cloth, so it was not the light from the glowing gas which made the fluorescent material shine.

Over the following seven weeks Röntgen investigated what was causing the fluorescence. He discovered that the rays that were coming from the end of the glass tube penetrated wood, a thick book and metal sheets.



JEAN-LOUP CHARMET / SCIENCE PHOTO LIBRARY

Strangest of all he saw the bones of his hand on the fluorescent screen.

During these investigations Röntgen had his meals served in the laboratory and even moved his bed there so he could work undisturbed. Only once did he mention his work to colleagues, he said “I have discovered something quite interesting but I do not know whether my observations are correct”.

On 1st January 1896 Röntgen sent his first report and some examples of X-ray photographs to scientific colleagues in several countries. These new rays became known as X-rays.

During 1896 other scientists investigated X-rays and found similar results. Many scientists gave lectures, with members of the audience paying a fee to have their hands or purses X-rayed.



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The first X-ray photograph of a human being shows the hand of Röntgen's wife, who was wearing a ring.

Dangers from X-rays

In the first few years after the discovery of X-rays there was no awareness of the risks of working with this new radiation.

The first known death from X-ray exposure was in 1904. At this time many radiologists suffered radiation burns as they used self-exposure experiments to determine exposure times for patients.

It was not until 1921 that the first recommendations were made to limit exposure to X-rays in hospitals. Commercial and industrial applications of X-rays were not controlled until much later.

Up until the late 1950s buying new shoes for children included the chance to see images of your feet inside the shoes to check the fit.

Governments now provide strict guidelines about the amount of exposure to ionising radiation – both for workers and for the public.