



**GOLD AWARD**

# DETECTING FOOD FRAUD



Typically 70 hours of project work  
Recommended for 16-18 year olds



**Practical  
project**

Learn more about food adulteration and investigate how to detect this

***#chemistry***

***#food***

***#crime***



# HOW TO RUN CREST USING THIS ACTIVITY

Entering your project without a teacher or facilitator? No problem! You can enter your work yourself by following this link: [www.crestawards.org/sign-in](http://www.crestawards.org/sign-in)

Looking for some support? Find a mentor by contacting your local STEM Ambassador hub: [www.stem.org.uk/stem-ambassadors/local-stem-ambassador-hubs](http://www.stem.org.uk/stem-ambassadors/local-stem-ambassador-hubs)

To use their project to achieve a CREST Gold Award your students will need to:

- **Develop and lead the project**
- **Complete a minimum of 70 hours of project work**
- **Consider the broader impact of their project and demonstrate an innovative approach**
- **Write a project report or portfolio of evidence**
- **Reflect on their work during the project using a student profile form**

## Preparation

Ready to get going with CREST? Sign up for a CREST account here: [www.crestawards.org/sign-in](http://www.crestawards.org/sign-in)

Create a new Gold Award project with the name(s) of the student(s) and the title of their project. If you don't have all these details, you can fill them in later!

We have some super handy workbooks and profiles for your students to use when running a CREST Award. You can download these when you create your CREST account by following the link above.

## Run the project

Encourage your students to use the Gold student guide to plan and carry out their project. Each student involved in the project should complete their own profile form.

You don't want all their good work to go to waste, so be sure they keep a record of all their amazing progress. Keeping a regular project diary will save them precious time when writing their final project report.

The students should spend at least 70 hours on the project in total.

Remember to consider safety and risks!

## Reflection

So, your students have been hard at work and completed their CREST project, but don't let this be the end of their learning. At the end of the project, each student should complete a Gold profile form and communicate their project. This is a chance for them to reflect on all the interesting things they've learnt and the invaluable skills they have used.

Students working in a group can either submit a joint report or separate reports, but they must each complete a profile form.

Use the CREST criteria on the profile form to help the students check that they have included everything in their report.

## Enter your project for a CREST Gold Award

Hard work deserves a reward! Celebrate and certify your student's achievements by entering their project for a CREST Gold Award. Simply:

Log in to your CREST account at [www.crestawards.org/sign-in](http://www.crestawards.org/sign-in)

Select your project and upload the profile form per student, project report and other evidence, such as pictures and diagrams.

Finally, complete the delivery and payment details for assessment and to order your snazzy certificates.

Congratulations on submitting for CREST Gold!

## What next?

Is university on the horizon for your students? They can use their project to help demonstrate their newly found STEM skills and knowledge in UCAS personal statements.

Don't keep all the fun to yourselves, encourage others to take part in CREST projects and share the wonder of science. For free ideas on how to get started, see [www.crestawards.org](http://www.crestawards.org)

**GOLD  
AWARD**

## *Detecting food fraud*

In this project you will undertake the role of an analyst commissioned to test food products for suspected fraud. You will devise a method for performing 'consumer tests' on a food product to check the concentration or identity of a core ingredient. You will need to test several brands and a range of prices to compare value for money and produce a report of your evidence and conclusions.

### *Getting started*

Do some research to find out about food fraud in the news. You could research some of the examples listed under Famous food scams below right.

You will need to select a number of different food products to test and devise a method for each one. Select some of the

Determine the concentration of several brands of vinegar over a range of prices and compare their value for money.

Determine the percentage of cocoa solids and/or cocoa butter in various brands of chocolate.

Determine whether a sample of olive oil has been adulterated with other vegetable oils. Research the differences between various vegetable oils and ways to measure these differences by chemical analysis, such as 'saponification value' and 'iodine value'.

Determine if wine has been contaminated with diethylene glycol. Find out the properties of diethylene glycol (2,2-dihydroxyethoxyethane) and devise ways to detect it in 10% aqueous ethanol (roughly equivalent to wine). Your tests must be able to detect a diethylene glycol concentration of about 1% and distinguish between diethylene glycol and other compounds that one would expect to find in wine.

Determine the type of fish used in a fish product. "Fish Fingers: 100% cod" says the label, but cod is increasingly expensive, who would know if an unscrupulous manufacturer were to substitute a cheaper fish? The answer lies in DNA. Find out about electrophoresis, and how it is used to establish biological identity. You will also need to learn how to extract DNA from a biological sample. Then investigate unknown samples provided by your teacher. Some of these should be a single fish, others a mixture. Your task is to detect which is which.

### *Things to think about*

How accurate are the news reports you have read?

Are 'value' brands actually good value?

How do your results compare to the ingredients listed on the packaging?

How many samples of each product will you test to reach a confident conclusion?

### *Useful resources*

You should make contact with professional scientists who can advise you about the methods you might use and show you the instrumental techniques they use themselves.

Starting points could include the Food Standards Agency, Trading Standards and public analysts.

### *Famous food scams*

1981 – Adulterated olive oil killed over 400 people in Spain

1985 – Several Austrian wine producers added 'antifreeze' to sweeten their wine

2004 – Specially purified water turned out to be bottled tap water and contained a suspected carcinogen (cancer-causing chemical)

2013 – DNA testing showed that several processed beef products contained horse meat



## GOLD AWARD



### ***Health and safety***

A science project is both dynamic and exciting but can also carry some risk. To avoid any accidents, make sure you stick to the following health and safety guidelines before getting started:

- find out if any of the materials, equipment or methods are hazardous;
- assess the risks (think about what could go wrong and how serious it might be);
- decide what you need to do to reduce any risks (such as wearing personal protective equipment, knowing how to deal with emergencies and so on);
- make sure your teacher agrees with your plan and risk assessment.

***Take care, some of the reagents used are hazardous.***

***Take care, make sure your electrophoresis equipment is of a safe design.***

### ***Remember!***

Science isn't just about data. The most successful projects will demonstrate good communication skills and show original ideas that address a real-world problem.

Look at the world around you and consider all the innovative ways that you could address the challenge. Even if things go wrong, use this to show what you have learned. Don't forget to use the student profile form to help structure your project.