



SILVER AWARD

DETECTING DRUGS



Typically 30 hours of project work
Recommended for 14-16 year olds



Practical
project

Investigate methods of
detecting specific drugs.

#chemistry

#health

#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

Looking for some support? Find a mentor by contacting your local STEM Ambassador hub: <https://www.stem.org.uk/stem-ambassadors/local-stem-ambassador-hubs>

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

- **Develop and lead the project**
- **Complete a minimum of 30 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

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

Run the project

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.

Encourage your students to use the Silver 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.

Make sure you 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 Silver Award. Simply:

Log in to your CREST account at 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 Silver!

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.

The scientific discovery doesn't need to end here. Students can have a go at the next level up - CREST Gold.

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

STUDENT BRIEF

SILVER
AWARD

Detecting drugs

Tablets are usually white, and when powdered it is impossible to tell which is which by sight. This is the sort of problem that forensic scientists face. Is this cocaine, aspirin, or just icing sugar? In this project, in place of controlled drugs, you will use common analgesics (pain-relievers), such as aspirin. The aim of the project is to investigate methods of detecting specific drugs (analgesics in this case), and thus to decide which drugs, if any, an unidentified powder contains.

Getting Started

You should start with known samples and investigate how the analgesics can be detected and distinguished from each other. When you have learned to do this reliably, try identifying some powders that are known to your teacher, but not to you. These could contain one or more of the analgesics, or none. You can then move on to testing analgesics in solution, at progressively lower concentrations, to see what is the lowest concentration that you can detect. This simulates testing for drugs in a urine sample, for example.

Choosing your samples: Your first task is to research several over-the-counter (OTC) pain-relievers, in other words, ones you can buy without a prescription. Find out what analgesic ingredients each contains. You should identify at least two analgesic compounds in addition to aspirin. You need brands of pain-reliever that contain each analgesic singly, and others which contain them in various combinations. Make a note of what is in each brand that you are going to test.

Testing your tablets: You need to research, and then try out, ways of detecting your analgesic compounds in mixtures. Your teacher may need to help you to find suitable methods. Some that you find may not be feasible in your school laboratory.

You could try:

- Chemical tests for particular organic functional groups.
- Paper and/or thin-layer chromatography to separate and identify analgesic mixtures.
- Colorimetry to measure the concentration of analgesic in solution - first you will need to find a way of converting the colourless analgesic into a coloured compound.

Once you are able to detect and identify different analgesics, you can check the sensitivity of your methods. By progressively diluting an analgesic solution, determine the lowest concentration that your various methods can reliably detect.

Things to think about

Professional analysts use various instrumental techniques to identify unknown samples. Your teacher may be able to help you make contact with an organisation where you can see these instruments in use, and maybe analyse some of your own samples. Before your visit you should read some background information about each technique, so that you understand what information each tells us about a sample. You do not need to understand how the instruments work. You should then be able to decide which techniques are likely to be most useful for detecting and identifying organic compounds such as analgesics and other drugs.

Useful Resources

You should be able to find suitable methods in chemistry books and on the internet.

Look up information about drugs testing in sport to find out what concentrations are detectable in blood or urine samples professionally.

Your results

From the results of your investigations, suggest the most suitable methods for deciding whether white tablets found near an unconscious person contain an analgesic, and if so which. The results are needed as quickly as possible, so that the person can be given the correct medical treatment. Explain your reasons for your choices.



STUDENT BRIEF

SILVER AWARD



Health and Safety

Science project work 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.

Be aware that some solvents traditionally used for chromatography of analgesics are no longer considered safe. Check for hazards of any chemicals used, including solvents, and think what control measures would be appropriate.

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.