



GOLD AWARD

THE EFFECT OF ADDITIVES ON BREAD



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



**Practical
project**

Investigate the effects of additives on breadmaking.

#biology

#food

#baking



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: 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

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

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

STUDENT BRIEF

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AWARD**



The effect of additives on bread

Most shop-bought breads also contain a selection of different natural and artificial additives designed to make the bread last longer and keep it fresh during its shelf-life. Most bread that is produced for sale must display a full ingredients list on its packaging, including additives. In this project, you will investigate the role of different additives used to preserve and enhance the quality of bread and determine how effective different additives are.

Getting Started

Begin the project by carrying out research into the types of additives used in bread.

Some of the different additives used are:

- Preservatives
- Emulsifying agents
- Added vitamins and minerals the bread is fortified with so it will meet the approved nutritional levels.
- Processing aids – aids such as certain enzymes are allowed for use in bread production. They are not listed as an ingredient as they are broken down during the process of bread-making.

Carry out some experiments making bread to compare different groups of additives used in breadmaking.

How good is your bread? Compare the different breads you make in a number of ways. This should include:

- The quality of the newly baked bread – you should make a list of what the important qualities of fresh bread are and decide whether your breads have these qualities.
- If the bread keeps its quality when used to make sandwiches.
- How well it keeps – in terms of how quickly it goes stale, how long before mould appears etc. Compare a sliced loaf and a non-sliced loaf of each type of bread.

Investigate the enzymes in your yeast selection, including:

- The amount of CO₂ produced
- The effect of temperature
- The effect of pH
- The effect of different substrates

Rank your selection of yeast types from high to low in terms of their suitability.

Justify your decision based on the evidence from your enzyme experiments.

Things to think about

You could also research additives that were traditionally used in bread-making before the advent of modern E-numbers. This might form part of your experiment where you compare traditional and modern bread-making and the effectiveness of the additives used.

Useful Resources

You could make contact with various organisations concerned with the bread industry, such as The Federation of Bakers, or companies who produce bread.

Investigate brewing

Carry out a research exercise into the use of yeasts in the brewing industry. Explain how the factors you have investigated above are controlled. You might like to set up your own fermentation to compare the effectiveness of different yeasts/substrates etc. in the fermentation process.

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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.

Remember taste testing should only be carried out in a food technology room, following hygienic procedures and using food quality chemicals.

If you have mouldy bread, you will need to plan its disposal in a way which will not allow spores to disperse.

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.