

SQUEAKY CLEAN

Research Project
For Teachers **p2&3**, for Students **p4**

HEALTH AND SAFETY

Students should be encouraged to make their own risk assessment before they carry out any activity, including surveys. In all circumstances this must be checked by a competent person. Students using specialised equipment should be supervised at all times.

Students may want to set up unorthodox experiments and you may need to seek specialist advice.

Organisations such as CLEAPSS and the Royal Society of Chemistry are able to help. The MISAC (Microbiology in Schools Advisory Committee) can provide advice concerning microbiological investigations.

SQUEAKY CLEAN:

Gold Research Project - For Teachers

Cleaning Up?

Supermarkets seem to have a product for every cleaning job that you can think of, then more besides! They include a range of 'value' products, but these take up much less shelf space and are much less attractively packaged than more expensive brands. There are also products that claim to be ecologically friendly. Controlling what we put down our drains is very important if we want a sustainable future.

What is the environmental impact of domestic cleaning? - and who's cleaning up, you or the supermarket?

HAVE YOU EVER WONDERED?

...if 'green' cleaning products really are 'greener' than the big brands?

You might like to imagine yourself in a situation such as...

You are thinking about a career as a research scientist. You are interested in the effect that cleaning products have on the environment. You want to know if the big companies have really made the progress that they claim. Could you help the environment more by working as a biotechnologist for a multinational company, or should you join a group like the Greenpeace Research Laboratories? You're not sure whose approach seems better, so you decide to

research information to:

- decide if cleaning products really are becoming more environmentally friendly
- decide if 'green' cleaning products really are 'greener' than the big brand or 'value' products
- review how progress can be made to reduce the environmental impacts of domestic cleaning.

POSSIBLE EQUIPMENT, MATERIALS AND RESOURCES

Though primarily a 'theoretical' research project, some time could usefully be spent in the laboratory - to illustrate, and explain or clarify, aspects being investigated theoretically. Equipment to follow up the suggestions above might include materials for:

- bioassay using the safe culture and incubation of micro-organisms or of germinating seeds or aquaculture of plants (e.g. culture of safe bacterium, culture medium such as nutrient broth or agar, sterile Petri dishes, incubator)

- comparison of the effectiveness of two cleaning agents. You could test the two agents on different materials (e.g. squares of standardised soiled cloth, dyed wool samples)

Experience of using sophisticated instrumental techniques may possibly be arranged through the mentor, local company or university.

Prompts

The **Student Brief** gives some triggers to start students thinking. They should realise that each trigger implies several items to research and compare. Encourage them to identify these themselves. However, if necessary, prompts such as those below might be given to point students in suitable directions.

- The different types of cleaning products and the problems they can cause
 - What are the main environmental problems associated with the use of cleaning products?
 - How else might the industry affect the environment?
- How 'green' cleaning products are different from the rest
 - What 'green' cleaning products are there on the market?
 - What claims do they make about being better than other products?
- Whether big companies in the cleaning industry are becoming more environmentally aware
 - Which companies are the industry leaders?
 - What kinds of research are the companies conducting?
- How cleaning products can be made more environmentally friendly
 - Which products potentially cause the greatest harm?
 - What do you understand by the terms non-toxic and biodegradable?
 - Can more environmentally friendly products be made at home?
- Whether cleaning products are becoming more environmentally friendly
 - What changes have been taking place?
 - What tests could you carry out for yourself?
- Which aspects of this project particularly interest you as a possible career
 - What kinds of research and development activities might careers in the cleaning product industry involve?
 - What changes would you like to see in cleaning products in the future?

Suggestions for supporting students

Though primarily based on secondary data, the Research project is likely to provide a more meaningful experience if the student also undertakes some practical work. Possibilities include investigating:

- the effectiveness of different cleaning products used for the same task
- bioassay to compare products, for example by testing their effect on germination rates of lettuce seedlings, the growth rates of duckweed or the effect of antimicrobials on bacterial cultures.

Gold Award students are required to have an external Mentor (normally a scientist or engineer) for their project. The Mentor's role is to provide guidance and support.

Depending on the nature of the project, someone with knowledge and/or experience of hygiene practice, cleaning technologies or ecology could be ideal. The Mentor might be involved in...

- academic or industrial research in environmental pollution, hygiene or cleaning products
- professional cleaning, for example of hospitals or schools
- health education or health visiting
- ecology, occupational hygiene or environmental health

There should be an early discussion about time management, the scope of the project (to keep it within a realistic timeframe) and milestones/progress checks. Contact your Local Coordinator for guidance.

Internet search

Combine 'cleaning' with terms such as: products, green, environment, environmentally friendly, health, hygiene, pollution, infection control, house and domestic or try soap, detergent, surfactant, saponification and stain removers. Or try:

- New research to make shampoos and washing powder eco-friendly
innovations-report.com/html/reports/environment_sciences/report-28256.html
- Soap
elmhurst.edu/~chm/vchembook/554soap.html
- Synthetic surfactant or soap?
fabrics.net/deterg.asp
- Surfactants: the ubiquitous amphiphiles RSC (Royal Society of Chemistry)
rsc.org/chemistryworld/Issues/2003/July/amphiphiles.asp
- Detergents, soaps and surface tension RSC (Royal Society of Chemistry)
practicalchemistry.org/experiments/detergents-soaps-and-surface-tension,301,EX.html

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not sure whose approach seems better, so you decide to **research information** to:

- decide if cleaning products really are becoming more environmentally friendly
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Some things to think about...

- The different types of cleaning products and the problems they can cause
- How 'green' cleaning products are different from the rest
- Whether big companies in the cleaning industry are becoming more environmentally aware
- How cleaning products can be made more environmentally friendly
- Whether cleaning products are becoming more environmentally friendly
- Which aspects of this project particularly interest you as a possible career

Health and Safety

Should you carry out any experiments:

- (a) find out if any of the substances, equipment or procedures are hazardous
- (b) assess the risks (think about what could go wrong and how serious it might be)
- (c) 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)
- (d) make sure your teacher agrees with your plan and risk assessment

NOTE: Your teacher will check your risk assessment against that of your school. If no risk assessment exists for the activity, your teacher may need to obtain special advice. This may take some time.

- (e) if special tools or machines are needed, arrange to use them in a properly supervised design & technology workshop.