

# SQUEAKY CLEAN

**Practical 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!

## Silver Practical Project - For Teachers



### Soap solution?

In the medieval world, pandemics were rife. Improved standards of hygiene have helped to bring these diseases under control. The widespread use of soap for washing hands, clothes and surfaces contributes to this daily battle. With the appearance of MRSA, C. diff and swine flu, the importance of effective hand washing is now at the forefront of health propaganda. Hospitals encourage visitors to use alcohol hand gels and people buy them for their own use. Yet many people still believe that hand washing isn't important.

Are we using the best methods to prevent the spread of potential killers like MRSA, C. diff and swine flu?

### HAVE YOU EVER WONDERED?

... are alcohol-based hand cleaning products really more effective than traditional soap and water?

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

You have a friend with a young baby. She knows about the importance of hospital hygiene in the control of MRSA, but wonders if she should use similar measures to protect her child at home. She particularly wants to know if she should use alcohol gel instead of soap for hand washing. Your first step is to **undertake practical experiments** to:

- determine if hand washing makes your hands cleaner
- compare the effectiveness of hand washing using soap and water with the use of an alcohol hand gel.

## POSSIBLE EQUIPMENT, MATERIALS AND RESOURCES

Normal laboratory equipment for:

- simulation of the presence of bacteria on students' hands (e.g. powder or gel such as *Glo Germ*, *Germ Juice* or *GlitterBug*, ultraviolet lamp)
- the safe culture and incubation of micro-organisms (e.g. culture medium such as nutrient agar, sterile Petri dishes, incubator).

## Prompts

The **Student Brief** gives some triggers to start students thinking. They will not have time to investigate all of these and must decide on which aspects to focus.

Each trigger could lead to various lines of investigation. Students should be encouraged to identify possibilities for themselves and to think about which are likely to lead to feasible practical investigations. However, if necessary, prompts such as those below might be given, to point students in suitable directions.

- **Why hand washing is important**
  - Why do we wash our hands?
  - Does hand washing make your hands really clean?
  - Who was Semmelweiss and what did he do?
- **How to test if hand washing makes your hands cleaner**
  - What can you tell from inspection of your hands?
  - How can you tell if there are micro-organisms on your hands?
  - How can micro-organisms be transferred from hands to plate cultures?
  - What is aseptic technique?
- **Whether soap is effective for cleaning hands**
  - Why is the use of soap for cleaning better than water alone?
- **Which is more effective: washing with soap and water or using an alcohol rub**
  - How is their action different?
  - How can you test to see which is more effective?
- **Why MRSA (Methicillin-resistant Staphylococcus aureus) and C. diff (Clostridium difficile) are so difficult to control**
  - Why have they been in the news?
  - What hand washing methods are used, to try to control them?
  - Should we use these methods in the home?
- **What hand cleaning methods you would recommend to someone with a young baby**
  - When should hands be washed?
  - What should be used for effective hand washing?
  - What is your evidence for your recommendations?

## Suggestions for supporting students

Though primarily based on laboratory investigations, the Practical project will probably require some initial research into the mechanism of disease spread and the types of product used to combat this. One possibility is for two students to undertake their projects – one Practical, the other Research – working independently, but coming together to share mutually useful information and activities.

It is recommended that, wherever possible, Silver Award students should have a scientist or engineer as Mentor for their project. Please contact your CREST Local Coordinator to discuss Mentoring.

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

- **academic or industrial research in hygiene or cleaning products**
- **professional cleaning, for example of hospitals or schools**
- **health education or health visiting**
- **occupational hygiene or environmental health**
- **Students should decide their focus, although this may alter in the light of experience as the project progresses.**

## Internet search

Combine 'hand washing' 'cleaning' with terms such as: experiment, testing, products, health, hygiene, infection control; or try: Semmelweiss, soap, detergent, surfactant, aseptic technique, plate cultures, swabbing. Or try:

- **Glogerm kits**  
[hygienicsolutionsuk.com/Glo-Germ-Micro-Kits/c-1-98](http://hygienicsolutionsuk.com/Glo-Germ-Micro-Kits/c-1-98) and [glogerm.com](http://glogerm.com)
- **Dr. Semmelweiss Was Right: Washing Hands Prevents Infection**  
[waterandhealth.org/newsletter/new/feb-1998/right.html](http://waterandhealth.org/newsletter/new/feb-1998/right.html)
- **How do disinfectants and antiseptics work?**  
[typesofbacteria.co.uk/how-do-disinfectants-antiseptics-work.html](http://typesofbacteria.co.uk/how-do-disinfectants-antiseptics-work.html)
- **Preventing MRSA infection, NHS**  
[nhs.uk/Conditions/MRSA/Pages/Prevention.aspx](http://nhs.uk/Conditions/MRSA/Pages/Prevention.aspx)
- **MRSA, Patient UK**  
[www.patient.co.uk/health/MRSA.htm](http://www.patient.co.uk/health/MRSA.htm)
- **What are triclocarban and triclosan (ingredients in some antiseptic soaps)?**  
[antoine.frostburg.edu/chem/senese/101/consumer/faq/triclosan.shtml](http://antoine.frostburg.edu/chem/senese/101/consumer/faq/triclosan.shtml)

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messages. Hospitals encourage visitors to use alcohol hand gels and people buy them for their own use. Yet many people still believe that hand washing isn't important.

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You have a friend with a young baby. She knows about the importance of hospital hygiene in the control of MRSA, but wonders if she should use similar measures to protect her child at home. She particularly wants to know if she should use alcohol gel instead of soap for hand washing.

Your first step is to **undertake practical experiments** to:

- determine if hand washing makes your hands cleaner
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### Some things to think about...

- Why hand washing is important
- How to test if hand washing makes your hands cleaner
- Whether soap is effective for cleaning hands
- Which is more effective: washing with soap and water or using an alcohol rub
- Why MRSA (*Methicillin-resistant Staphylococcus aureus*) and *C. diff* (*Clostridium difficile*) are so difficult to control
- What hand cleaning methods you would recommend to someone with a young baby

### Health and Safety

Before you carry out any experiment:

- (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.