Student safety sheets 1

Microorganisms

See also CLEAPSS *Student Safety Sheet 76, Bioreactors and Fermenters*

Source	Hazard	Comment
Samples from the environment	 BIOHAZARD	Air, water and soil samples could be used, but not samples from high-risk areas, eg, toilets or the floors of changing rooms. All environmental samples could be contaminated with **pathogens** (organisms which cause disease).
Samples from humans	 BIOHAZARD	'Finger dabs' could be used or hair from clean areas, eg, the scalp. Samples could, however, be contaminated with pathogens (see above).
Foods	 BIOHAZARD	Any uncooked animal product (eggs, meat, cheese etc) may be contaminated with bacteria, especially *Salmonella* and *Escherichia coli* (*E. coli*) from the gut, which can cause food poisoning. Take care to prevent cross contamination between cooked and uncooked foods. Thorough cooking will destroy bacteria.
Purchased cultures (ie, samples of microorganisms bought from suppliers)	 BIOHAZARD	Cultures bought from reputable suppliers (but not those from hospitals, etc) should be safe but may have become contaminated. *E. coli* is often studied in schools, but this is **not** the same strain of bacterium that causes food poisoning.

Typical control measures to reduce risk

- When culturing, if possible, grow bacteria and fungi on solids (agar) rather than liquids (broth) to avoid spills and aerosol formation. Choose culture media, eg, nutrient agar, that do not favour the growth of pathogens. Incubate at temperatures which do not encourage growth of pathogens (ie, not normally around 37 °C).
- Do **not** seal cultures completely *before* incubation (otherwise hazardous anaerobic bacteria are encouraged) but make sure they cannot be opened accidentally. *After* incubation, seal completely agar plates containing microbial samples taken from the environment or human skin before they are examined.
- Incubated cultures taken from the environment or humans must never be opened.
- Use sterile equipment and procedures (eg, by flaming loops and mouths of bottles, etc).
- Avoid draughts (from open windows and doors) which could contaminate cultures and cause spores from fungi (eg, mould) to spread.
- Work near Bunsen-burner flames so that the updraught helps to prevent contamination of cultures.
- After work is complete, treat surfaces using a suitable disinfectant, for a sufficient length of time.
- Dispose of all cultures (including mould on food) by sterilisation in an autoclave (pressure cooker).
- Always wash hands after handling cultures and before handling food.
- Wear a clean lab. coat or overall to protect cultures and food from microbes on the skin, clothing, etc.
- In cooking, ensure that food is heated to at least 70 °C for at least 2 minutes.
- Do not reheat cooked food; prepare, store and display cooked and uncooked foods separately.

Assessing the risks

- ***What are the details of the activity to be undertaken? What are the hazards?***
- ***What is the chance of something going wrong?***
  eg, could a food or a culture be, or become, contaminated? Could microorganisms or their spores escape?
- ***How serious would it be if something did go wrong?***
  eg, could material pathogenic to humans be released? Could food poisoning result?
- ***How can the risk(s) be controlled for this activity?***
  eg, can it be done safely? Does the procedure need to be altered?

Emergency action

- **Spilt on the floor, bench, etc** For spills of cultures, place paper towels over the spill, pour disinfectant (eg, *Virkon*) on top and leave for at least 15 minutes. Bleach is usually suitable in the home.

