Working with DNA

See also CLEAPSS *Student Safety Sheet 78: Genetic modification*

Source	Hazard	Comment
'Naked' DNA (ie DNA not incorporated into a living cell)	LOW HAZARD	DNA only functions when it is inserted into a living cell, hence work with DNA itself is generally low hazard, although there may be other hazards associated with the process, eg chemical, microbiological or electrical hazards (electrophoresis).
Extraction of DNA from human tissue	 BIOHAZARD	Extraction of DNA from human tissue, eg cheek cells, prior to amplification by the polymerase chain reaction (PCR), could result in the transfer of infective material between participants. See CLEAPSS *Student Safety Sheet 3*.
DNA from laboratory suppliers	 BIOHAZARD	DNA from sources such as bacteriophage lambda and salmon sperm is generally safe but DNA from mammalian sources may be contaminated with viruses.
Gel electrophoresis	 ELECTRIC SHOCK	Electrophoresis can be very slow unless moderately high voltages are used, giving a risk of electric shock, especially because of the high conductivity of the buffer solutions. If voltages in excess of 30V AC or DC are used it must be impossible to touch a live conductor accidentally or to open the tank if a current is flowing. Some commercial tanks, especially if imported from the USA, may not satisfy this requirement.
Chemicals used	 TOXIC	Polyacrylamide gels are too toxic to make or cast in schools. Some stains, eg ethidium bromide are also unsuitable. Others may be used with care. See CLEAPSS *Student Safety Sheet 70, Dyes, stains and indicators*.

Typical control measures to reduce risk

- If extracting DNA from human tissue, you should only handle your own.
- Avoid using DNA obtained by laboratory suppliers from mammalian sources.
- Carry out electrophoresis at voltages below 30V AC or DC unless the design of tank is such that it is impossible to open the tank when a current is flowing or accidentally touch a live conductor.
- Use agarose gels, but if polyacrylamide gels are used, buy ready-made ones.
- Use safe stains such as methylene blue, Azure A or B or Nile blue sulfate; avoid ethidium bromide.

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 culture become contaminated? Could microorganisms escape?
- ***How serious would it be if something did go wrong?***
  eg, could somebody receive an electric shock from damaged or unsuitable equipment?
- ***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 DNA extracts, place paper towels over the spill, pour disinfectant (eg, *Virkon*) on top and leave for at least 15 minutes.

