Ethanol

also applies to **denatured alcohol** *and* **methylated spirit**

Substance	Hazard	Comment
Ethanol (pure) *Liquid*	 **HIGHLY FLAMMABLE**	DANGER: highly flammable liquid & vapour. There is a serious risk of liquid catching fire; its vapour may catch fire above 13 °C. The vapour/air mixture is explosive (from 3.3 to 19% ethanol). The concentration in the air should not exceed 5760 mg m^{-3}. Evaporation/cooling experiments: Alcohol-based hand gels may be used to experience the cooling effect of evaporation. Check the health warnings provided with such products BEFORE use. Apply only a small quantity to the back of a hand. Do not use surgical spirits.
Industrial denatured alcohol (IDA) (formerly Industrial methylated spirit or IMS)	 **FLAMM. HARMFUL HEALTH HAZARD**	DANGER: highly flammable liquid & vapour; harmful if swallowed; may cause damage to organs, causes serious eye irritation. This is ethanol, containing 5% methanol (v/v). It is often used in schools in place of pure ethanol (because it is cheaper) and usually labelled just as 'Ethanol' but it is more hazardous than pure ethanol because of the methanol. Commonly used as a solvent, eg for chlorophyll, for indicators (universal indicator, phenolphthalein).
Completely denatured alcohol (CDA)	 **FLAMM. HARMFUL HEALTH HAZARD**	It contains methanol, propan-2-ol, methyl ethyl ketone (a bitter-tasting compound) and sometimes a purple dye. CDA is not suitable for use indoors.
Surgical spirit	 **FLAMM. CORROSIVE ENVIRON. HAZARD**	Ethanol, with small amounts of castor oil, methyl salicylate and diethyl phthalate. It is prescribed for medical purposes, eg foot infections. It must not be swallowed. Use only as prescribed. Do not use for skin evaporation experiments
Ethanol *Dilute solution in water*	**Currently not classified as hazardous**	Alcoholic drinks contain ethanol, typically 3 to 7% (v/v) (beers), 11 to 14% (v/v) (wines), 30 to 40% (v/v) (spirits). Although chemical hazards are low, there may be considerable effects on the body leading to a loss of judgement, slower reaction times, etc. Consumption is dangerous if driving a vehicle or operating machinery.

Typical control measures to reduce risk

- Use the smallest volume possible; wear eye protection.
- Make sure the room is well ventilated.
- Check that equipment for extinguishing fires is nearby, eg, damp cloth, bench mat, fire blanket.
- Do not use near naked flames; if heating necessary, use an electrically-heated water bath or hot water from kettle.

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 does ethanol need to be heated? Could quantities of the vapour be breathed in? Might there be fooling around?
- How serious would it be if something did go wrong?
  eg some of the most serious accidents in school science have involved ethanol fires, including clothing fires and badly-burnt skin.
- How can the risk(s) be controlled for this activity?
  eg can it be done safely? Does the procedure need to be altered? Should goggles or safety spectacles be worn?

Emergency action

In all emergency situations, alert the responsible adult immediately. Be aware that actions may include the following:

- In the eye — Irrigate the eye with gently-running tap water for at least 20 minutes. Call 999/111.
- In the mouth/swallowed — Do no more than rinse and spit with drinking water. Do **not** induce vomiting. Call 999/111.
- Spilt on the skin or clothing — Remove contaminated clothing and rinse it. Wash the affected area and clothing with plenty of water.
- Clothing catches fire — Smother flames on clothing or the skin with a fire blanket or other material. Cool any burnt skin with gently-running tap water for 20 minutes. Call 999/111 if the area of burn is larger than a small coin.
- Other ethanol fires — Allow fires in sinks, etc to burn out. Fires at the top of test tubes, beakers, etc should be smothered with a damp cloth or heat-resistant mat.
- Spilt on the floor, bench, etc — Extinguish all Bunsen flames. Wipe up small amounts with a cloth and rinse well. Open windows for larger amounts, cover with mineral absorbent (eg, cat litter), scoop into a bucket and add water.

