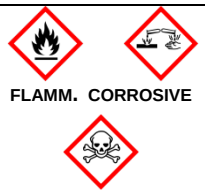
Student safety sheets 39

Boron compounds

including **borax, boric acid, sodium perborate, sodium borohydride**

Substance	Hazard	Comment
Borax (sodium tetraborate, disodiumtetraborate-10-water) Solid and concentrated solutions *(if 80 g dm^{-3}, ie 0.2 M or more)*	 HEALTH HAZARD	DANGER: may damage fertility and the unborn child, although this classification is controversial. It has been/is used in some laundry and cleaning products, as a fire retardant and as a food additive (E285, to aid food preservation and improve the texture).
Borax Dilute solutions *(if less than 80 g dm^{-3}, less than 0.2 M)*	LOW HAZARD	The borax solution commonly used for making slime is usually either 80 g dm^{-3} if using low molar mass PVA (< 85 000 g mol^{-1}) or 40 g dm^{-3} if using high molar mass PVA (> 85 000 g mol^{-1}).
Boric acid (boracic acid) Solid and concentrated solutions *(if 0.9 M or more)*	 HEALTH HAZARD	DANGER: may damage fertility and the unborn child, although this classification is controversial. In solution used as a mild antiseptic. The powder is used as an insecticide and to treat wood that is rotten and as a food additive (E284, to aid food preservation and improve the texture).
Boric acid (boracic acid) Dilute solutions *(if less than 0.9 M)*	LOW HAZARD	-
Sodium perborate (sodium peroxoborate-4-water)	 OXIDISER HARMFUL CORROSIVE HEALTH	DANGER: oxidiser; harmful if swallowed; causes serious damage to eyes; may cause respiratory irritation; may damage unborn child; suspected of damaging fertility. Used in the past in detergents, bleaches, cleaning products and for tooth-whitening but almost entirely replaced now. Releases oxygen if heated above 60°C, or in presence of catalyst.
Sodium borohydride (sodium tetrahydridoborate(III))	 FLAMM. CORROSIVE TOXIC	DANGER: Contact with water liberates flammable gases which may ignite spontaneously (hydrogen); toxic if swallowed; causes skin burns and eye damage; may damage fertility or the unborn child. Widely used in chemistry as a reducing agent.

Typical control measures to reduce risk

- Wear eye protection when handling hazardous solids & solutions;
- Wear gloves when handling these solids.
- Avoid the risk of inhaling dust from sodium tetraborate or boric acid, eg by weighing in a fume cupboard.
- Avoid naked flames when handling sodium borohydride.
- Slime made using sodium tetraborate should not be taken home; should only be handled wearing gloves.

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?***
- ***How serious would it be if something did go wrong?***
- ***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 the eye** Flood the eye with gently-running tap water for 10 minutes. Consult a medic if pain persists.
- **Swallowed** Do no more than wash out the mouth with drinking water. Do **not** induce vomiting. Consult a medic.
- **Spilt on the skin or clothing** Brush solid off contaminated clothing. Rinse clothing or skin as necessary.
- **Spilt on the floor, bench, etc** Brush up solid spills, trying to avoid raising dust, then wipe with a damp cloth (EXCEPT sodium borohydride). Wipe up small solution spills with a cloth and rinse it well.

