





Zinc and its compounds

including Zinc oxide, carbonate, sulfate(VI), chloride, bromide

Substance	Hazard	Comment
Zinc metal (granulated or sheets of metal)	LOW HAZARD	Pure zinc does not react readily with dilute acids, without a catalyst [usually copper(II) sulfate]. Iron or steel is often coated with zinc (galvanised) to protect it from rusting.
Zinc metal (powder or dust)	 FLAM. ENVIR	DANGER: in contact with water releases flammable gases which ignite spontaneously; catches fire spontaneously if exposed to air; toxic to aquatic life with long-lasting effects. Reacts violently with iodine, sulfur and copper(II) oxide. Most school samples have a surface coating of zinc oxide, making reactions unpredictable.
Zinc oxide or carbonate	LOW HAZARD	The zinc oxide fumes ('philosopher's wool') formed when zinc dust burns in air are regarded as hazardous dust.
Zinc salts <i>Solid or concentrated solutions</i> Sulfate(VI) if 1.5 M or more Chloride & bromide if 1 M or more	 CORR. HARM. ENVIRONMENT	DANGER: Harmful if swallowed (especially saturated solutions for crystal-growing); causes serious eye damage (sulfate); causes severe skin burns and eye damage (chloride & bromide); toxic to aquatic life with long-lasting effects. When preparing zinc sulfate by reacting zinc and sulfuric acid, the reaction can be slow and is often incomplete.
Zinc salts <i>Most solutions</i> Sulfate(VI) if less than 1.5 M but 0.2 M or more Chloride if less than 1M but 0.2 M or more Bromide if less than 1 M but 0.1 M or more	 CORR. IRRIT.	DANGER: corrosive to eyes (all) and to skin (chloride & bromide); respiratory irritant (chloride if more than 0.4 M, bromide if more than 0.2 M).
Zinc salts <i>Dilute solutions</i> Sulfate(VI) if less than 0.2 M but 0.06 M or more Chloride if less than 0.2 M but 0.1 M or more Bromide if less than 0.1 M but 0.05 M or more	 IRRITANT	WARNING: irritating to eyes (all) and skin (chloride & bromide).
Zinc salts <i>Very dilute solutions</i> Sulfate(VI) if less than 0.06 M Chloride if less than 0.1 M Bromide if less than 0.05 M	LOW HAZARD	-

Typical control measures to reduce risk

- Use the lowest possible quantities and concentrations.
- Only electrolyse zinc chloride/bromide solutions briefly, unless in a fume cupboard (essential for molten compounds).
- Assume zinc powder/dust is fresh and not partially oxidised on the surface.
- When reacting zinc and acid, check no acid remains before evaporating solutions (pH should be 4 or higher).
- Wear eye protection.

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, solutions spurting out of test tubes when heated or solutions heated to dryness and decomposing.
- **How serious would it be if something did go wrong?**
eg, are there hazardous reaction products (such as chlorine from the electrolysis of zinc chloride)?
- **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 at least 10 minutes. Consult a medic.
- **Swallowed** Do no more than wash out the mouth with water. Do **not** induce vomiting. Consult a medic.
- **Dust breathed in** Remove the casualty to fresh air. Consult a medic if breathing is difficult.
- **Spilt on the skin or clothing** Remove contaminated clothing and rinse it. Wash off the skin with plenty of water.
- **Spilt on floor, bench, etc** Scoop up solid (take care not to raise dust). Wipe up small solution spills or any traces of solid with cloth; for larger spills use mineral absorbent (eg, cat litter).