




Citric, Oxalic & Tartaric acids

2-hydroxypropane-1,2,3-tricarboxylic acid, ethanedioic acid
and 2,3-dihydroxybutanedioic acid

Substance	Hazard	Comment
2-hydroxypropane-1,2,3-tricarboxylic acid (citric acid), solid and most solutions (If 0.5 M or more)	 IRRITANT	WARNING: causes serious eye and skin irritation and may cause respiratory irritation. It is an approved food additive, E330. Concentrated lemon juice may contain 2-hydroxypropane-1,2,3-tricarboxylic acid (citric acid) up to 1.7 M.
Dilute 2-hydroxypropane-1,2,3-tricarboxylic acid (If less than 0.5 M)	LOW HAZARD	Even dilute solutions will cause discomfort in the eye. It is found in citrus fruits, eg, lemons, oranges, grapefruit. Lemons contain 2-hydroxypropane-1,2,3-tricarboxylic acid up to about 0.25 M.
Ethanedioic acid (oxalic acid), solid and most solutions (If 0.1 M or more)	 HARMFUL	WARNING: harmful in contact with the skin and if swallowed. May cause eye damage. It removes calcium ions from the blood, forming insoluble calcium ethanedioate (calcium oxalate); this can block kidneys. It is found in rhubarb, especially in the leaves and in unripe leaf stalks (ie, the part which is eaten). Cases of poisoning have been reported, although very rarely fatal. The toxic effects of rhubarb may be due to other substances.
Dilute ethanedioic acid (If less than 0.1 M)	LOW HAZARD	Even dilute solutions will cause discomfort in the eye.
2,3-dihydroxy-butanedioic acid (tartaric acid), solid and most solutions (If 0.7 M or more)	 IRRITANT	WARNING: causes serious eye and skin irritation and may cause respiratory irritation. It is an approved food additive, E334. It is used in baking powder and is found in many food products.
Dilute 2,3-dihydroxy-butanedioic acid (If less than 0.7 M)	LOW HAZARD	Even dilute solutions will cause discomfort in the eye.

Typical control measures to reduce risk

- Use the lowest concentration possible.
- Wear eye protection for all but the most-dilute solutions; goggles for concentrated acids.
- Avoid the possibility of swallowing oxalic acid or its salts, eg, by using a safety pipette filler.

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, specks of solid acid transferred into the eye, by rubbing with a contaminated finger.
- **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.
- **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** Remove contaminated clothing. Then drench the skin with plenty of water.
- **Spilt on the floor, bench, etc** Wipe up small amounts with a damp cloth and rinse it well.
For larger amounts, cover with mineral absorbent (eg, cat litter) and scoop into a bucket. Neutralise with sodium carbonate. Rinse with plenty of water.