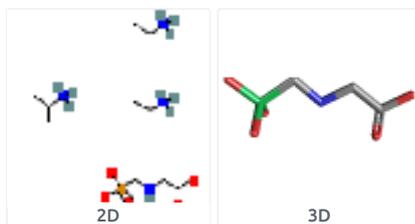


Glyphosate isopropylamine salt

PubChem CID: 22743554

Structure:



[Find Similar Structures](#)

Chemical Safety:



Environmental
Hazard

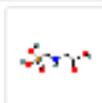
[Laboratory Chemical Safety Summary \(LCSS\) Datasheet](#)

Molecular Formula: $C_{12}H_{35}N_4O_5P$

Synonyms: GLYPHOSATE ISOPROPYLAMINE SALT

Molecular Weight: 346.4 g/mol

Parent Compound:



[CID 3496 \(Glyphosate\)](#)

Component Compounds:



[CID 6363 \(Isopropylamine\)](#)



[CID 3496 \(Glyphosate\)](#)

Dates:

Modify: 2020-02-26 Create: 2007-12-05

10 Safety and Hazards



10.1 Hazards Identification



10.1.1 GHS Classification



Pictogram(s)	 Environmental Hazard
GHS Hazard Statements	H401: Toxic to aquatic life [Hazardous to the aquatic environment, acute hazard] H411: Toxic to aquatic life with long lasting effects [Hazardous to the aquatic environment, long-term hazard]
Precautionary Statement Codes	P273, P391, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)

▶ HSDB

10.1.2 Skin, Eye, and Respiratory Irritations



Some **glyphosate** end-use products are in Toxicity Categories I or II form primary eye irritation or skin irritation. In California, **glyphosate** ranks high among pesticides causing illness or injury to workers, who report numerous incidents of eye and skin irritation from splashes during mixing and loading.

USEPA; Reregistration Eligibility Decision (RED) Database for Glyphosate (38641-94-0). EPA 738-R-93-014 (September 1993). Available from, as of January 25, 2006: <http://www.epa.gov/pesticides/reregistration/status.htm>

▶ HSDB

10.2 Fire Fighting



10.2.1 Fire Fighting Procedures



Suitable extinguishing media: Use **water** spray, alcohol-resistant foam, dry chemical or **carbon dioxide**.

Sigma-Aldrich; Material Safety Data Sheet for N-(Phosphonomethyl)glycine, Monoisopropylamine. Product Number: 338109, Version 3.6 (Revision Date 07/02/2014). Available from, as of October 8, 2014: <http://www.sigmaaldrich.com/safety-center.html>

▶ HSDB

Advice for firefighters: Wear self contained breathing apparatus for fire fighting if necessary.

Sigma-Aldrich; Material Safety Data Sheet for N-(Phosphonomethyl)glycine, Monoisopropylamine. Product Number: 338109, Version 3.6 (Revision Date 07/02/2014). Available from, as of October 8, 2014: <http://www.sigmaaldrich.com/safety-center.html>

▶ HSDB

10.2.2 Firefighting Hazards



Special hazards arising from the substance or mixture: Carbon oxides, nitrogen oxides (NO_x), oxides of phosphorus.

Sigma-Aldrich; Material Safety Data Sheet for N-(Phosphonomethyl)glycine, Monoisopropylamine. Product Number: 338109, Version 3.6 (Revision Date 07/02/2014). Available from, as of October 8, 2014: <http://www.sigmaaldrich.com/safety-center.html>

▶ HSDB

10.3 Accidental Release Measures



11 Toxicity



11.1 Toxicological Information



11.1.1 Health Effects



Health Effect Code(s)

HE14 - Irritation-Eyes, Nose, Throat, Skin---Marked

HE16 - Irritation-Eyes, Nose, Throat, Skin---Mild

HE11 - Respiratory Effects---Acute lung damage/edema or other

HE4 - Acute Toxicity---Short-term high risk effects

- ▶ [Occupational Safety and Health Administration \(OSHA\)](#)

11.1.2 Toxicity Summary



IDENTIFICATION AND USE: Glyphosate isopropylamine salt is a white odorless powder that is commonly used as a herbicide to control broadleaf weeds and grasses, in many food and non-food crops. It is an active ingredient in the herbicide Roundup. HUMAN EXPOSURE AND TOXICITY: Clinical experiences with patients exposed to Roundup either accidentally or through deliberate ingestion have been reported by investigators. Symptoms resulting from dermal exposure incidental to the use of the product included periorbital edema and chemosis of the eye, cardiovascular effects (tachycardia and elevated blood pressure), swelling and paraesthesia at the site of dermal contact and prolonged skin irritation. Deliberate ingestion resulted in more severe effects, including lethality from apparent respiratory and cardiac arrest. In [glyphosate](#)-containing herbicides abdominal pain with nausea, vomiting, and/or diarrhea are the most common manifestations of acute poisoning. These may be mild self-resolving, but in severe poisoning there may be inflammation, ulceration, or infarction. Severe diarrhea and recurrent vomiting may induce dehydration. Gastrointestinal burns and necrosis occurs with high doses of concentrated formulations and may be associated with hemorrhage. Extensive erosions of the upper gastrointestinal tract are associated with more severe systemic poisoning and a prolonged hospitalization. Severe poisonings by [glyphosate](#)-containing herbicides manifests as hypotension, cardiac dysrhythmias, renal and hepatic dysfunction, hyperkalemia, pancreatitis, pulmonary edema or pneumonitis, altered level of consciousness, and metabolic acidosis. These effects may be transient or severe, progressing over 12 to 72 hours to shock and death. The mechanism of hypotension may relate to both hypovolemia (fluids shifts and increased losses) and direct cardiotoxicity. Deaths following ingestion of Roundup alone were due to a syndrome that involved hypotension, unresponsive to iv fluids or vasopressor drugs, and sometimes pulmonary edema, in the presence of normal central venous pressure. ANIMAL STUDIES: Six groups of 10 male rabbits were treated with 76 or 114 mg/kg b.w. undiluted glyphosate isopropylamine salt for 5 days/week for 21 days. Toxicity was apparent only as dermal changes, which were more pronounced on abraded skin, but which in all cases had healed by the end of a 28-day recovery period. In [glyphosate isopropylamine](#) formulations containing surfactants, acute toxicity was due to the surfactant. In acute female dog study the joint effect of both [glyphosate](#) and the surfactant in Roundup formulation resulted in cardiac depression, which was mostly due to the surfactant since [glyphosate](#) itself increased myocardial contractility. A 4-week inhalation study was carried out on rats with a 1:3 dilution of Roundup formulation. Test concentrations of 50, 160 and 360 mg/cu m of the diluted formulation were administered as an aerosol spray for 6 hr/day, 5 days/week. An increased incidence of irritation of the nasal turbinates (subacute inflammation), trachea (mononuclear cell infiltration) and lungs (perivascular lymphoid infiltrates/aggregates) was observed among the high-dose females only. No signs of systemic toxicity were found (parameters: survival, growth, limited hematology and blood biochemistry, organ weights, limited histopathology). The genotoxic potential of the herbicide Roundup and glyphosate isopropylamine salt was studied in three different assays. No clastogenic effects were found in the mouse bone marrow micronucleus test for either of the two agents. In the Salmonella assay only Roundup was tested. It showed a weak mutagenic effect for the concn 360 ug/plate in TA98 (without metabolic activation) and 720 ug/plate in TA100 (with metabolic activation). The anaphase-telophase Allium test showed no effect for the glyphosate isopropylamine salt, but a significant increase in chromosome aberrations appeared after treatment with Roundup at concn of 1.44 and 2.88 mg/L when calculated as [glyphosate isopropylamine](#). The most frequent aberrations observed could be characterized as disturbances of the spindle. ECOTOXICITY STUDIES: Roundup had no apparent adverse effects on reproduction, growth, or survival of deer mice 1 year after treatment of forest. The population density of Townsend chipmunks (*Eutamias townsendii*) appeared to initially decline in the treated area,

although this response was short lived. No changes in fecundity or gonadosomatic index were observed in adult rainbow trout treated with up to 2.0 mg/L of glyphosate isopropylamine salt. In avoidance studies, rainbow trout did not avoid concentrations of the **isopropylamine** salt up to 10.0 mg/L. The egg stage was the least sensitive early life stage for both rainbow trout and channel catfish. Overall, the Roundup formulation was 3 to 42 times more toxic than the technical grade material.

▶ **HSDB**

11.1.3 Antidote and Emergency Treatment



Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR as necessary. Immediately flush contaminated eyes with gently flowing **water**. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention.

/Glyphosate (Roundup) and Related Compounds/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds.); Emergency Care For Hazardous Materials Exposure. 3rd revised edition, Elsevier Mosby, St. Louis, MO 2007, p. 358

▶ **HSDB**

Basic treatment: Establish a patent airway (oropharyngeal or nasopharyngeal airway, if needed). Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if necessary. Administer **oxygen** by nonrebreather mask at 10 to 15 L/min. Monitor for pulmonary edema and treat if necessary Monitor for shock and treat if necessary For eye contamination, flush eyes immediately with **water**. Irrigate each eye continuously with 0.9% saline during transport Do not use emetics. For ingestion, rinse mouth and administer 5 mL/kg up to 200 mL of **water** for dilution if the patient can swallow, has a strong gag reflex, and does not drool. Administer activated **charcoal** Monitor body temperature and treat if necessary. Cover skin burns with dry sterile dressings after decontamination **/Glyphosate** (Roundup) and Related Compounds/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds.); Emergency Care For Hazardous Materials Exposure. 3rd revised edition, Elsevier Mosby, St. Louis, MO 2007, p. 358-9

▶ **HSDB**

Advanced treatment: Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious, has severe pulmonary edema, or is in severe respiratory distress. Positive-pressure ventilation techniques with a bag valve mask device may be beneficial. Consider drug therapy for pulmonary edema Monitor and treat cardiac arrhythmias if necessary Start IV administration of D5W /SRP: "To keep open", minimal flow rate/. Use 0.9% saline (NS) or lactated Ringer's (LR) if signs of hypovolemia are present. For hypotension with signs of hypovolemia, administer fluid cautiously. Consider vasopressors if patient is hypotensive with a normal fluid volume. Watch for signs of fluid overload Use **proparacaine hydrochloride** to assist eye irrigation **/Glyphosate** (Roundup) and Related Compounds/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds.); Emergency Care For Hazardous Materials Exposure. 3rd revised edition, Elsevier Mosby, St. Louis, MO 2007, p. 359

▶ **HSDB**

EXPERIMENTAL: BACKGROUND: Although **glyphosate** intoxication has been considered minimally toxic in animals, severe toxicity has been observed in humans due to surfactant. /This study/ aimed to examine the potential therapeutic effects of intravenous lipid emulsion (ILE) on the patients with acute **glyphosate** intoxication. METHODS: This study enrolled 64 **glyphosate**-intoxicated patients with allocation to two groups: those treated with ILE (ILE group, n = 22), and control patients treated with only supportive (conservative) care. Control patients were selected by matching for the amount ingested and time since ingestion. Twenty-two control patients were separately selected from the 42 patients receiving supportive care only. In ILE group, 20% lipid emulsion product was injected intravenously ... for the patients who ingested less than 100 mL of **glyphosate**. In the patients who ingested more than 100 mL of **glyphosate**, the loading dose was ... according to the status of the patients, followed by a maintenance dose ... for the next 24 hr. RESULTS: Thirteen patients received high dose of ILE because the ingestion amount was more than 100 ml. None of the ILE group suffered from the complication of hypotension, while approximately 41% of the control group developed the complication. Additionally, arrhythmia was not observed in the ILE group. The incidence of mental change, respiratory failure, and acute kidney

injury was similar between the two groups. CONCLUSIONS: ILE administration was associated with lower incidence of hypotension and arrhythmia in patients with acute [glyphosate](#) intoxication. ILE administration seems to be an effective treatment modality in patients who ingested sufficient amount of [glyphosate](#) herbicide that is expected to bring about significant toxicity. [/Glyphosate/](#)

[PMID:23869655](#)

Gil HW et al; Clin Toxicol (Phila) 51 (8): 767-71 (2013)

▶ [HSDB](#)

Retrospective studies suggest a correlation between dose, severity of poisoning, and death. All patients except for those with trivial exposures should be observed for a minimum of 6 hours. In particular, patients presenting with intentional self-poisoning or ingestion of concentrated formulation must be carefully monitored. If gastrointestinal symptoms are noted then the patient should be observed for a minimum of 24 hours given that clinical toxicity may progress. Because the toxicity of individual surfactants has not been determined, treatment does not vary depending on specific coformulants. [/Glyphosate/](#)

Goldfrank, L.R., Goldfrank's Toxicologic Emergencies 9th Ed. 2011., McGraw-Hill, New York, N.Y., p. 1509

▶ [HSDB](#)

[Glyphosate](#) is sometimes mistakenly referred to as ... a cholinesterase inhibitor similar to the organophosphate insecticides ... [Atropine](#) or [2-PAM \(Pralidoxime\)](#) are not indicated in the treatment of [glyphosate](#) exposure. [/Glyphosate/](#)

Krieger, R. (ed.). Handbook of Pesticide Toxicology. Volume 2, 2nd ed. 2001. Academic Press, San Diego, California., p. 1671

▶ [HSDB](#)

A 62-year-old man was brought to the emergency department (ED) 8.5 h after drinking a bottle of commercial herbicide containing a 41% solution of [glyphosate isopropylamine](#), in polyoxyethyleneamine ([POEA](#)) surfactant and [water](#). ... The patient underwent hemodialysis 16 h post ingestion, after which he demonstrated resolution of acidosis and hyperkalemia, and improvement in clinical status. Serum [glyphosate](#) concentrations were drawn prior to, during, and after hemodialysis. The extraction ratio and hemodialysis clearance were calculated to be 91.8% and 97.5 mL/min, respectively. We demonstrate the successful clearance of [glyphosate](#) using hemodialysis, with corresponding clinical improvement in a patient with several poor prognostic factors (advanced age, large volume ingested, and impaired consciousness). The effects of hemodialysis on the surfactant compound are unknown. Hemodialysis can be considered when severe acidosis and acute kidney injury complicate ingestion of [glyphosate](#)-containing products. [/Glyphosate/](#)

[PMID:24400933](#)

Garlich FM et al; Clin Toxicol (Phila) 52 (1): 66-71 (2014)

▶ [HSDB](#)

Emergency and supportive measures. 1. Maintain an open airway and assist ventilation if necessary. 2. Treat hypotension and coma if they occur. Intravenous lipid emulsion was effective in reversing hypotension in one reported case 3. If corrosive injury to the GI tract is suspected, consult a gastroenterologist for possible endoscopy. [/Glyphosate/](#)

OLSON, K.R. (Ed). Poisoning and Drug Overdose, Sixth Edition. McGraw-Hill, New York, NY 2012, p. 229

▶ [HSDB](#)

Specific drugs and antidotes. No specific antidote is available. [/Glyphosate/](#)

OLSON, K.R. (Ed). Poisoning and Drug Overdose, Sixth Edition. McGraw-Hill, New York, NY 2012, p. 231

▶ [HSDB](#)

Decontamination. 1. Skin and eyes. Remove contaminated clothing and wash exposed skin with [water](#). Flush exposed eyes with copious tepid [water](#) or saline. 2. Ingestion. For small ingestions of a diluted or low-concentration product, no decontamination is necessary. For large ingestions, place a flexible nasogastric tube and aspirate gastric contents, then lavage with tepid [water](#) or saline. The efficacy of activated [charcoal](#) is unknown. [/Glyphosate/](#)

OLSON, K.R. (Ed). Poisoning and Drug Overdose, Sixth Edition. McGraw-Hill, New York, NY 2012, p. 231

▶ [HSDB](#)

Enhanced elimination. There is no known role for these procedures. [/Glyphosate/](#)