

Section 1 - Identification of Chemical Product and Company

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Substance: Ethephon is (2-chloroethyl)phosphonic acid - an ethylene generator.
Trade Name: Farmoz Promote 720 Growth Regulator
Product Use: Plant growth regulator for use as described on the product label.
Creation Date: February 2005
This version issued: April, 2009

Section 2 - Hazards Identification

Statement of Hazardous Nature

This product is classified as: Hazardous according to the criteria of ASCC Australia.

Dangerous according to the Australian Dangerous Goods (ADG) Code.

Risk Phrases: R22, R34, R38, R41. Harmful if swallowed. Causes burns. Irritating to skin. Risk of serious damage to eyes.

Safety Phrases: S20, S24, S36, S46. When using, do not eat or drink. Avoid contact with skin. Wear suitable protective clothing. If swallowed, contact a doctor or Poisons Information Centre immediately and show this container or label.

SUSDP Classification: S6

ADG Classification: Class 8 (CORROSIVE LIQUID, N.O.S.)

UN Number: 1760

Emergency Overview

Physical Description & colour: Clear colourless to pale yellow liquid.

Odour: Characteristic, mild odour.

Major Health Hazards: causes burns, may cause serious damage to eyes, irritating to skin, harmful if swallowed.

Potential Health Effects

See section 11 for Chronic exposure studies.

Ethephon is a weak to moderate cholinesterase inhibitor. Repeated minor exposures may have a cumulative effect.

Inhalation

Short term exposure: Available data indicates that this product is not harmful. However, this product may be irritating, but is unlikely to cause anything more than mild transient discomfort.

Skin Contact:

Short term exposure: Available data indicates that this product is not harmful. It should present no hazards in normal use. However, this product is irritating, but is unlikely to cause anything more than mild transient discomfort.

Eye Contact:

Short term exposure: Available data shows that this product is not harmful. However product is corrosive to eyes. It will cause severe pain, and corrosion of the eye and surrounding facial tissues. Unless exposure is quickly treated, permanent blindness and facial scarring is likely.

Ingestion:

Short term exposure: Available data shows that this product is harmful, and will cause cholinesterase inhibition. This product is corrosive to the gastrointestinal tract. Will cause burning to mouth and throat, possible irreversible problems, even death unless treated promptly.

Carcinogen Status:

ASCC: No significant ingredient is classified as carcinogenic by ASCC.

NTP: No significant ingredient is classified as carcinogenic by NTP.

IARC: No significant ingredient is classified as carcinogenic by IARC.

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Section 3 – Composition/Information on Ingredients

Ingredients	CAS No	Conc, %	TWA (mg/m ³)	STEL (mg/m ³)
Ethephon	16672-87-0	72	not set	not set
Water	7732-18-5	to 100	not set	not set

This is a commercial product whose exact ratio of components may vary slightly. Minor quantities of other non hazardous ingredients are also possible.

The TWA exposure value is the average airborne concentration of a particular substance when calculated over a normal 8 hour working day for a 5 day working week. The STEL (Short Term Exposure Limit) is an exposure value that should not be exceeded for more than 15 minutes and should not be repeated for more than 4 times per day. There should be at least 60 minutes between successive exposures at the STEL. The term "peak" is used when the TWA limit, because of the rapid action of the substance, should never be exceeded, even briefly.

Section 4 - First Aid Measures

General Information:

You should call The Poisons Information Centre if you feel that you may have been poisoned, burned or irritated by this product. The number is 13 1126 from anywhere in Australia (0800 764 766 in New Zealand) and is available at all times. Have this MSDS with you when you call.

If swallowed, splashed on skin or inhaled, contact a Poisons Information Centre or a doctor at once. Remove any contaminated clothing and wash skin thoroughly.

This product has the properties of a strong acid and may cause strong mucosal damage if swallowed. Appropriate conventional treatment for circulatory shock, respiratory depression and convulsions may be needed.

Inhalation: No first aid measures normally required. However, if inhalation has occurred, and irritation has developed, remove to fresh air and observe until recovered. If irritation becomes painful or persists more than about 30 minutes, seek medical advice.

Skin Contact: Quickly and gently, blot or brush away excess chemical. Wash gently and thoroughly with water (use non-abrasive soap if necessary) for 20 minutes or until chemical is removed. Under running water, remove contaminated clothing, shoes and leather goods (e.g. watchbands and belts). If irritation persists, repeat flushing and obtain medical advice. Completely decontaminate clothing, shoes and leather goods before reuse or discard.

Eye Contact: Quickly and gently, blot or brush away chemical. Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 20-30 minutes, by the clock, while holding the eyelid(s) open. Neutral saline solution may be used as soon as it is available. DO NOT INTERRUPT FLUSHING. If necessary, keep emergency vehicle waiting (show paramedics this MSDS and take their advice). Take care not to rinse contaminated water into the unaffected eye or onto face. If irritation persists, repeat flushing. Call a Poisons Information Centre or a doctor urgently.

Ingestion: If swallowed, rinse mouth thoroughly with water and contact a Poisons Information Centre. Urgent hospital treatment may be needed.

Section 5 – Fire Fighting Measures

Fire and Explosion Hazards: There is no risk of an explosion from this product under normal circumstances if it is involved in a fire.

Fire decomposition products from this product are likely to be harmful if inhaled. Take suitable protective measures.

This product is likely to decompose only after heating to dryness, followed by further strong heating.

Extinguishing Media: Water fog or fine spray is the preferred medium for large fires. Try to contain spills, minimise spillage entering drains or water courses.

Fire Fighting: If a significant quantity of this product is involved in a fire, call the fire brigade. There is little danger of a violent reaction or explosion if significant quantities of this product are involved in a fire. Recommended personal protective equipment is liquid-tight chemical protective clothing and breathing apparatus. **Flash point:** Will not burn until water component is driven off.

Upper Flammability Limit: Does not burn.

Lower Flammability Limit: Does not burn.

Autoignition temperature: Does not burn.

Flammability Class: Does not burn.

Section 6 – Accidental Release Measures

Accidental release: In the event of a major spill, prevent spillage from entering drains or water courses. Wear full protective clothing including face mask, face shield and gauntlets. All skin areas should be covered. See above under Personal Protection regarding Australian Standards relating to personal protective equipment. Suitable materials for

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protective clothing include rubber, PVC. Stop leak if safe to do so, and contain spill. Absorb onto sand, vermiculite or other suitable absorbent material. If spill is too large or if absorbent material is not available, try to create a dike to stop material spreading or going into drains or waterways. Avoid using sawdust or other combustible material. Sweep up and shovel or collect recoverable product into labelled containers for recycling or salvage, and dispose of promptly. After spills, wash area preventing runoff from entering drains. If a significant quantity of material enters drains, advise emergency services. Full details regarding disposal of used containers, spillage and unused material may be found on the label. If there is any conflict between this MSDS and the label, instructions on the label prevail. Ensure legality of disposal by consulting regulations prior to disposal. Thoroughly launder protective clothing before storage or re-use. Advise laundry of nature of contamination when sending contaminated clothing to laundry.

Section 7 – Handling and Storage

Handling: Keep exposure to this product to a minimum, and minimise the quantities kept in work areas. Check Section 8 of this MSDS for details of personal protective measures, and make sure that those measures are followed. The measures detailed below under "Storage" should be followed during handling in order to minimise risks to persons using the product in the workplace. Also, avoid contact or contamination of product with incompatible materials listed in Section 10.

Storage: This product is a Scheduled Poison. Observe all relevant regulations regarding sale, transport and storage of this class of poison. Make sure that containers of this product are kept tightly closed. Make sure that the product does not come into contact with substances listed under "Materials to avoid" in Section 10. Some liquid preparations settle or separate on standing and may require stirring before use. Check packaging - there may be further storage instructions on the label.

Section 8 Exposure Controls and Personal Protection

The following Australian Standards will provide general advice regarding safety clothing and equipment:

Respiratory equipment: **AS/NZS 1715**, Protective Gloves: **AS 2161**, Industrial Clothing: **AS2919**, Industrial Eye Protection: **AS1336** and **AS/NZS 1337**, Occupational Protective Footwear: **AS/NZS2210**.

ASCC Exposure Limits **TWA (mg/m³)** **STEL (mg/m³)**

Exposure limits have not been established by ASCC for any of the significant ingredients in this product.

The ADI for Ethephon is set at 0.02mg/kg/day. The corresponding NOEL is set at 0.17mg/kg/day. ADI means Acceptable Daily Intake and NOEL means No-observable-effect-level. Values taken from Australian ADI List, December 2008.

Ventilation: No special ventilation requirements are normally necessary for this product. However make sure that the work environment remains clean and that dusts are minimised.

Eye Protection: Your eyes must be completely protected from this product by splash resistant goggles with face shield. All surrounding skin areas must be covered. Emergency eye wash facilities must also be available in an area close to where this product is being used.

Skin Protection: It is essential that all skin areas are adequately covered by impermeable gloves, overalls, hair covering, apron and face shield. See below for suitable material types.

Protective Material Types: We suggest that protective clothing be made from the following materials: rubber, PVC.

Respirator: Usually, no respirator is necessary when using this product. However, if you have any doubts consult the Australian Standard mentioned above. Otherwise, not normally necessary.

Eyebaths or eyewash stations should be provided near to where this product is being used.

Section 9 - Physical and Chemical Properties:

Physical Description & colour:	Clear colourless to pale yellow liquid.
Odour:	Characteristic, mild odour.
Boiling Point:	Approximately 100°C at 100kPa.
Freezing/Melting Point:	Approximately 0°C.
Volatiles:	Water component.
Vapour Pressure:	2.37 kPa at 20°C (water vapour pressure).
Vapour Density:	No data.
Specific Gravity:	1.30 at 20°C
Water Solubility:	Completely soluble in water.
pH:	No data.
Volatility:	No data.
Odour Threshold:	No data.
Evaporation Rate:	No data.

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Coeff Oil/water distribution: No data
Autoignition temp: Does not burn.

Section 10 – Stability and Reactivity

Reactivity: This product is unlikely to react or decompose under normal storage conditions. However, if you have any doubts, contact the supplier for advice on shelf life properties.

Conditions to Avoid: This product should be kept in a cool place, preferably below 30°C.

Incompatibilities: strong bases.

Fire Decomposition: Carbon dioxide, and if combustion is incomplete, carbon monoxide and smoke. Oxides of phosphorus and other phosphorus compounds. Hydrogen chloride gas, other compounds of chlorine. Water. Carbon monoxide poisoning produces headache, weakness, nausea, dizziness, confusion, dimness of vision, disturbance of judgment, and unconsciousness followed by coma and death.

Polymerisation: This product is unlikely to undergo polymerisation processes.

Section 11 – Toxicological Information

Toxicity: The acute oral toxicity of Ethephon in rats ranged from 3400 mg/kg to 4229 mg/kg. Acute animal toxicity studies in a few species show that via the oral and dermal routes, Ethephon is relatively non-toxic except in hens. An acute study with rats showed an oral LD₅₀ of 1.6 g/kg (EPA toxicity category III). An acute dermal study using rabbits showed a dermal LD₅₀ of greater than 5 g/kg (EPA toxicity category III). In a rat study, Ethephon was administered by gavage for 13 weeks to 20 rats per sex per dose level at 0, 50, 100, and 200 mg/kg/day. Plasma cholinesterase and brain cholinesterase activity were found to be different from the controls at all dose levels. However, red blood cell cholinesterase activity did not differ from the controls in either sex of any dose group. The acute oral LD₅₀ of 24% Ethephon solution in propylene glycol for rats was reported to range between 3,400 mg/kg (RTECS, 1985) to 4,229 mg/kg. The dermal LD₅₀ for the same 24% solution for rabbits was 5,730 mg/kg. Irritation of mucous membranes in rabbits was also reported. The same study indicated that the inhalation LC₅₀ for rats was greater than 5 mg/l of air. EPA reported the acute oral LD₅₀ to be 1.6 g/kg for rats; the acute dermal LD₅₀ for rabbits to be greater than 5 g/kg; and the primary skin irritation score for rabbits to be 6.75 (corrosive). The oral LD₅₀ for mice fed technical Ethephon was 2850 mg/kg; 5,000 mg/kg for rabbits; 4,200 mg/kg for guinea pigs; and an unreported 4,200 mg/kg for mammals. In a dog study, Ethephon was administered in the food to 4 dogs per sex per dose level at 0, 5.0, 25.0, or 187.5 mg/kg/day for 13 weeks. Plasma cholinesterase activity was depressed in both males and females at all dose levels. Red blood cell activity was depressed in the males (at all dose levels except 5.0 mg/kg/day at 8 weeks) and at the 25.0 and 187.5 mg/kg/day dose levels in the females. Brain cholinesterase activity was significant only in females dosed at 187.5 mg/kg/day.

Chronic Toxicity: A chronic toxicity/oncogenicity study using Swiss albino mice included 85 mice fed diets containing 0, 4.5, 45, or 150 mg/kg/day of Ethephon for 78 weeks. Inhibition of plasma cholinesterase activity was significant at the 45 and 150 mg/kg/day dose levels in males and females. The No Observable Effect Level (NOEL) for plasma cholinesterase activity is 4.5 mg/kg/day for both sexes and the Lowest Effect Level for this effect was 45 mg/kg/day for both sexes. There appeared to be a dose-related decrease in red blood cell cholinesterase activity in females. There was significant depression in RBC cholinesterase activity at the 45 and 150 mg/kg/day dose levels, while females in the 4.5 mg/kg/day dose groups exhibited depression in RBC cholinesterase activity at 52 weeks and 78 weeks, which was not considered statistically significant. Because of the apparent dose-related decrease in RBC cholinesterase activity in females in the 4.5 mg/kg/day dose group, the NOEL for this effect in females is considered to be below 4.5 mg/kg/day, the lowest dose tested. RBC cholinesterase activity was nominally decreased in males at the mid- and high-dose groups. Brain cholinesterase activity was not different from control values at any dose level in males or females. In two-year feeding studies, rats receiving greater than or equal to 12,500 mg/kg diet showed no ill-effect except at top dose levels toward the end of the trial. The highest dose without adverse effects reported in rats was 375 mg/kg/day for 90 days.

Reproductive Effects: A developmental toxicity study was conducted on New Zealand white rabbits. The doses tested were 50, 100, or 150 mg/kg. The teratogenic NOEL was greater than 50 mg/kg/day (LDT or lowest dose tested). The number of litters at termination of the study were insufficient to determine teratogenic effects at the 100 and 150 mg/kg/day levels. The embryotoxic NOEL was 50 mg/kg/day; an increased average number of resorptions occurred. The maternal toxic NOEL was 100 mg/kg, while the maternal LEL was 250 mg/kg (HDT or highest dose tested); decreased body weight, food consumption and increased mortality occurred at this dose level. The fetal toxic NOEL was reported to be 50 mg/kg/day. The foetotoxic LEL was 100 mg/kg/day, at which decreased fetal viability was reported. In another study, doses of 0, 200, 750, and 1,500 ppm of 39% Ethephon were tested in a multigeneration rat reproduction study. The NOEL was reported to be greater than 1500 ppm (highest dose tested).

Teratogenic Effects: The NOEL for rat teratogenic effects is 600 mg/kg/day, while in the rabbit, the NOEL was reported to be 50 mg/kg/day based on fetal resorptions at higher dose levels tested.

Mutagenic Effects: Ethephon studies in Salmonella typhimurium indicated no mutagenic effect up to 1,000 micrograms/100mL, without enzyme activation.

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Carcinogenic Effects: A carcinogenicity study was conducted in mice using 70.6-72.1% Ethephon. The doses were administered in feed at 0, 15.5, 156 or 1630 mg/kg/day to CD-1 mice for 78 weeks. No dose-related evidence of carcinogenicity/oncogenicity was reported.

Organ Toxicity: No information currently available.

Fate in Humans and Animals: No information currently available.

Section 12 – Ecological Information

Effects on Birds: Data indicate that technical-grade Ethephon is slightly toxic on an acute oral basis to bobwhite quail, and slightly toxic on a subacute dietary basis to bobwhite quail and mallard ducks. The acute oral LC₅₀ in bobwhite quail is from 596 to 804 mg/kg. The acute oral LC₅₀ is 3,750 ppm for mallard ducks and greater than 2,160 ppm in bobwhite quail. The average acute oral toxicity for formulated products is greater than 10,000 ppm in bobwhite quail, or practically non-toxic. Another source reported the oral LD₅₀ for bobwhite quail to be 1,000 mg/kg. The chronic toxicity LC₅₀ for birds was reported to be 804 mg/kg for quail and 3,750 ppm for ducks; and the LC₅₀ (8 days) for mallard ducks was greater than 10,000 mg/kg diet.

Effects on Aquatic Organisms: Laboratory and field studies indicate that Ethephon is slightly toxic to fish. Studies indicated LC₅₀ values for fish of 170 mg/l for rainbow trout; and 180 mg/l for bluegill sunfish. Also, a 96-hour LC₅₀ for rainbow trout ranged from 254 mg/l to 350 mg/l and for bluegill sunfish 222 mg/l to 300 mg/L.

Effects on Other Animals (Nontarget species): Two studies using Ethephon were conducted in humans. In the first study, some symptoms characteristic of anticholinesterase activity were observed. Five humans of each sex were dosed with Ethephon at an average dose level of 1.8 mg/kg/day. Subjects receiving the test compound reported the following symptoms and/or signs; sudden onset of diarrhea or an urgency of bowel movements, stomach cramps or gas and increased urgency or frequency of urination, and either an increase or decrease in appetite. None of the control subjects had complaints similar to the test group. Plasma CHE and RBC CHE activities were similar to or higher than initial values in test subjects. In the second human study, 10 humans of each sex were administered Ethephon at 0.5 mg/kg/day for 16 days, followed by a 2-week recovery period. Dose related effects occurred in plasma cholinesterase activity, but not in red blood cell cholinesterase activity. The effect was reversible within 15 days. When the control group and test groups were compared, the decreased plasma cholinesterase activity was statistically significant. No dose-related effects were seen in hematology, blood chemistry, or urine analysis. Based on this study, the NOEL for plasma cholinesterase inhibition in humans is less than 0.5 mg/kg/day. Ethephon usage has resulted in four cases of skin injury (irritation) reported from 1980 through 1986 in California due to exposure to field residues. Ethephon is considered relatively non-toxic to honeybees.

ENVIRONMENTAL FATE

Breakdown of Chemical in Soil and Groundwater: Ethephon was found to have low to moderate mobility in soils ranging in texture from loamy sand to peat and silt loam based on soil thin layer chromatography tests. Therefore, the potential for contamination of groundwater appears to be low to moderate. In soil, rapid degradation to phosphoric acid, ethylene, and chloride ions was reported.

Breakdown of Chemical in Surface Water: No information currently available.

Breakdown of Chemical in Vegetation: In plants, Ethephon rapidly degrades to phosphate, ethylene, and chloride. Ethephon and the ethylene gas it produces are the major metabolites in plants. Residues of monochloroacetic acid may be found in Ethephon-treated commodities. Monochloroacetic acid is a potential degradation product of an impurity in Ethephon, monochloroethyl ester of (2-chloroethyl)-phosphonic acid.

Section 13 – Disposal Considerations

Disposal: Instructions concerning the disposal of this product and its containers are given on the product label. These should be carefully followed.

Section 14 – Transport Information

ADG Code: 1760, CORROSIVE LIQUID, N.O.S.

Hazchem Code: 2X

Special Provisions: 223, 274

Limited quantities: ADG 7 specifies a Limited Quantity value of 5 L for this class of product.

Dangerous Goods Class: Class 8, Corrosive Substances.

Packaging Group: III

Packaging Method: P001, IBC03, LP01

Class 8 Corrosive Substances shall not be loaded in the same vehicle or packed in the same freight container with Classes 1 (Explosives), 4.3 (Dangerous When Wet Substances), 5.1 (Oxidising Agents), 5.2 (Organic Peroxides), 6 (Toxic Substances where the Toxic Substances are cyanides and the Corrosives are acids), 7 (Radioactive Substances), Foodstuffs and foodstuff empties. They may however be loaded in the same vehicle or packed in the same freight container with Classes 2.1 (Flammable Gases), 2.2 (Non-Flammable, Non-Toxic Gases), 2.3 (Poisonous Gases), 3 (Flammable liquids), 4.1 (Flammable Solids), 4.2 (Spontaneously Combustible Substances), 6 (Toxic

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Substances except where the Toxic Substances are cyanides and the Corrosives are acids) and 9 (Miscellaneous Dangerous Goods).

Section 15 – Regulatory Information

AICS: All of the significant ingredients in this formulation are to be found in the public AICS Database.

Section 16 – Other Information

This MSDS contains only safety-related information. For other data see product literature.

Acronyms:

ADG Code	Australian Code for the Transport of Dangerous Goods by Road and Rail, 7th Edition
AICS	Australian Inventory of Chemical Substances
CAS number	Chemical Abstracts Service Registry Number
Hazchem Number	Emergency action code of numbers and letters that provide information to emergency services especially firefighters
IARC	International Agency for Research on Cancer
ASCC	Office of the Australian Safety and Compensation Council
NOS	Not otherwise specified
NTP	National Toxicology Program (USA)
R-Phrase	Risk Phrase
SUSDP	Standard for the Uniform Scheduling of Drugs & Poisons
UN Number	United Nations Number

Contact Points:

Call Farmoz on (02)9431 7800

Fax: (02)9431 7700 and ask for the technical manager.

Police and Fire Brigade:

Dial 000

Emergency contact:

1800 024 973 (24 hours)

If ineffective:

**Dial Poisons Information Centre
(13 1126 from anywhere in Australia)**

The information contained in this Material Safety Data Sheet is provided in good faith and is believed to be correct at the date hereof. However, it is expected that individuals receiving the information will exercise their independent judgement in determining its appropriateness for a particular purpose. Farmoz Pty Ltd makes no representation as to the accuracy or comprehensiveness of the information and to the full extent allowed by law excludes all liability whatsoever, whether with respect to negligence or otherwise, for any loss or damage arising from or connection with the supply or use of the information in this Material Safety Data Sheet.

Please read all labels carefully before using product.

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