

CONTROLLED PESTICIDES
Sodium and Potassium Cyanide ('Cyanide')
In Pest Control

Sodium cyanide in the form of a paste has been used for many years to control possums. Potassium cyanide, in the form of a pellet has also now recently been registered in New Zealand. The properties, mode of action and proper use of both formulations are covered, together with precautions to observe and first aid treatment.

Introduction

Cyanide has been recognised as a poison since very early times, having been used by the ancient Egyptians and early Romans.

The poison occurs in clovers, couch, and other grasses, and in some parts of the world livestock occasionally die through eating the naturally occurring cyanides.

Technical sodium cyanide (100% cyanide) is made by heating charcoal and ammonia gas with sodium metal. Technical potassium cyanide is made by a similar process.

Properties of Cyanide

In its pure form, cyanide is a colourless solid and is soluble in water. It is hydrolysed and decomposed by carbon dioxide and water or acids, generating hydrogen cyanide, which has a characteristic odour of bitter almonds. Not everybody can smell it, however.

Both cyanide pellets and pastes use encapsulation in the former and oil in the latter to protect the cyanide from exposure to air, encapsulation in the pellets also prevents the release of hydrogen cyanide.

The cyanide paste and pellets used by possum hunters is coloured green, so that it should not be mistaken for other non-toxic substances.

How the poison acts

Cyanide acts as a poison by inhibiting the enzyme system involved in oxygen utilisation in body cells. Its major effect is on the part of the brain, which controls breathing.

If sodium or potassium cyanide (as in possum paste and pellets) is swallowed, it is converted by the acids in the stomach into hydrocyanic acid, which is absorbed through the blood stream.

The lethal dose (expressed as mg/kg of body weight to kill 50 percent of a test population and designated LD50) for various animals is shown in table 1.

TABLE 1: LD50 OF CYANIDE FOR VARIOUS ANIMALS	
Species	LD50(mg/kg)
deer	Approx 3.5 - 4.5
pig	
goat	
rabbit	
hare	
possum	8.7

If cyanide is swallowed, the patient may vomit and will often fall unconscious within 10 seconds and die within 2-5 minutes, after some convulsions. Unless it is a deliberate attempt at suicide, it is hard to see how this could happen to an adult; however it could happen to a small child who gets hold of a tube of possum paste or of bait left within reach. No effects would be noticeable for several minutes, if a small accidental dose of paste were taken, but then there would be dizziness, headache, palpitation, and difficulty in breathing, followed by unconsciousness and violent convulsions. The mortality rate from this form of cyanide poisoning is high, but a patient who survives for an hour usually recovers.

Never mix cyanide paste with any form of acid, because the acid will liberate hydrocyanic acid gas from the paste and cause a weakening of the paste, plus a possibly dangerous concentration of the gas in an enclosed space.

Out of doors, it is unlikely that dangerous concentrations of the gas could occur from cyanide paste mixed with acid.

Dangerous amounts of the gas give some warning by causing an immediate and progressive sensation of warmth over the whole body, like a 'hot flush'. This is a danger signal that should not be ignored. If exposure to the gas continues, vomiting will follow, often with a headache. Breathing will become difficult, with a sensation of having tight bands around the chest. This is soon followed by the loss of consciousness and the paralysis of the breathing system. An unconscious person who is taken into the open air before breathing has stopped usually recovers unaided, but may feel sick for some days.

USING CYANIDE

Correct bait placement is essential for the operation to succeed and also to avoid accidental poisoning of livestock, wildlife or even human beings.

Pellets: The cyanide pellets used for possum control in New Zealand contain 800g/kg (80%) of potassium cyanide. This inner cyanide core is surrounded by a hardened coating and layer of feed attractive to possums. Each pellet contains a lethal dose for a possum. Because the encapsulation process prevents the release of hydrogen cyanide gas from the pellet, the possibility of the possum detecting the poison is overcome - this means the pellet is able to both kill poison-shy possums as well as prevent sub-lethal exposure.

In field operations the cyanide pellets are mixed with non-toxic cereal feed pellets or peanut based feed paste and presented to possums in specially designed pellet feeders. Under no circumstances should cyanide pellets be used in any device other than that recommended by the manufacturer. This is because the recommended pellet feeder is designed with a narrow opening that forces the possum to eat directly from the feeder rather than picking the pellets up in their paws. The pellet feeder also has a magnetic catch built into the lid to prevent access by birds.

The optimum height off the ground for the pellet feeder is approx. 17 cm. Position the pellet feeder vertically against a tree or post, away from direct sunlight and the prevailing wind. They should ideally be located in a clear area of the bush, near run pads, nesting sites and trees which have been marked by possums (scratches, teeth marks). They should also be positioned on a slope so carcasses will roll away from the base of the feeder. The location of the pellet feeder can be marked, by hanging a brightly-coloured disc or tag from a nearby branch. Pellets should not be placed where stock have access unless the pellet feeder is placed 2 metres above ground.

Paste: The cyanide paste used in New Zealand contains about 550 g/kg (55%) of sodium cyanide. Possums become poison shy if cyanide paste is used too often. This is because some animals take a non-lethal dose and become wary about swallowing the poison again. When this happens, a different poison and bait or some **Around dwellings or in public places** Never lay poison near a house or in a public place,

other method of destruction must be used or lay prefeed non-toxic paste for several days prior to laying cyanide, to improve the toxic bait acceptance.

With cyanide poisoning, correct bait placement is essential for the operation to succeed and also to avoid accidental poisoning of livestock, wildlife, or even fellow human beings.

On land where livestock may be found, baits must be placed well out of their reach. For cattle and horses, this means over 2 m above the ground.

Cattle, for instance, will lick baits off a tree if they can reach them.

When you lay baits in trees, make sure the baits are positioned so that they cannot be accidentally dislodged, either by passing possums or by branches blowing in the wind. Preferably, put the baits in hollows or in cracks in the branches or trunk.

If you are placing baits on the branches of a tree, put them about a possum's length from the junction of the branch and the trunk, so that the possum does not sit on any of the bait or knock it off. Another method is to use small bait stations such as KK, Romark or heavy duty flower pots to place the cyanide paste in.

On a tree trunk, place the bait in a flaw or knot on the side up which the possum is most likely to climb. Avoid anywhere that has a vine, a leaning tree, or anything else that the possum may use as an alternative route instead of the baited trunk.

Where livestock have no access: In such areas set the baits where possible 10 cm above the ground. The bait can be placed on the roots of trees, on trimmed sticks or twigs, on tree trunks, or possibly on broken branches, or even on stones.

In baiting possum tracks on the ground, place the bait on trimmed sticks or twigs covering about half the run, and place more than one bait along the track. In other words, follow the track, baiting along it.

A line of baits set in trees can be identified by marking the baited tree or one adjacent to it with rags (preferably white or brightly coloured ones), tinfoil, or aerosol paint.

particularly where children go.

Notices: Wherever baits are laid or pellet feeders set, use plenty of the recommended notices to warn people of the poison. The notices must stay in position: -

- **For Cyanide paste** - until the bait has disintegrated, or has been destroyed, or until a period of 1 month has elapsed from the date on which the bait was laid - whichever occurs sooner.
- **For Cyanide pellets** - until the pellet feeders have been removed, or the pellets taken out or consumed.

After this, remove notices from the area.

Permission from owner or occupier of land:

Make sure that the owner or the occupier of the land where you are laying poison has given permission, and that other people who are allowed into the area are warned that poison has been laid.

Lures: In the past, cyanide was available with or without a lure being incorporated into the paste. As all paste now contains a lure it is not necessary to add additional lure. Limited research has indicated that birds can be attracted to certain lures (wintergreen, raspberry, banana and rose). To overcome the problem of attracting birds, cyanide manufacturers have agreed to supply only lures that do not include any of the above suspect lures. It is dangerous to add lure that may contain acid, as this would produce hydrocyanic gas. In addition the paste and pellets are coloured green for identification purposes, and also to repel birds.

There is some evidence that domestic animals have been attracted by lure. Bear this in mind when using cyanide paste. However if flour is used in baiting operations, ensure that it is placed around the bait - not on top or beneath it, so that it is easily seen by both humans and birds.

Preventing Poisoning of Non-Target Species

Cyanide PASTE: Cyanide paste investigations have shown that cyanide may kill ground birds such as kiwis and wekas. To avoid this baits must be placed above the ground. This can be done by placing them on steep log runs or higher up, on a tree for example, to keep them out of reach of the birds.

If you are laying poison where birds abound, you must take adequate steps to prevent any

large-scale destruction.

Never place poison baits on fence posts, battens, gate tops, or bridge railings, or in any place where people could accidentally come into contact with them.

To obtain the best results in terms of possum kills and to reduce the potential for harm to non-target species always use small pea-sized baits.

A 500g tube will supply about 1230 pea-size (0.4g) baits.

In theory a 0.4g bait will kill:

- five possums 3 kg in weight;
- two dogs 14 kg in weight;
- one human 73 kg in weight.

At least nine baits this size are required to kill a cattle beast weighing 350 kg.

Though cyanide baits are poisonous to livestock, secondary poisoning of dogs through eating possum carcasses is unlikely. Dogs have been safely fed on the skinned and gutted carcasses of poisoned animals - though, in at least three cases, dogs have been poisoned by licking the paste from around the mouths of possums poisoned with cyanide.

How long cyanide baits will remain poisonous in the field depends greatly on the rainfall and on how well they are protected from the rain. They must be regarded as poisonous for as long as they can be identified as baits. However, possums will normally take the baits on the first two or three nights only. To reduce the risk of possums taking sub lethal doses of cyanide paste, all baits should be destroyed after 3 nights.

Cyanide PELLETS: Each cyanide pellet contains approx. 0.1g of cyanide - sufficient to kill a possum weighing up to 6kg. Generally cyanide pellets and the non-toxic feed pellets used with them will be unpalatable to dogs. However precautions to avoid poisoning of non-target species must be taken. Only use cyanide pellets in the feeder recommended by the manufacturer of the pellets. Never lay cyanide pellets on the ground. Pellet feeders should be placed in a position inaccessible to interference by livestock.

Trials have demonstrated that cyanide pellets exposed directly to moist conditions (i.e. on the

ground) will degrade after 1 to 4 months - over this period however they should remain potentially hazardous. Once the control programme is finished, pellet feeders should be removed from the location or all unused cyanide pellets should be removed from each pellet feeder and either returned to their original container or disposed of in the recommended manner.

Precautions When Using Cyanide

When using cyanide, wear overalls and gloves (rubber or plastic) to protect your hands and keep them clean. Remove this protective clothing before you eat and after work, and store it in a safe place. Wash protective clothing separately from other washing. Do not leave it lying around with other washing at home.

Cyanide poison must be treated with the greatest care and respect, as it is extremely lethal. You must observe the following precautions when handling or using it:

- Wear overalls and gloves (rubber or plastic) to protect your hands and keep them clean.
- Remove your protective clothing before you eat, after work and before getting into your vehicle and store it in a safe place.
- Wash protective clothing separately from other washing. Do not leave it lying with other washing at home.
- Do not smoke or eat while you are handling the poison.
- Wash your hands frequently, especially after handling the poison. Keep your finger nails short and clean. Cyanide on your hand gives the skin an oily feel in water.
- Carry amyl nitrite capsules (see 'First-aid treatment in the field' below) at all times and know how to use them.
- Always store the amyl nitrite capsules below 15°C to prevent explosions and decomposition of amyl nitrite.
- Replace the amyl nitrite capsules with new ones every 2 years (they deteriorate in time).
- Make sure the cyanide poison is always in a labelled container.
- Always store the cyanide poison under lock and key.
- Always get the permission of the landowner or occupier before you lay poisoned bait.
- Always use a number of small baits instead of a single large one.
- Thoroughly signpost the area where the

poison has been laid.

- Make sure other people are fully conversant with the precautions, and especially with the first-aid treatment. Your life could depend on it.
- If you lose a tube of cyanide paste or bottle of cyanide pellets, contact the owner of the property, the police, and local medical officer of health immediately.

Additional precautions when using cyanide paste

- Destroy any empty poison containers by slashing or burning them, then bury them at least 60cm underground. Do not just toss them away.
- Do not attempt to heat cold tubes of the cyanide paste over a flame or in hot water. Massage them gently in the hand.
- Watch for air locks in a paste tube - otherwise you may get a "blowout" of the bait.
- Always use a number of small baits instead of a single large one.

First Aid Treatment in the Field

Aims: When cyanide poisoning occurs the immediate actions required are to:

- Prevent further absorption of cyanide into the body.
- Prevent any further 'oxygen blocking' action by the cyanide.
- Release cyanide from the cells.
- Render harmless the cyanide in the blood and assist in removing it from the body.

Gas Inhalation: When cyanide gas is inhaled you must:

- Remove the patient into clean air.
- If breathing has ceased, begin artificial respiration.
- If the patient is still breathing, break a capsule of amyl nitrite into a handkerchief and hold it under his nose for 30 seconds. Repeat with further capsules at intervals of 2-3 minutes.
- Remove any contaminated clothing and wash any cyanide from the skin.
- Keep the patient warm.
- Call a doctor and an ambulance as soon as possible.

Accidental Swallowing: When cyanide is swallowed the steps to be taken are:

- If the patient is conscious, make him/her drink a large quantity of cold water, and then cause vomiting by putting a finger down his throat. Repeat until the vomit fluid looks clear.
- Also, break a capsule of amyl nitrite and hold it under the patient's nose for 30 seconds. Repeat with further capsules at intervals of 2-3 minutes
- If the patient's breathing has stopped or is difficult, immediately administer mouth-to-nose artificial respiration (not mouth-to-mouth).
- Remove any contaminated clothing and wash any cyanide from the skin.
- Keep the patient warm.
- Call a doctor and an ambulance as soon as possible.

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