PRODUCT SPECIFICATION

PESTOFF® RODENT BLOCKS

Product Name

Pestoff Rodent Blocks

Manufacturer

Animal Control Products Limited, 408 Heads Road (Private Bag 3018)Wanganui, New Zealand.

Product Description

Square faced, blue, extruded block with a central hole for attachment purposes using wire or a nail. Each block weighs approximately 30 grams and measures 25mm square by 40 mm in length.

Active Ingredient

Contains 0.002% Brodifacoum. Can be manufactured with 0.005% brodifacoum if required to meet overseas registration criteria based on bio-equivalence (similar to other registered products).

Moisture/pH

Moisture 11%-12% w/w, pH approximately 7

Bio-equivalence

Bell Laboratories (USA) rodenticide blocks. Talon® rodenticide blocks (Zeneca and Crop Care Holdings).

Product Purpose

For use in bait stations for the control of rodent pests.

Product Application

For use in agricultural, industrial, domestic and conservation situations where baits need to be fixed into bait stations to prevent the removal of bait by rodents which might otherwise cause contamination or place non-target animals and humans at risk from poisoning. For outdoor applications, ensure bait stations are weatherproof and placed out of direct sunlight if possible.

Pack sizes

10 kg plastic pail with clip-seal lid. 2.5 kg plastic pail with clip-seal lid, 500 g plastic pot with press on lid.

New Zealand Registration

Product registered by the Ministry of Agriculture and Forestry's (MAF), Pesticides Board on 31 July 1998. Registered number 5099.

Special Approvals

MAF approved for use in meat, fish and game processing plants. AgriQuality NZ Ltd approved for use in dairy factories.

New Zealand Efficacy Trials

Carried out April – May 1997 at the Ports of New Plymouth and Wanganui.

Storage Precautions

Store in a well ventilated area, out of direct sunlight and out of reach of children or domestic animals.

Handling precautions

Wear rubber gloves when handling baits. Human scent on baits will deter rodents which are naturally suspicious of novel food. . Do not eat, drink or smoke while laying baits. Wash hands and exposed skin after handling baits.

Transportation Precautions

This product is not defined as hazardous by IATA or IMO rules (covering international air and sea freight) or under land transportation rules in most countries world wide. There are no quantity restrictions for the transportation of this product and hazardous substance signage is not necessary because the product falls well below the minimum criteria which establish or products as hazardous or non-hazardous goods.

Product Shelf Life

Recommended maximum shelf life from data of manufacture, under ambient storage conditions is 2 years.

Signs and symptoms of Over-exposure

Absorption of the formulated products is only likely to occur by ingestion of the bait. Sickness and vomiting may occur after ingestion, but in some cases no symptoms will occur for several days before typical features of anticoagulant poisoning occur. Typical features result from increased bleeding tendency, they include:

a. Low dose poisoning: Bruising easily with occasional nose and gum bleeds. Appearance of blood in stool or urine. Excessive bleeding from cuts or abrasions.
b. Severe poisoning: Massive haemorrhage (usually internal). Shock. Coma.

If underlying disease is present e.g. Parasitic disease, anaemia or liver disease, then the above features may be more severe and the poisoning may be more difficult to control. It is important to look for these, if there is a poor response to treatment.

First Aid

If product is swallowed, induce vomiting by giving the patient a glass or two of water and placing a finger down the throat. In the event of contact with the skin, wash the affected area with soap and water. If contact with the eyes occurs, irrigate with clean water or an eyewash solution.

Antidote

Vitamin K1 administered orally or intravenously. Adults 40mg/day (divides doses) , children 20 mg/day (divided doses). Vitamin K1 therapy may be necessary over several weeks until prothrombin (blood clotting) times have stabilised. Normal time is approximately 12 seconds. In severe cases of poisoning, blood transfusions may be necessary

Waste Disposal

Disposed of unused product and containers by burning if conditions, especially wind direction, permit. Avoid inhalation of fumes emitted by burning. Alternatively bury unused baits and containers in an approved landfill under the direction of the local waste management authority.

Flammability

Combustible solid, flash point in excess of 250 degrees C. In case of fire use water spray, dry chemical, carbon dioxide or chemical foam. In enclosed areas, wear SCBU equipment in pressure demand and full protective gear.

DETAILS OF ACTIVE INGREDIENT

Manufacturer of Active ingredient

Taegeuk Trading Co., 75-38 Biha-Dong, Chongju-Shi, Korea.

Chemical Name

3-[3-(4'-bromobiphenyl-4-yl)-1,2,3,4-tetrahydro-1-naphthyl]-4-hydroxycoumarin (IUPAC).

3-[3-(4'-bromo-[1,1'-biphenyl]-4-yl)-1,2,3,4-tetrahydro-1-naphthalenyl]-4-hydroxy-2H-1-benzopyran-2-one (C.A.)

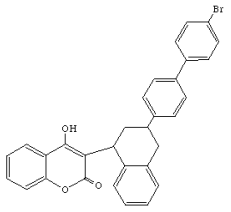
Common Name

Brodifacoum.

CAS RN

56073-10-0

Chemical Structure



Formula

$C_{31}H_{23}O_3Br$

Molecular Weight

523

Manufacturing Impurities in Pure Active

4-hydroxycoumarin <20g/kg

3-(4-bromobiphenyl-4-yl)-naphthlalene < 10g/kg

3-(4-bromobiphenyl-4-yl)-hydroxy-1,2,3,4-tetrahydronaphthalene <10g/kg

Dry absence <10g/kg

Technical Concentrate Used in Manufacture of Formulated Product

Purity: 2.5% brodifacoum

Composition:

2.5% w/w pure Brodifacoum (CAS RN 56073-10-0)

1.0% w/w Brilliant blue No1 (CAS RN 3844-45-9)

96.5% w/w Polypropylene glycol USP (CAS RN 57-55-6)

Appearance: Hygroscopic, slightly viscous liquid.

Colour: Blue

Flash point: Not applicable.

Flammability: None.

Explosion: None.

Oxidising Properties: None.

Density: 1.015 at 15^{o}C

Stability in storage: Stable for at least 2 years when stored in the unopened sales container under normal storage conditions and protected from extremes of temperature.

Mixing method: (Preparation of 2.5% Brodifacoum Tech.)

50.0 parts by weight Brodifacoum Tech solution (5%)

49.0 parts by weight polypropylene glycol

1.0 part by weight edible dyestuff (Brilliant Blue No1)

Mix at 90^{o}C for about 30 min

TOXICOLOGICAL SUMMARY

Mode of Action

The action of Brodifacoum is the same as for other 4-hydroxycoumarin anticoagulants e.g. Difenacoum and Warfarin. These have been shown to block the reductase enzyme mediated step of the vitamin K_1 expoxide to vitamin K_1 cycle, thus depleting the supply of vitamin K_1 necessary for the production of blood clotting factor precursors. Like other anticoagulants, supply of excess vitamin K_1 is an antidote to Brodifacoum.

Toxicity in Application

Brodifacoum is the most potent of the second generation anticoagulant toxins. Successful in controlling *Rattus norvegicus, R.. Rattus* and *Mus musculus* at levels lower than many other anticoagulants. May also be used to control *Cricetus cricetus, Mesocricetus auratus, Microtus Pennsylvanicus, M. pinetorum, R.argentiventer, R.mindanensis* and rodents such as hamsters which may be difficult to control with other anticoagulants.

Environmental toxicity

Technical Grade stable >0.5year. (50^{o} C)

No loss of activity in 30 days in direct sunlight.

Degraded in soils (pH 5.5 - 8) under aerobic and flooded conditions.

Degraded only slowly in water due to brodifacoum being insoluble.

Analysis method

Determination by HPLC

Toxicity to animals

In mice haemorrhage occurs mainly in the intestine, liver and pancreas. At high doses, external haemorrhaging occurred in the eyes, ears and blood spots in the skin were observed.

Rainbow Trout: LC_{50} 0.09mg/L for 48 hours

Blue gill species LC_{50} 0.225mg/L for 48 hours

Mallard Duck LD_{50} 2.0 mg/kg

Chicken (*Gallus spp*) LD_{50} 4.5 mg/kg

Rabbit LD_{50} 0.29 mg/kg

Cat LD_{50} 25 mg/kg

Dog LD_{50} 3.56 mg/kg

Guinea pig LD_{50} 2.8 mg/kg

Cattle *(Bos taurus)* LD_{50} 15.0 mg/kg

Brodifacoum has shown negligible insecticidal activity in laboratory tests. It is unlikely Brodifacoum will cause any risk to bees or any other beneficial insects.

Carcinogenicity

Mouse: In a 2 year oral toxicity and carcinogenicity study, eighty male and eighty female mice were administered NRDC 161 in the diet at dosage levels of 1, 5, 25, and 100 ppm for 24 months. No compound related changes were seen at all during this period.

Rat: Brodifacoum was offered in the diet to rats at dosage levels of 2, 20 and 50 ppm for 2 years. The rats were observed macroscopically throughout the study period and haematological and biochemical studies were made every six months. Some rats were euthanased at 6 month intervals and examined for histopathological changes.

No significant dose-related changes were observed over the two year period. Brodifacoum showed negatives results for carcinogenicity by ames tests.

Teratogenicity and Reproduction

Administered orally to female rats during the period of organogenesis - from day 6 to day 17 of the gestation period.

The product was dissolved in PEG 300 and administered daily at 12.5, 25 and 50 µg/kg/day as an aqueous dilution to 3 groups of females. A fourth group of twenty five females received the vehicle only.

There were no deaths among the females in the study. No signs that could be attributed to the treatment were observed in those females treated .

No significant treatment related effect was observed in food consumption or bodyweight in full-term pregnant females.

The number of full term pregnancies were 23 in group 1, 21 in group 2, 25 in group 3, 25 in group 4

This gave 295, 274, 347 and 329 live foetuses respectively to be examined. There was no treatment related effect on the fertility of the females. There was no embryotoxicity. No abnormalities or malfunctions were observed during the foetal examinations which could be attributed to treatment.

It was concluded that under experimental conditions, the oral administration of test compound Brodifacoum to pregnant rats at dose levels of 12.5, 25 and 50 µg/kg/day during the period of organogenesis produced no toxic effects in the females treated and no embryotoxicity or teratogenic activity in the foetuses.

Brodifacoum has shown no compound related embryotoxic or teratogenic effects.

Mutagenicity

No recorded effects.

Effects in Soils

Brodifacoum is adsorbed by soils of widely different types and is of low mobility in soil.

Bio-degradation and decomposition of brodifacoum in soils is slow but brodifacoum breaks down readily in soils pH 5.5 - pH8 under both aerobic and flooded conditions. Studies have shown that the rate at which brodifacoum is adsorbed by soil and degraded by soil is related to the organic content of the soil and soil alkalinity.

Leaching studies have shown that brodifacoum's mobility was less than 2% over 2 cm.

A study which applied up to 15 times the expected normal application rate of brodifacoum bait to rangelands and harvested grass from the same area 3 days later showed that residues in the grass did not exceed 0.002 mg/kg of brodifacoum. There is therefore no significant transfer of brodifacoum residues from soil into grass or indications of phytotoxicity.

Effects in Water

Brodifacoum is insoluble in water and not readily hydrolysed. Degradation in water is therefore extremely slow.

Non-Target Effects

There are a number of recorded incidences where secondary poisoning of predatory and carrion feeders has occurred. Those species most at risk appear to be mustelids, raptors and owls. In order to mitigate this hazard to non-target areas, measures must be taken to limit their access to poisoned rodents.

Efficacy

The mean lethal dose of Brodifacoum is a very small percentage of a rodents daily food requirements. Therefore continuous daily feeding, normally required by low-potency first generation anticoagulants, is not necessary. This is particularly useful in the control of house mice which have a very low daily food intake requirement and are therefore difficult to control.

Attachments

1. New Zealand efficacy trial report.
2. New Zealand Approvals for fish, meat, game and dairy use.
3. New Zealand Product Registration Certificate.
4. Active Ingredient manufacturer's technical specification.
5. Manufacturer's Certificate of Analysis on Active Ingredient.