AC Invoke

AXICHEM Pty Ltd

Chemwatch Hazard Alert Code: **2**

Chemwatch: **5200-47**
Version No: **5.1**
Safety Data Sheet according to WHS Regulations (Hazardous Chemicals) Amendment 2020 and ADG requirements

Issue Date: **15/04/2021**
Print Date: **07/10/2022**
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SECTION 1 Identification of the substance / mixture and of the company / undertaking

Product Identifier

Product name	AC Invoke
Chemical Name	Not Applicable
Synonyms	isoxaflutole herbicide agricultural
Proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (contains isoxaflutole)
Chemical formula	Not Applicable
Other means of identification	Not Available

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Herbicide for agricultural use. ‣ Material is mixed and used in accordance with manufacturers directions

Details of the manufacturer or supplier of the safety data sheet

Registered company name	**AXICHEM Pty Ltd**
Address	9 Palings Court Nerang QLD 4211 Australia
Telephone	07 5596 1736
Fax	Not Available
Website	www.axichem.com.au
Email	msds@axichem.com.au

Emergency telephone number

Association / Organisation	**CHEMWATCH EMERGENCY RESPONSE**
Emergency telephone numbers	+61 1800 951 288
Other emergency telephone numbers	+61 3 9573 3188

Once connected and if the message is not in your preferred language then please dial 01

SECTION 2 Hazards identification

Classification of the substance or mixture

Poisons Schedule	S5
Classification [1]	Reproductive Toxicity Category 2, Specific Target Organ Toxicity - Repeated Exposure Category 2, Hazardous to the Aquatic Environment Long-Term Hazard Category 1, Serious Eye Damage/Eye Irritation Category 2B
Legend:	*1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI*

Label elements

Hazard pictogram(s)	

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Signal word	**Warning**

Hazard statement(s)

H361d	Suspected of damaging the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.
H410	Very toxic to aquatic life with long lasting effects.
H320	Causes eye irritation.

Precautionary statement(s) Prevention

P201	Obtain special instructions before use.
P260	Do not breathe dust/fume.
P280	Wear protective gloves and protective clothing.
P273	Avoid release to the environment.
P264	Wash all exposed external body areas thoroughly after handling.

Precautionary statement(s) Response

P308+P313	IF exposed or concerned: Get medical advice/ attention.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P314	Get medical advice/attention if you feel unwell.
P337+P313	If eye irritation persists: Get medical advice/attention.
P391	Collect spillage.

Precautionary statement(s) Storage

P405	Store locked up.

Precautionary statement(s) Disposal

P501	Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation.

SECTION 3 Composition / information on ingredients

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
141112-29-0	75	isoxaflutole
Not Available		(750g/kg)
1332-58-7	5-15	kaolin
Not Available	10-30	Ingredients determined not to be hazardous

Legend:	*1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 4. Classification drawn from C&L; * EU IOELVs available*

SECTION 4 First aid measures

Description of first aid measures

Eye Contact	If this product comes in contact with eyes: ▸ Wash out immediately with water. ▸ If irritation continues, seek medical attention. ▸ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If skin or hair contact occurs: ▸ Flush skin and hair with running water (and soap if available). ▸ Seek medical attention in event of irritation.
Inhalation	▸ If dust is inhaled, remove from contaminated area. ▸ Encourage patient to blow nose to ensure clear passage of breathing. ▸ If irritation or discomfort persists seek medical attention.

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Ingestion	▸ If swallowed do **NOT** induce vomiting. ▸ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▸ Observe the patient carefully. ▸ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▸ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▸ Seek medical advice.

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5 Firefighting measures

Extinguishing media

- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

Special hazards arising from the substrate or mixture

Fire Incompatibility	▸ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

Advice for firefighters

Fire Fighting	▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ Wear breathing apparatus plus protective gloves. ▸ Prevent, by any means available, spillage from entering drains or water courses. ▸ Use water delivered as a fine spray to control fire and cool adjacent area. ▸ **DO NOT** approach containers suspected to be hot. ▸ Cool fire exposed containers with water spray from a protected location. ▸ If safe to do so, remove containers from path of fire. ▸ Equipment should be thoroughly decontaminated after use.
Fire/Explosion Hazard	▸ Combustible solid which burns but propagates flame with difficulty; it is estimated that most organic dusts are combustible (circa 70%) - according to the circumstances under which the combustion process occurs, such materials may cause fires and / or dust explosions. ▸ Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidizing medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions). ▸ Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust (420 micron or less) may burn rapidly and fiercely if ignited - particles exceeding this limit will generally not form flammable dust clouds; once initiated, however, larger particles up to 1400 microns diameter will contribute to the propagation of an explosion. ▸ In the same way as gases and vapours, dusts in the form of a cloud are only ignitable over a range of concentrations; in principle, the concepts of lower explosive limit (LEL) and upper explosive limit (UEL) are applicable to dust clouds but only the LEL is of practical use; - this is because of the inherent difficulty of achieving homogeneous dust clouds at high temperatures (for dusts the LEL is often called the "Minimum Explosible Concentration", MEC). ▸ When processed with flammable liquids/vapors/mists,ignitable (hybrid) mixtures may be formed with combustible dusts. Ignitable mixtures will increase the rate of explosion pressure rise and the Minimum Ignition Energy (the minimum amount of energy required to ignite dust clouds - MIE) will be lower than the pure dust in air mixture. The Lower Explosive Limit (LEL) of the vapour/dust mixture will be lower than the individual LELs for the vapors/mists or dusts. ▸ A dust explosion may release of large quantities of gaseous products; this in turn creates a subsequent pressure rise of explosive force capable of damaging plant and buildings and injuring people. ▸ Usually the initial or primary explosion takes place in a confined space such as plant or machinery, and can be of sufficient force to damage or rupture the plant. If the shock wave from the primary explosion enters the surrounding area, it will disturb any settled dust layers, forming a second dust cloud, and often initiate a much larger secondary explosion. All large scale explosions have resulted from chain reactions of this type. ▸ Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport. ▸ Build-up of electrostatic charge may be prevented by bonding and grounding. ▸ Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting. ▸ All movable parts coming in contact with this material should have a speed of less than 1-meter/sec. ▸ A sudden release of statically charged materials from storage or process equipment, particularly at elevated temperatures and/ or pressure, may result in ignition especially in the absence of an apparent ignition source. ▸ One important effect of the particulate nature of powders is that the surface area and surface structure (and often moisture content) can vary widely from sample to sample, depending of how the powder was manufactured and handled; this means

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	that it is virtually impossible to use flammability data published in the literature for dusts (in contrast to that published for gases and vapours). ▸ Autoignition temperatures are often quoted for dust clouds (minimum ignition temperature (MIT)) and dust layers (layer ignition temperature (LIT)); LIT generally falls as the thickness of the layer increases. Combustion products include: carbon monoxide (CO) carbon dioxide (CO2) hydrogen fluoride nitrogen oxides (NOx) sulfur oxides (SOx) other pyrolysis products typical of burning organic material.
HAZCHEM	2Z

SECTION 6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	Environmental hazard - contain spillage. ▸ Clean up waste regularly and abnormal spills immediately. ▸ Avoid breathing dust and contact with skin and eyes. ▸ Wear protective clothing, gloves, safety glasses and dust respirator. ▸ Use dry clean up procedures and avoid generating dust. ▸ Vacuum up or sweep up. **NOTE:** Vacuum cleaner must be fitted with an exhaust micro filter (HEPA type) (consider explosion-proof machines designed to be grounded during storage and use). ▸ Dampen with water to prevent dusting before sweeping. ▸ Place in suitable containers for disposal.
Major Spills	Environmental hazard - contain spillage. ▸ Clear area of personnel and move upwind. ▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ Control personal contact with the substance, by using protective equipment and dust respirator. ▸ Prevent spillage from entering drains, sewers or water courses. ▸ Recover product wherever possible. Avoid generating dust. ▸ Sweep / shovel up. ▸ If required, wet with water to prevent dusting. ▸ Put residues in labelled plastic bags or other containers for disposal. ▸ Wash area down with large quantity of water and prevent runoff into drains. ▸ If contamination of drains or waterways occurs, advise emergency services.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 Handling and storage

Precautions for safe handling

Safe handling	▸ Limit all unnecessary personal contact. ▸ Wear protective clothing when risk of exposure occurs. ▸ Use in a well-ventilated area. ▸ When handling **DO NOT** eat, drink or smoke. ▸ Always wash hands with soap and water after handling. ▸ Avoid physical damage to containers. ▸ Use good occupational work practice. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. ▸ Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidizing medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions) ▸ Minimise airborne dust and eliminate all ignition sources. Keep away from heat, hot surfaces, sparks, and flame. ▸ Establish good housekeeping practices. ▸ Remove dust accumulations on a regular basis by vacuuming or gentle sweeping to avoid creating dust clouds. ▸ Use continuous suction at points of dust generation to capture and minimise the accumulation of dusts. Particular attention should be given to overhead and hidden horizontal surfaces to minimise the probability of a "secondary" explosion. According to NFPA Standard 654, dust layers 1/32 in.(0.8 mm) thick can be sufficient to warrant immediate cleaning of the area.

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	▸ Do not use air hoses for cleaning. ▸ Minimise dry sweeping to avoid generation of dust clouds. Vacuum dust-accumulating surfaces and remove to a chemical disposal area. Vacuums with explosion-proof motors should be used. ▸ Control sources of static electricity. Dusts or their packages may accumulate static charges, and static discharge can be a source of ignition. ▸ Solids handling systems must be designed in accordance with applicable standards (e.g. NFPA including 654 and 77) and other national guidance. ▸ Do not empty directly into flammable solvents or in the presence of flammable vapors. ▸ The operator, the packaging container and all equipment must be grounded with electrical bonding and grounding systems. Plastic bags and plastics cannot be grounded, and antistatic bags do not completely protect against development of static charges. Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source. ▸ Do NOT cut, drill, grind or weld such containers. ▸ In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.
Other information	▸ Store in original containers. ▸ Keep containers securely sealed. ▸ No smoking, naked lights or ignition sources. ▸ Store in a cool, dry, well-ventilated area. ▸ Store away from incompatible materials and foodstuff containers. ▸ Protect containers against physical damage and check regularly for leaks. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS.

Conditions for safe storage, including any incompatibilities

Suitable container	▸ Polyethylene or polypropylene container. ▸ Check all containers are clearly labelled and free from leaks.
Storage incompatibility	▸ Many isoxazoles decompose exothermically with release of much gas, after heating in sealed capsules. Several do so in open crucibles. ▸ Avoid reaction with oxidising agents

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Australia Exposure Standards	kaolin	Kaolin	10 mg/m3	Not Available	Not Available	(a) This value is for inhalable dust containing no asbestos and < 1% crystalline silica.

Emergency Limits

Ingredient	TEEL-1	TEEL-2	TEEL-3
AC Invoke	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH
isoxaflutole	Not Available	Not Available
kaolin	Not Available	Not Available

Occupational Exposure Banding

Ingredient	Occupational Exposure Band Rating	Occupational Exposure Band Limit
isoxaflutole	E	≤ 0.01 mg/m³
Notes:	*Occupational exposure banding is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health.*	

MATERIAL DATA

Exposure controls

Appropriate engineering controls	Use in a well-ventilated area General exhaust is adequate under normal operating conditions.

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Personal protection	
Eye and face protection	‣ Safety glasses with side shields ‣ Chemical goggles. ‣ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]
Skin protection	See Hand protection below
Hands/feet protection	‣ Wear chemical protective gloves, e.g. PVC. ‣ Wear safety footwear or safety gumboots, e.g. Rubber
Body protection	See Other protection below
Other protection	‣ Overalls. ‣ P.V.C apron. ‣ Barrier cream. ‣ Skin cleansing cream. ‣ Eye wash unit.

Respiratory protection

Particulate. (AS/NZS 1716 & 1715, EN 143:2000 & 149:001, ANSI Z88 or national equivalent)

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	P1 Air-line*	- -	PAPR-P1 -
up to 50 x ES	Air-line**	P2	PAPR-P2
up to 100 x ES	-	P3	-
		Air-line*	-
100+ x ES	-	Air-line**	PAPR-P3

* - Negative pressure demand ** - Continuous flow
A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Brown granules with a weak characteristic odour; dispersible in water.

Physical state	Divided Solid	**Relative density (Water = 1)**	0.555-0.625 kg/m3 (bulk density)
Odour	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odour threshold	Not Available	**Auto-ignition temperature (°C)**	Not Available
pH (as supplied)	Not Applicable	**Decomposition temperature (°C)**	Not Available
Melting point / freezing point (°C)	Not Available	**Viscosity (cSt)**	Not Available
Initial boiling point and boiling range (°C)	Not Applicable	**Molecular weight (g/mol)**	Not Applicable
Flash point (°C)	Not Applicable	**Taste**	Not Available
Evaporation rate	Not Applicable	**Explosive properties**	Not Available
Flammability	Not Applicable	**Oxidising properties**	Not Available

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Upper Explosive Limit (%)	Not Available	**Surface Tension (dyn/cm or mN/m)**	Not Applicable
Lower Explosive Limit (%)	60 mg/m3	**Volatile Component (%vol)**	Not Available
Vapour pressure (kPa)	Negligible	**Gas group**	Not Available
Solubility in water	Partly miscible	**pH as a solution (Not Available%)**	4.0 - 6.0
Vapour density (Air = 1)	Not Available	**VOC g/L**	Not Available

SECTION 10 Stability and reactivity

Reactivity	See section 7
Chemical stability	‣ Unstable in the presence of incompatible materials. ‣ Product is considered stable. ‣ Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 Toxicological information

Information on toxicological effects

Inhaled	Generated dust may be discomforting Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled. If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.
Ingestion	Accidental ingestion of the material may be damaging to the health of the individual. Ingestion may result in nausea, abdominal irritation, pain and vomiting
Skin Contact	Limited evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis.
Eye	Limited evidence exists, or practical experience suggests, that the material may cause eye irritation in a substantial number of individuals and/or is expected to produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals. Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.
Chronic	Exposure to the material may cause concerns for humans owing to possible developmental toxic effects, generally on the basis that results in appropriate animal studies provide strong suspicion of developmental toxicity in the absence of signs of marked maternal toxicity, or at around the same dose levels as other toxic effects but which are not a secondary non-specific consequence of other toxic effects. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems. Long term exposure to high dust concentrations may cause changes in lung function (i.e. pneumoconiosis) caused by particles less than 0.5 micron penetrating and remaining in the lung. A prime symptom is breathlessness. Lung shadows show on X-ray.

	TOXICITY	**IRRITATION**
AC Invoke	Dermal (Rabbit) LD50: >2000 mg/kg[2]	Not Available
	Inhalation (Rat) LC50: 5260 mg/m3/4h[2]	
	Oral (Rat) LD50: >5000 mg/kg[2]	

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isoxaflutole	**TOXICITY**	**IRRITATION**
	dermal (rat) LD50: >2000 mg/kg[2]	Eye (rabbit): mild *
	Oral (Rat) LD50; 5000 mg/kg[2]	Skin (rabbit): slight *
kaolin	**TOXICITY**	**IRRITATION**
	Not Available	Not Available
Legend:	*1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances*	

ISOXAFLUTOLE

Does not exhibit sensitisation potential * *EPA Pesticide Fact Sheet (September 1998)
The main mechanisms of action of 4-hydroxyphenylpyruvate dioxygenase (HPPD) inhibitors are the development of tyrosinemia and alterations in thyroid hormone level as a result of hepatic enzyme induction.
The main target organs of its action are the eyes, liver and thyroid gland. It was proved that the most adequate model for extrapolation of the effects of tyrosinemia on humans are mice, because their tyrosine aminotransferase activity level is similar to that in humans.
Based on the parameters of acute oral toxicity and dermal toxicity, all the examined herbicides are classified into toxicity class 4 (low-risk). The majority are moderately hazardous or toxic only by inhalation (Class 2 or 3); only pyrazoxyphen is extremely hazardous (Class 1).
It was found that in subchronic and chronic experiments the magnitudes of subthreshold doses for male and female rats do not differ. However, the severity and range of symptoms in males are much larger, confirming their greater sensitivity to the negative impact of 4-HPPD inhibitors In particular, changes in most of the studied parameters in females occur at dose levels which are one or two times higher than that of males. Some toxicologically significant effects in females are absent.
It was also discovered in subchronic and chronic experiments that the major target organs under the action of 4-HPPD inhibitors are the liver (hepatocellular hypertrophy in rats and mice), thyroid gland (follicular cell hypertrophy in rats and dogs), and the eye (corneal opacity and chronic keratitis in rats)
The severity of tyrosinemia provoked by 4-HPPD inhibitors depends on the tyrosine aminotransferase (TAT) activity which in mice is 3-5 times higher, and the level of tyrosinemia is lower than in rats At the inhibition of 4-HPPD action, TAT becomes the main enzyme catalyzing the conversion of tyrosine. However, in rats, especially males, the activity of this enzyme is insufficient for tyrosinemia occurrence and to maintain the level of tyrosine which would be below toxic level.
TAT is the first and dose-dependent enzyme in the cascade of tyrosine conversion into 4-hydroxyphenylpyruvate (4-HPP), which then converts into homogentisic acid with the help of 4-HPPD. If this pathway is limited due to the inhibition of 4-HPPD, its substrate 4-HPP is excreted in the urine directly, or turned into other phenolic acids (e.g. p-hydroxyphenylacetic acid), before excretion with the urine. Since the reaction involving TAT is reversible, the 4-HPP may again convert into tyrosine. Severe tyrosinemia in rats leads to the occurrence of so-called critical effects – eye damage In contrast, in mice, 4-HPPD inhibition develops to a much lesser degree due to the higher basal TAT activity and, consequently, much lower tyrosinemia, that does not lead to the occurrence of critical effects. TAT activity in mice and in humans is at the same level, but is much higher than in rats, suggesting that humans will not develop such a severe tyrosinemia as rats. These arguments suggest that the extrapolation of tyrosinemia caused by 4-HPPD inhibitors in rats to human s is not justified.
There are three ways of tyrosine metabolism in mammals:
1) in the liver – converting it into 4-hydroxyphenylpyruvate (4-HPP) with the help of TAT, followed by decarboxylation to homogentisate which, in turn, then converts into acetylacetate and fumarate;
2) in the nervous tissue – conversion using tyrosine hydroxylase to 3,4-dihydroxyphenylalanine (DOPA) and conversion to dopamine by DOPA-decarboxylase participation, formation of norepinephrine and epinephrine;
3) in melanocytes – dopaquinone is formed from DOPA which is then spontaneously converted to melanin.
The pesticides only affects the first pathway of tyrosine metabolism.
Antonenko et al: Mechanism of action of 4-hydroxyphenylpyruvate dioxygenase inhibitor herbicide on homoterm animals and humans Journal of Pre-clinical and Clinical Research 9 149-154: December 2015
http://www.researchgate.net/publication/287390485_Mechanism_of_action_of_4-hydroxyphenylpyruvate_dioxygenase_inhibitor_herbicide_on_homoterm_animals_and_humans/citation/download
The inhibition of the enzyme 4-hydroxyphenylpyruvate dioxygenase (HPPD), the second enzyme in the tyrosine catabolic pathway, results in excess plasma tyrosine (tyrosinemia). When HPPD is completely inhibited, the clearance of excess tyrosine is dependent upon catabolism by the first and rate-limiting enzyme in the catabolic pathway, tyrosine aminotransferase (TAT) and elimination of the products of this catabolism via the urine.
Investigation of the effects of HPPD inhibition, as it relates to herbicides frequently employs rodents in experimental models..
The inherent activity of TAT is low in rats (in contrast to humans) and hence they catabolize tyrosine slowly and accumulate tyrosine to very high concentrations in plasma which results in a spectrum of adverse effects that are related to excess tyrosine.
There is a large database showing a positive correlation between a range of biological endpoints and elevations in plasma tyrosine. Although plausible in humans, the extent and duration of plasma tyrosine elevation in humans is not sufficient to cause adverse effects resulting from the intended use of HPPD herbicides.
In laboratory animals, treatment with nitisinone (an HPPD inhibitor of the triketone class) leads to the elevation of plasma tyrosine (tyrosinaemia). In rats and Beagle dogs, repeat low-dose exposure to nitisinone leads to corneal opacities whilst similar studies in the mouse and Rhesus monkey showed no comparable toxicities or other treatment related findings. The differences in toxicological sensitivities have been related to the upper limit of the concentration of tyrosine that accumulates in plasma, which is driven by the amount/activity of tyrosine aminotransferase (TAT).
Dysregulation of enzymes involved in the phenylalanine-tyrosine (Phe-Tyr) catabolic pathway is linked to various human diseases. As an example,deficiency of the TAT enzyme caused by mutations in the TAT gene is found in type II tyrosinemia (Richner-Hanhart syndrome), an autosomal recessive inherited disease.The disease is characterized by hypertyrosinemia (elevated levels of tyrosine) with eye-skin (oculocutaneous) manifestations and, in some cases, mental retardation. Management

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of the disease includes dietary restriction of phenylalanine and tyrosine. Such a controlled diet allows lowering of plasma Tyr levels and rapid resolution of the oculocutaneous manifestations, though the effects on CNS are less clear..
Moreover, deficiency of HPPD caused by mutations in the 4-hydroxyphenylpyruvate dioxygenase (HPD) gene is responsible for type III tyrosinemia, where the accumulation of 4-hydroxyphenylpyruvate (HPP) might eventually lead to elevated blood Tyr levels due to reversibility of the TAT-catalyzed reaction. The disease is characterized by mild hypertyrosinemia and variable clinical picture
Increased blood tyrosine amounts and consequent ocular manifestations are found also in T1T and in alkaptonuria patients treated with nitisinone (NTBC). Both T1T and alkaptonuria are metabolic diseases arising from defects downstream of production of homogentisate (HGA) in the Tyr degradation pathway. In particular, mutations affecting the activity of the enzyme fumarylacetoacetate hydrolase (FAH) cause Type I tyrosinemia (T1T), a fatal disease with autosomal recessive inheritance.The inability of fumarylacetoacetate hydrolase (FAH), an enzyme downstream of HPPD, to finalize the Tyr metabolic pathway leads to the nonenzymatic reduction of both fumarylacetoacetate and its precursor maleylacetoacetate into succinylacetoacetate, which is in turn decarboxylated to give succinylacetone The last two compounds accumulate in high amounts in the liver and kidneys, affecting cellular morphology and organ architecture because of altered redox equilibria. Hepatotoxicity, hepatic lesions, failure, and cirrhosis, as well as primary liver cancer can occur. The mutagenic effects of fumarylacetoacetate may contribute to the initiation steps that lead to cancer.
Alkaptonuria is consequent to gene mutations that cause the inability of the enzyme homogentisate dioxygenase (HGD) to catabolize homogentisate (HGA), which then accumulates. Evidence suggests that homogentisate can undergo oxidation into the corresponding benzoquinone derivative (benzoquinone acetate, BQA) whose polymerization yields a black pigment found in connective tissues and urine of affected individuals . Deposition of such a black pigment (a phenomenon known asochronosis) causes dramatic degeneration of connective tissues in affected organs, mainly joints and cardiac valves, although any tissue expressing HGD may be involved.
The application of nitisinone as a therapeutic agent for T1T also stimulated work on fumarylacetoacetate and its involvement in mutagenic changes hypothetically responsible for liver tumors in infancy and childhood.
Nitisinone has been evaluated in clinical trials for its efficacy and safety in alkaptonuria As expected, one major side effect found was a combined effect of accumulation of 4-hydroxyphenylpyruvate and its reconversion into Tyr, which was responsible for corneal opacity and ocular lesions very similar to those found in type II tyrosinemia.
A role for Nitisinone was hypothesized also for hawkinsinuria, a disease characterized by the presence of the unusual cyclic amino acid hawkinsin in urine. The HPD gene mutation responsible for hawkinsinuria in humans leads to loss of enzyme activity and production of hawkinsin through a quinolacetic acid intermediate . Hawkinsinuria is a temporary disease whose symptoms, described as failure or inability to thrive, disappear after the first 1-2 years of life.
Many of the currently available HPPD inhibitors, are characterized by a rapid inactivation of the enzyme and a long residence time. This means that the HPPD-inhibitor complex is formed very quickly, but it dissociates very slowly (quasi-irreversible inhibition). As a result of the rapid and persistent HPPD inactivation, an unbalanced ratio between suppressed production of homogentisate and high Tyr accumulation led to important side effects. In this context, a fine modulation of HPPD activity is required by means of compounds with reduced residence time. By this way, a partial reactivation of HPPD will guarantee a limited production of homogentisate and avoid too high levels of tyrosinemia. In particular, a rapid complex dissociation will result in the desired pharmacology, while prolonged residence time will cause unwanted effects.
Santucci et al: 4-Hydroxyphenylpyruvate Dioxygenase and Its Inhibition in Plants and Animals: Small Molecules as Herbicides and Agents for the Treatment of Human Inherited Disease: Jnl Medicinal Chemistry: January 2017
http://www.aimaku.it/documenti/lavori/Santucci_JMC_2017.pdf
It is widely accepted that markedly elevated tyrosine in rats is a direct consequence of HPPD inhibition; therefore, the ocular effects observed following exposure to HPPD inhibitors is due to elevated tyrosine. The observed increased incidences of corneal keratitis and regenerative hyperplasia in rats but parallel the increases in tyrosine, which are maximal at dietary concentrations of = 500 ppm. Additionally, it has been noted previously with another HPPD inhibiting herbicide that mice tended to be less susceptible to the toxicity of the herbicide, with a lack of ocular effects up to the limit dose of 1000 mg/kg bw/d and rats are more susceptible. .
A review of the literature revealed that evidence from human cases of hereditary diseases that affect tyrosine metabolism indicates that corneal opacity is observed in human with plasma tyrosine concentration of approximately 3000 nmol/mL. This can be considered to be the threshold of plasma tyrosine concentration for ocular effects in humans and in the event of complete inhibition of HPPD, this threshold is unlikely to be exceeded in humans.
Additionally, it has also been reported in the literature that ocular lesions are seen in humans with tyrosinaemia type II who have a deficiency in the enzyme tyrosine aminotransferase, and high tyrosine levels. In contrast, exposure of humans with tyrosinaemia type I who have a deficiency in the enzyme fumarylacetoacetate hydrolase, to the pharmaceutical compound nitisinone (NTBC) which is a complete HPPD inhibitor, does not result in the same marked elevation in tyrosine levels and does not cause ocular toxicity similar to that seen in the rat. While under treatment for tyrosinaemia type I dietary restriction to prevent significant tyrosine elevation is recommended, NTBC has also been used in clinical trials for alkaptonuria, another metabolic defect in the tyrosine catabolic pathway, without any dietary restriction and 1/40 patients developed corneal opacity which was reversed following discontinuation of treatment. Therefore, there is evidence that although humans can develop ocular lesions when tyrosine levels are highly elevated for prolonged periods of time, as is the case in tyrosinaemia type II, the administration of HPPD inhibitors, at doses which are intended to completely inhibit the HPPD enzyme rarely elevates tyrosine sufficiently to cause ocular lesions.
Thus, in contrast to rats there is a substantially reduced risk of adverse ocular effects occurring in humans following exposure to HPPD inhibitors
It is reported in the scientific literature that in the rat, free tyrosine can create conditions in the thyroid analogous to mild iodine deficiency, while the HPPD inhibitor NTBC has been used for the treatment of type I tyrosinaemia since 1991, with some patients therefore taking the drug for >20 years, and during this time there have been no reports of effects on thyroid function. Thus, it is clear that humans are significantly less sensitive than rats to elevated tyrosine levels due to HPPD inhibition and associated thyroid hormone disturbances that can lead to histopathological changes in the thyroid.
Isoxaflutole is not mutagenic, teratogenic or a reproductive toxin. In long-term feeding studies in rodents, liver tumours were observed in rats and mice and thyroid tumours in rats. these effects were only seen at the highest dose tested (the Maximum Tolerated Dose) which is far higher than any exposure that could be envisaged by humans. Thus isoxaflutole presents a

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negligible, if any, increased cancer risk for humans.

Subchronic Toxicity:

In a 21-day dermal toxicity study in rats, treatment-related marginal increase in relative liver weight was observed in both sexes of rats at 1000 mg/kg/day. This finding was considered as an adaptive response to isoxaflutole treatment. The systemic toxicity lowest observable effect level (LOAEL) is greater than 1000 mg/kg/day for males and females; the systemic toxicity no observable effect level (NOEL)is 1000 mg/kg or greater for males and females. The dermal toxicity LOAEL is greater than 1000 mg/kg/day for males and females; the dermal toxicity NOEL is 1000 mg/kg/day or greater for males and females.

In a 28-day oral subchronic toxicity study, RPA 203328 (a metabolite of isoxaflutole) was administered in the diet to male and female rats. There were no compound related adverse effects on survival, clinical signs, body weight, food consumption, clinical chemistry, hematology, and gross or microscopic pathology.

Chronic Toxicity

Carcinogenicity:

Isoxaflutole induced benign and malignant tumors of the liver in rats (both sexes) at 500 mg/kg/day hepatocellular adenomas and hepatocellular carcinomas.

Combined incidences of liver adenoma/carcinoma in males and females showed animals bearing carcinomas in the majority. Thyroid follicular adenomas occurred with increased frequency in 500 mg/kg/day males. The tumor incidences exceeded the historical incidence of these tumors for this strain in the laboratory. In a separate special study investigating the mechanism of action of isoxaflutole on the thyroid thyroid stimulating hormone (TSH) was indirectly measured since there was a significant reduction in T4 level and thyroid gland weights were significantly increased. These results were sufficient to support the hypothesis that isoxaflutole may have induced thyroid tumors in male rats through a disruption in the thyroid-pituitary hormonal feedback mechanisms.

In a 78-week study in rats, there were significant occurrences of hepatocellular adenomas in 52% of the males and 29% of the females, and carcinomas in 33% of the males and 8% of the females (non-significant). The incidences of these tumors exceeded the corresponding historical incidence with this species in the laboratory. Combined adenoma and carcinoma incidences at 7,000 ppm were 73% for males and 35% for females. At 500 ppm, the incidences of 17% adenomas and 15% carcinomas in males and 2% adenomas in females were not statistically significant, but exceeded the means for historical controls.

52- and 78-week studies revealed a dose-related decrease in the first occurrence of carcinomas in males; the earliest carcinomas were observed at 78, 71, 52, and 47 weeks at the 0 through 7,000 ppm doses. There were no carcinomas in females up to 78 weeks at 0, 25, or 500 ppm, although, the earliest finding at 7000 ppm was at 60 weeks.

Isoxaflutole appears to induce hepatocellular adenomas and carcinomas in male and female CD-1 mice. .

Developmental Toxicity

In a developmental toxicity study in rats, maternal toxicity was observed at 500 mg/kg/day.

The maternal LOAEL is 500 mg/kg/day, based on increased incidence of clinical signs and decreased body weights, body weight gains, and food consumption.

The maternal NOEL is 100 mg/kg/day. Developmental toxicity, observed at 100 and 500 mg/kg/day, were manifested as increased incidences of foetuses/litters with various anomalies: growth retardations (decreased foetal body weight; increased incidence of delayed ossification of sternebrae, metacarpals and metatarsals). In addition, an increased incidence of vertebral and rib anomalies and high incidence of subcutaneous edema were observed at 500 mg/kg/day. The LOAEL for developmental toxicity is 100 mg/kg/day, based on decreased foetal body weights and increased incidences of skeletal anomalies. The developmental NOEL is 10 mg/kg/day.

In a developmental toxicity study in rabbits, maternal toxicity was observed at 100 mg/kg/day. The maternal LOAEL is 100 mg/kg/day, based on increased incidence of clinical signs, decreased body weight gains and food consumption. The maternal NOEL is 20 mg/kg/day. Developmental toxicity, observed at 5 mg/kg/day, consisted of increased incidence of 27th pre-sacral vertebrae. Additional findings noted at 20 and 100 mg/kg/day were manifested as increased number of postimplantation loss and late resorptions, as well as growth retardations in the form of generalized reduction in skeletal ossification, and increased incidence of 13 pairs of ribs. At 100 mg/kg/day, an increased incidence of foetuses with incisors not erupted was also observed. Incidences of these anomalies, on a litter basis, were higher than the concurrent control values and in some cases exceeded the range for historical controls. The LOAEL for developmental toxicity is 5 mg/kg/day, based on increased incidence of fetuses with 27th pre-sacral vertebrae. The developmental NOEL was not established.

Reproductive Toxicity

In a 2-generation reproduction study in rats, evidence of toxicity was observed in the male and female parental rats of both generations: at 20 and 500 mg/kg/day, increased absolute and relative liver weights associated with liver hypertrophy was observed; at 500 mg/kg/day (HDT), decreased body weight, body weight gain and food consumption during premating and gestation, and increased incidence of subacute inflammation of the cornea of the eye in F0 adults as well as keratitis in F1 adults were reported. There were no other systemic effects that were attributed to treatment, nor was there any indication, at any treatment level, of an effect on reproductive performance of the adults.

Treatment-related effects were observed in F1 and F2 offspring: at 20 and 500 mg/kg/day, reduction in pup survival was noted; at 500 mg/kg/day, decrease in body weights of F1 and F2 pups throughout lactation, increased incidence of chronic keratitis, low incidence of inflammation of the iris, as well as retinal and vitreous bleeding in F2 pups and weanlings were observed. Necropsy of F1 and F2 pups culled on Day 4 revealed an increased number of pups with no milk in the stomach and underdeveloped renal papillae. The Systemic LOAEL is 17.4 mg/kg/day for males and females, based upon increased liver weights and hypertrophy and the Systemic NOEL is 1.76 mg/kg/day for males and females. The Reproductive LOAEL is greater than 437 mg/kg/day, based on lack of reproductive effects and the Reproductive NOEL is greater than or equal to 437 mg/kg/day.

Mutagenicity:

For parent isoxaflutole, in a Salmonella typhimurium reverse gene mutation assay, independently performed tests were negative in S.typhimurium strains up to insoluble doses (=>500 ug/plate +/- S9) and was non-cytotoxic. In a mouse lymphoma L5178Y forward gene mutation assay, independently performed tests were negative up to insoluble (=>150 ug/mL +/-S9) or soluble (=>75 ug/mL +/-S9) doses. An in vitro cytogenetic assay in cultured human lymphocytes tested negative up to insoluble concentrations (=>300 ug/mL -S9; 600 ug/mL +S9) and was non-cytotoxic. A mouse micronucleus assay tested negative in male or female CD-1 mice up to the highest administered oral gavage dose (5000 mg/kg). No evidence of an overt toxic response in the treated animals or a cytotoxic effect on the target cells was observed.

For the major metabolite RPA 202248 and the minor metabolite RPA 203328, mutagenicity assays were negative.

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	Metabolism In a metabolism study, 14C-isoxaflutole was rapidly and extensively absorbed and metabolised. RPA 202248, a major metabolite, a diketonitrile derivative, represented 70% or more of the radioactivity excreted in the urine and feces from the two lowest dose groups. The other minor metabolite, RPA 203328, was more polar. Elimination was rapid and dose-dependent. The mean total recovery was 99.21%. Urinary elimination was predominant in the two low dose groups while the major portion of radiolabel was excreted via the feces in the high dose group. The higher faecal elimination possibly resulted from the saturation of absorption resulting in elimination of unchanged parent compound. The majority of the radiolabel was eliminated in the first 24 and 48 hours for the low and the high dose groups, respectively. The elimination half-lives were similar among single low and high dose groups, with an estimated mean blood half-life of 60 hours. No sex differences were observed in the metabolism of 14C-isoxaflutole. **Neurotoxicity** In an acute neurotoxicity study in rats, no treatment-related effects were observed on survival, body weight, body weight gain or food consumption. There were significant decreases in landing foot splay measurements in males at 2000 mg/kg during functional observational battery (FOB) tests indicating impairment of neuromuscular function. At 500 mg/kg, males exhibited significant decreases in landing foot splay measurements on day 15. The LOAEL was 500 mg/kg based on significant decreases in landing foot splay on day 15. The NOEL was 125 mg/kg. In a subchronic neurotoxicity study in rats, treatment-related effects observed in high-dose males consisted of decreases in body weight and body weight gain. The LOAEL was established at 25 mg/kg/day based on significant decreases in mean hind limb grip strength in male rats at 25 mg/kg/day (LDT) during both trials at week 13 as well as a non-significant decrease in mean forelimb grip strength at week 13.
KAOLIN	for bentonite clays: Bentonite (CAS No. 1302-78-9) consists of a group of clays formed by crystallisation of vitreous volcanic ashes that were deposited in water. The expected acute oral toxicity of bentonite in humans is very low (LD50>15 g/kg). However, severe anterior segment inflammation, uveitis and retrocorneal abscess from eye exposure were reported when bentonite had been used as a prophypaste. In a 33 day dietary (2 and 6%) and a 90 day dietary (1, 3 and 5%) studies in chickens, no changes in behaviour, overall state, clinical and biochemical parameters and electrolytic composition of the blood. Repeat dietary administration of bentonite did not affect calcium or phosphorus metabolism. However, larger amounts caused decreased growth, muscle weakness, and death with marked changes in both calcium and phosphorus metabolism. Bentonite did not cause fibrosis after 1 year exposure of 60 mg dust (<5 um) in a rat study. However, in a second rat study, where 5 um particles were intratracheally instilled at 5, 15 and 45 mg/rat, dose-related fibrosis was observed. Bentonite clay dust is believed to be responsible for bronchial asthma in workers at a processing plant in USA. Ingestion of bentonite without adequate liquids may result in intestinal obstruction in humans. Hypokalaemia and microcytic iron-deficiency anaemia may occur in patients after repeat doses of clay. Chronic ingestion has been reported to cause myositis.
ISOXAFLUTOLE & KAOLIN	No significant acute toxicological data identified in literature search.

Acute Toxicity	✗	**Carcinogenicity**	✗
Skin Irritation/Corrosion	✗	**Reproductivity**	✓
Serious Eye Damage/Irritation	✓	**STOT - Single Exposure**	✗
Respiratory or Skin sensitisation	✗	**STOT - Repeated Exposure**	✓
Mutagenicity	✗	**Aspiration Hazard**	✗

Legend: ✗ *– Data either not available or does not fill the criteria for classification*
✓ *– Data available to make classification*

SECTION 12 Ecological information

Toxicity

AC Invoke

Endpoint	Test Duration (hr)	Species	Value	Source
Not Available	Not Available	Not Available	Not Available	Not Available

isoxaflutole

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	48h	Crustacea	>2.124mg/L	4
NOEC(ECx)	672h	Crustacea	0.001mg/L	4
LC50	96h	Fish	>2.407mg/L	4

kaolin

Endpoint	Test Duration (hr)	Species	Value	Source
Not Available	Not Available	Not Available	Not Available	Not Available

Legend: *Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity*

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	4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.
Wastes resulting from use of the product must be disposed of on site or at approved waste sites.
For isoxaflutole
log Kow 2.34 (20 C)
Vapour pressure 1 x 10-9 kPa (25 C)
Hydrolysis: 11.1 h (pH 5); 20.1 h (pH 7); 3.2 h (pH 9)
Photolysis in water: 6.7 days
Photolysis in soil: 23 h
Aerobic soil metabolism: 2.4 days
Anaerobic Aquatic metabolism: < 2 h
For primary metabolite RPA 202248
Hydrolysis: stable at pH 7
Photolysis in water: stable
Aerobic soil metabolism: 61 days
Mobility: potentially very mobile
For terminal metabolite RPA 203328
Hydrolysis: stable at pH 7
Photolysis min water: stable
Aerobic soil metabolism: 977 days
Mobility: potentially very mobile
Environmental fate:
Isoxaflutole is mobile in the soil and is biodegradable. The primary metabolite is also mobile although it degrades less rapidly and remains phytotoxic. Very mobile in sand and sandy loam soils; moderately mobile in sandy loam soil; essentially immobile in silty clay soil and loam sediment. Generally not found below 6 cm of soil depth
Isoxaflutole is mobile and is expected to persist and accumulate in surface water and groundwater. Modeling data show that parent isoxaflutole and its primary metabolite RPA 202248 may accumulate to concentrations that would result in harm to non-target plants. Isoxaflutole s terminal metabolite RPA 203328 is expected to persist and accumulate, but does not demonstrate phytotoxicity.
Concern has been expressed about risks posed to ground and surface water and the potential impact on off target plants and crops
Ecotoxicity:
Isoxaflutole is practically non-toxic to birds on an acute basis and slightly toxic to birds on a sub-acute basis. Isoxaflutole is moderately toxic to freshwater and marine fish, moderately toxic to Daphnia and eastern oyster and highly toxic to mysid shrimp It is practically non-toxic to honey bees.
Bird: Acute LD50: mallard duck, bobwhite quail >2150 mg/kg
Bird: Sub-acute LD50 (5 day): mallard duck, bobwhite quail >4255 ppm
Honey bee LD50: >100 ug/bee
Fish LC50 (96 h): rainbow trout >1.7 ppm; bluegill sunfish >4.5 ppm; sheepshead minnow >6.4 ppm
Daphnia magna EC50 (48 h): > 1.5 ppm
Mysid shrimp EC50/ LC50 (96 h): 0.018 ppm
Eastern oyster EC50 (96 h): >6.4 ppm
Plants: Isoxaflutole is highly toxic to terrestrial plants . Due to the low vapor pressure of this herbicide, and due to the fact that it is only to be applied using ground equipment, risk to nontarget plant species is not expected from the parent compound. The primary metabolite RPA 202248, however, is mobile and is expected to move off-site.
DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
	No Data available for all ingredients	No Data available for all ingredients

Bioaccumulative potential

Ingredient	Bioaccumulation
	No Data available for all ingredients

Mobility in soil

Ingredient	Mobility
	No Data available for all ingredients

SECTION 13 Disposal considerations

Continued...

Waste treatment methods

Product / Packaging disposal	▸ Recycle wherever possible or consult manufacturer for recycling options. ▸ Consult State Land Waste Authority for disposal. ▸ Bury or incinerate residue at an approved site. ▸ Recycle containers if possible, or dispose of in an authorised landfill.

SECTION 14 Transport information

Labels Required

	
Marine Pollutant	
HAZCHEM	2Z

Land transport (ADG)

UN number	3077
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (contains isoxaflutole)
Transport hazard class(es)	Class: 9 Subrisk: Not Applicable
Packing group	III
Environmental hazard	Environmentally hazardous
Special precautions for user	Special provisions: 274 331 335 375 AU01 Limited quantity: 5 kg

Environmentally Hazardous Substances meeting the descriptions of UN 3077 or UN 3082
are not subject to this Code when transported by road or rail in;
(a) packagings;
(b) IBCs; or
(c) any other receptacle not exceeding 500 kg(L).
- Australian Special Provisions (SP AU01) - ADG Code 7th Ed.

Air transport (ICAO-IATA / DGR)

UN number	3077
UN proper shipping name	Environmentally hazardous substance, solid, n.o.s. * (contains isoxaflutole)
Transport hazard class(es)	ICAO/IATA Class: 9 ICAO / IATA Subrisk: Not Applicable ERG Code: 9L
Packing group	III
Environmental hazard	Environmentally hazardous
Special precautions for user	Special provisions: A97 A158 A179 A197 A215 Cargo Only Packing Instructions: 956 Cargo Only Maximum Qty / Pack: 400 kg Passenger and Cargo Packing Instructions: 956 Passenger and Cargo Maximum Qty / Pack: 400 kg Passenger and Cargo Limited Quantity Packing Instructions: Y956 Passenger and Cargo Limited Maximum Qty / Pack: 30 kg G

Sea transport (IMDG-Code / GGVSee)

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UN number	3077
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (contains isoxaflutole)
Transport hazard class(es)	IMDG Class: 9 IMDG Subrisk: Not Applicable
Packing group	III
Environmental hazard	Marine Pollutant
Special precautions for user	EMS Number: F-A, S-F Special provisions: 274 335 966 967 969 Limited Quantities: 5 kg

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

Product name	Group
isoxaflutole	Not Available
kaolin	Not Available

Transport in bulk in accordance with the ICG Code

Product name	Ship Type
isoxaflutole	Not Available
kaolin	Not Available

SECTION 15 Regulatory information

Safety, health and environmental regulations / legislation specific for the substance or mixture

isoxaflutole is found on the following regulatory lists

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals
Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 5
Chemical Footprint Project - Chemicals of High Concern List

kaolin is found on the following regulatory lists

Australian Inventory of Industrial Chemicals (AIIC)
Chemical Footprint Project - Chemicals of High Concern List
International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)

National Inventory Status

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	No (isoxaflutole)
Canada - DSL	No (isoxaflutole)
Canada - NDSL	No (isoxaflutole; kaolin)
China - IECSC	No (isoxaflutole)
Europe - EINEC / ELINCS / NLP	No (isoxaflutole)
Japan - ENCS	No (isoxaflutole; kaolin)
Korea - KECI	No (isoxaflutole)
New Zealand - NZIoC	No (isoxaflutole)
Philippines - PICCS	No (isoxaflutole)
USA - TSCA	No (isoxaflutole)
Taiwan - TCSI	Yes
Mexico - INSQ	No (isoxaflutole)
Vietnam - NCI	Yes

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National Inventory	Status
Russia - FBEPH	No (isoxaflutole)
Legend:	*Yes = All CAS declared ingredients are on the inventory* *No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.*

SECTION 16 Other information

Revision Date	15/04/2021
Initial Date	19/01/2016

SDS Version Summary

Version	Date of Update	Sections Updated
4.1	01/11/2019	One-off system update. NOTE: This may or may not change the GHS classification
5.1	15/04/2021	Classification change due to full database hazard calculation/update.

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average
PC—STEL: Permissible Concentration-Short Term Exposure Limit
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists
STEL: Short Term Exposure Limit
TEEL: Temporary Emergency Exposure Limit。
IDLH: Immediately Dangerous to Life or Health Concentrations
ES: Exposure Standard
OSF: Odour Safety Factor
NOAEL :No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value
LOD: Limit Of Detection
OTV: Odour Threshold Value
BCF: BioConcentration Factors
BEI: Biological Exposure Index
AIIC: Australian Inventory of Industrial Chemicals
DSL: Domestic Substances List
NDSL: Non-Domestic Substances List
IECSC: Inventory of Existing Chemical Substance in China
EINECS: European INventory of Existing Commercial chemical Substances
ELINCS: European List of Notified Chemical Substances
NLP: No-Longer Polymers
ENCS: Existing and New Chemical Substances Inventory
KECI: Korea Existing Chemicals Inventory
NZIoC: New Zealand Inventory of Chemicals
PICCS: Philippine Inventory of Chemicals and Chemical Substances
TSCA: Toxic Substances Control Act
TCSI: Taiwan Chemical Substance Inventory
INSQ: Inventario Nacional de Sustancias Químicas
NCI: National Chemical Inventory
FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances