

# thiabendazole (Ref: MK 360)

\*\* tiabendazole \*\* TBZ \*\* tebuzate \*\*  
Translations



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## GENERAL INFORMATION

**Description:** A mainly post-harvest fungicide used to control a wide range of diseases including Aspergillus, Botrytis, Cladosporium and Fusarium

**Introduction:** 1963

### EC Directive 91/414:

Status	Annex 1
Dossier rapporteur/co-rapporteur	Spain
Date inclusion expires	31/12/2011

Approved for use (✓) or known to be used (#) in the following European countries:



AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
■	✓	■	✓	■	✓	■	✓	✓	■	✓	■	✓	■	✓	✓	✓	✓	■	✓	✓	✓	✓	■	■	✓	✓


Also registered in: Australia

### General status:




Pesticide Type	Fungicide
Chemical Group	Benzimidazole
Mode of Action	Systemic with curative and protective action
CAS RN	148-79-8
EC Number	205-725-8
CIPAC Number	323
US EPA Chemical code	060101
Chemical Formula	C <sub>10</sub> H <sub>7</sub> N <sub>3</sub> S
SMILES	n2c1c(cccc1)nc2c3ncsc3
International Chemical Identifier (InChI)	InChI=1/C10H7N3S/c1-2-4-8-7(3-1)12-10(13-8)9-5-14-6-11-9/h1-6H,(H,12,13)
Structure diagram available?	Yes
Molecular Mass (g mol <sup>-1</sup> )	201.25
IUPAC Name	2-(thiazol-4-yl)benzimidazole
CAS Name	2-(4-thiazolyl)-1H-benzimidazole
Other status information	-
Herbicide Resistance (HRAC) Classification	Not applicable




Insecticide Resistance (IRAC) Classification	Not applicable
Fungicide Resistance (FRAC) Classification	1
Physical State	Colourless to white powder

## Formulations:

Property 	Value
Example manufacturers of products using this active	<ul style="list-style-type: none"> <li>• AgriGuard</li> <li>• Merial</li> <li>• Syngenta</li> </ul>
Example products using this active	<ul style="list-style-type: none"> <li>• Hykeep</li> <li>• Storite</li> <li>• Tezate 220 SL</li> </ul>
Associated substances	<ul style="list-style-type: none"> <li>• <a href="#">imazalil</a></li> <li>• <a href="#">thiram</a></li> </ul>
UK LERAP status	None
Formulation and application details	Formulations include dry powders, soluble liquids and concentrates.

## ENVIRONMENTAL FATE

Property 	Value	Source/Quality Score/Other Information 	Interpretation 
Solubility - In water at 20°C (mg l <sup>-1</sup> )	30	A5	Low
Solubility - In organic solvents at 20°C (mg l <sup>-1</sup> )	10	A5 - n-Heptane	-
	130	A5 - Xylene	-
	8230	A5 - Methanol	-
	2430	A5 - Acetone	-
Melting Point (°C)	297	A5	-
Boiling Point (°C)	-	-	-
Degradation point (°C)	-	-	-
Flashpoint (°C)	Not highly flammable	A5	-
Octanol-water partition coefficient at pH 7, 20°C	P: 2.45 X 10 <sup>02</sup>	Calculated	-
	Log P: 2.39	A5	Low
Bulk density (g ml <sup>-1</sup> )/Specific gravity	1.4	A5	-
Dissociation constant (pKa) at 25°C	4.73	A5	-
	Note: pKa(2) 12.00		




Vapour pressure at 25°C (mPa)	5.30 X 10 <sup>-04</sup>	A5	Volatile
Henry's law constant at 25°C (Pa m <sup>3</sup> mol <sup>-1</sup> )	3.70 X 10 <sup>-06</sup>	A5	Non-volatile
Henry's law constant at 20°C (dimensionless)	1.46 X 10 <sup>-09</sup>	Calculated	Non-volatile
Soil degradation (days) (aerobic)	DT50 (typical): 500	A5	Very persistent
	DT50 (lab at 20°C): 365	A5	Very persistent
	DT50 (field): 724	A5	Very persistent
	DT90 (lab at 20°C): -	-	-
	DT90 (field): -	-	-
	Note: -		
Aqueous photolysis DT50 (days) at pH 7	Value: 1.2 Note: -	A5	Moderately fast
Aqueous hydrolysis DT50 (days) at 20°C and pH 7	Value: 203 Note: Stable pH 5 to pH 9	A5	Persistent
Water-Sediment DT50 (days)	4	A5	Fast
Water phase only DT50 (days)	1.5	A5	Moderately fast
GUS leaching potential index 	1.62	Calculated	Low leachability
SCI-GROW groundwater index (µg l <sup>-1</sup> ) for a 1 kg ha <sup>-1</sup> or 1 l ha <sup>-1</sup> application rate 	Value: 4.98 X 10 <sup>-02</sup> Note: -	Calculated	-
Potential for particle bound transport index 	-	Calculated	High
Koc - Organic-carbon sorption constant (ml g <sup>-1</sup> )	2500 pH sensitivity: Note:	W4	Slightly mobile
Freundlich isotherm	Kf: - 1/n: - Note: -	-	-
Maximum UV-vis absorption L mol <sup>-1</sup> cm <sup>-1</sup>	[254nm and 302nm]	A5	-

### Other known metabolites:

Metabolite name and reference	Aliases	Formation Medium /	Estimated Maximum
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		Rate	Occurrence Fraction
5-hydroxythiabendazole	-	Animal	-
benzimidazole-2-carboxamide	-	Water	-

## ECOTOXICOLOGY

Property 	Value	Source/Quality Score/Other Information 	Interpretation 
Bio-concentration factor	BCF: 96.5 CT50 (days): Not available	A5	Low potential -
Bioaccumulation potential	-	Calculated	Low
Mammals - Acute oral LD50 (mg kg <sup>-1</sup> )	3100	A5 Rat	Low
Mammals - Short term dietary NOEL (mg kg <sup>-1</sup> ):	> 10	A5 Rat	High
	(ppm diet): -		-
Birds - Acute LD50 (mg kg <sup>-1</sup> )	> 2250	A5 <i>Colinus virginianus</i>	Low
Birds - Short term dietary (LC50/LD50)	> 5620 mg/kg feed	A5 <i>Colinus virginianus</i>	-
Fish - Acute 96 hour LC50 (mg l <sup>-1</sup> )	0.55	A5 <i>Oncorhynchus mykiss</i>	Moderate
Fish - Chronic 21 day NOEC (mg l <sup>-1</sup> )	0.012	A5 <i>Oncorhynchus mykiss</i>	-
Aquatic invertebrates - Acute 48 hour EC50 (mg l <sup>-1</sup> )	0.81	A5 <i>Daphnia magna</i>	Moderate
Aquatic invertebrates - Chronic 21 day NOEC (mg l <sup>-1</sup> )	0.042	A5 <i>Daphnia magna</i>	-
Aquatic crustaceans - Acute 96 hour LC50 (mg l <sup>-1</sup> )	0.34	F3 <i>Americamysis bahia</i>	Moderate
Sediment dwelling organisms - Acute 96 hour LC50 (mg l <sup>-1</sup> )	-	-	-
Sediment dwelling organisms - Chronic 28 day NOEC, static, water (mg l <sup>-1</sup> )	2.0	A5 <i>Chironomus riparius</i>	Moderate
Sediment dwelling organisms - Chronic 28 day NOEC, sediment (mg kg <sup>-1</sup> )	3.0	A5 <i>Chironomus riparius</i>	Moderate
Aquatic plants - Acute 7 day EC50, biomass (mg l <sup>-1</sup> )	-	-	-
Algae - Acute 72 hour EC50, growth (mg l <sup>-1</sup> )	9.0	C4 <i>Raphidocelis subcapitata</i>	Moderate

Algae - Chronic 96 hour NOEC, growth (mg l <sup>-1</sup> )	3.2		A4 Unknown species	Low
Honeybees - Acute 48 hour LD50 (µg bee <sup>-1</sup> )	50		L2 Unknown mode	Moderate
Earthworms - Acute 14 day LC50 (mg kg <sup>-1</sup> )	> 1000		A5 <i>Eisenia foetida</i>	Moderate
Earthworms - Chronic 14 day NOEC, reproduction (mg kg <sup>-1</sup> )	4.2		A5 <i>Eisenia foetida</i>	Moderate
Other soil macro-organisms - e.g. Collembola	LR50 / EC50 / NOEC / % Effect	-	-	-
Other arthropod (1)	LR50 g ha <sup>-1</sup> : % Effect:	- 0 62	- Mortality Fecundity Dose: 1.8 kg ha <sup>-1</sup> A5 <i>Aphidius rhopalosiphi</i>	- Moderately harmful
Other arthropod (2)	LR50 g ha <sup>-1</sup> : % Effect:	- 3 5	- Mortality Fecundity Dose: 1.8 kg ha <sup>-1</sup> A5 <i>Typhlodromus pyri</i>	- Harmless
Soil micro-organisms		Nitrogen mineralisation: No significant effect Carbon mineralisation: No significant effect	A5 [Dose: 9 mg ha <sup>-1</sup> soil]	-
Mesocosm study data	NOEAEC mg l <sup>-1</sup> :	-	-	-
	NOEAEC mg l <sup>-1</sup> :	-	-	-

## HUMAN HEALTH AND PROTECTION

### General:

Property 	Value	Source/Quality Score/Other Information 	Interpretation 
Mammals - Acute oral LD50 (mg kg <sup>-1</sup> )	3100	A5 Rat	Low
Mammals - Dermal LD50 (mg kg <sup>-1</sup> body weight)	> 2000	A5 Rat	-
Mammals - Inhalation LC50 (mg l <sup>-1</sup> )	0.5	A5 Rat	-

ADI - Acceptable Daily Intake (mg kg <sup>-1</sup> bw day <sup>-1</sup> )	0.1	A5, Rat, SF=100	-
ARfD - Acute Reference Dose (mg kg <sup>-1</sup> bw day <sup>-1</sup> )	None allocated	A5	-
AOEL - Acceptable Operator Exposure Level - Systemic (mg kg <sup>-1</sup> bw day <sup>-1</sup> )	0.1	A4 Rat, 2 year, SF=100	-
Dermal penetration studies (%)	10	A5	-
Dangerous Substances Directive 76/464	-	-	-
Exposure Limits	-	-	-
Exposure Routes	Public: [No unacceptable risks to bystanders identified] Occupational: [No unacceptable risks to operators or other workers identified]		
Examples of European MRLs (mg kg <sup>-1</sup> )	Value: Sweet potatoes, ware potatoes and avocados: 15.0; Broccoli, citrus, apples and pears: 5.0; Other vegetables, other fruit and cereal grains: 0.05 Note: [Current May 2007.] For the EU pesticides database <a href="#">click here</a>		
Drinking Water MAC (µg l <sup>-1</sup> )	-	-	-

### Health issues:

	Endocrine disrupter	Reproduction / development effects	Acetyl cholinesterase inhibitor	Neurotoxicant	Respiratory tract irritant	Skin irritant	Eye irritant
General human health issues	-	?	-	X	?	?	X
[Possible thyroid, liver, spleen and kidney toxicant]							

- ✓ : Yes, known to cause a problem  
 X : No, known not to cause a problem  
 ? : Possibly, status not identified  
 - : No data

### Handling issues:

Property	Value	Source/Quality Score/Other Information	Interpretation
General	[Not explosive or oxidising], [IMDG Transport Code is usually 9]		
EC Risk Classification	[N - Dangerous for the environment: R50, R53]		
EC Safety Classification	S60, S61		
WHO Classification	U	-	Unlikely to present acute hazard in normal use
US EPA Classification (formulation)	III	-	Caution - Slightly toxic
UN Number	Variable with product, usually 3077 or 3082		

Waste disposal &amp; packaging [Usually Packaging Group III (minor danger)]



## TRANSLATIONS

Language	Name
English	thiabendazole
French	thiabendazole
German	Thiabendazol
Danish	E 233, thiabendazole
Italian	tiabendazolo
Spanish	tiabendazol
Greek	thiabendazol
Slovenian	tiabendazol
Polish	tiabendazol
Swedish	tiabendazol
Hungarian	thiabendazole
Dutch	thiabendazool

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