Cheminova A/S
P.O. Box 9
DK-7620 Lemvig
Denmark

Phone (+45) 96 90 96 90
Fax (+45) 96 90 96 91
www.cheminova.com
CVR-No. DK 12 76 00 43

SAFETY DATA SHEET

FLUTRIAFOL TECHNICAL

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. **Product identifier** ..... **Flutriafol Technical**
CAS no. 76674-21-0

1.2. **Relevant identified uses of the substance or mixture and uses advised against** — Can be used as active ingredient in fungicides only.

1.3. **Details of the supplier of the safety data sheet** —
CHEMINOVA A/S
P.O. Box 9
DK-7620 Lemvig
Denmark
sds@cheminova.dk

1.4. **Emergency telephone number** ... — (+45) 97 83 53 53 (24 h; for emergencies only)

SECTION 2: HAZARDS IDENTIFICATION

2.1. **Classification of the substance or mixture** — See section 16 for full text of hazard statements and R-phrases.

CLP classification of the substance according to Reg. 1272/2008 as amended — Acute oral toxicity: Category 4 (H302)
Hazards to the aquatic environment: Chronic Category 2 (H411)

DPD classification of the substance according to Dir. 67/548/EEC as amended — Xn;R22 N;R51/53

WHO classification ..... Guidelines to Classification 2009 — Class III: Slightly hazardous

Health hazards ..... — Flutriafol is harmful by ingestion. Chronic exposure may cause liver damage.

Environmental hazards ..... — The product is toxic to aquatic organisms.

2.2. **Label elements**
According to EU Reg. 1272/2008 as amended
Product identifier ..... — Flutriafol Technical
CAS no. 76674-21-0

Hazard pictograms (GHS07, GHS09)

Signal word	Warning
Hazard statements	
H302	Harmful if swallowed
H411	Toxic to aquatic life with long lasting effects.
Supplementary hazard statement	
EUH401	To avoid risks to human health and the environment, comply with the instructions of use.
Precautionary statements	
P264	Wash hands thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P301+P312	IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
P330	Rinse mouth.
P501	Dispose of contents/container as hazardous waste.

According to Dir. 1999/45/EC as amended

Hazard symbols .....

Xn

Harmful

N

Dangerous for the environment

R-phrases	
R22	Harmful if swallowed.
R51/53	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S-phrases	
S36/37	Wear suitable protective clothing and gloves.
S61	Avoid release to the environment. Refer to special instructions/ safety data sheets.
Other mention	To avoid risks to man and the environment, comply with the instructions of use.

2.3. **Other hazards** ..... The substance does not meet the criteria for being PBT or vPvB.

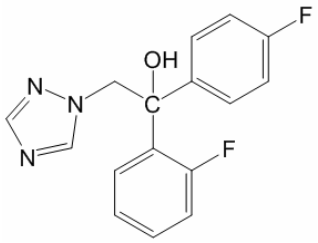
SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. **Substances**

Flutriafol

CAS name	1H-1,2,4-Triazole-1-ethanol, α-(2-fluorophenyl)-α-(4-fluoro-phenyl)-
CAS no.	76674-21-0
IUPAC name	(RS)-2,4′-Difluoro-α-(1H-1,2,4-triazol-1-ylmethyl)benzhydryl alcohol
ISO name	Flutriafol
EC no. (list no.)	616-367-0
EU index no.	None

Structural formula .....



3.2. **Mixtures** ..... The product is a substance, not a mixture.

SECTION 4: FIRST AID MEASURES

4.1. **Description of first aid measures** — If exposure has occurred, do not wait for symptoms to develop, but immediately start the procedures described below.

Inhalation ..... If experiencing any discomfort, immediately remove from exposure. Light cases: Keep person under surveillance. Get medical attention immediately if symptoms develop. Serious cases: Get medical attention immediately or call for an ambulance.

Skin contact ..... Immediately remove contaminated clothing and footwear. Flush skin with much water. Wash with water and soap. See physician if irritation persists.

Eye contact ..... Immediately rinse eyes with much water or eyewash solution, occasionally opening eyelids, until no evidence of chemical remains. Remove contact lenses after a few minutes and rinse again. Get medical attention immediately.

Ingestion ..... Let the exposed person rinse mouth and let him/her drink several glasses of water or milk, but do not induce vomiting. If vomiting does occur, let him/her rinse mouth and drink fluids again. Never give anything by mouth to an unconscious person. Get medical attention immediately.

4.2. **Most important symptoms and effects, both acute and delayed** — When fed to animals at high dosage, the product caused salivation, depression of activity, muscle spasms, ataxia and increased body temperature.

4.3. **Indication of any immediate medical attention and special treatment needed** — Immediate medical attention is required in case of ingestion and eye contact.

Notes to physician ..... There is no specific antidote for exposure to this material. Administration of activated charcoal or gastric lavage can be considered. After decontamination, treatment should be directed at the control of symptoms and the clinical condition.

SECTION 5: FIREFIGHTING MEASURES

5.1. **Extinguishing media** ..... Dry chemical or carbon dioxide for small fires, water spray or foam for large fires. Avoid heavy hose streams.

5.2.	**Special hazards arising from the substance or mixture**	The essential breakdown products are volatile, toxic, malodorous, irritant and inflammable compounds such as hydrogen fluoride, nitrogen oxides, carbon monoxide, carbon dioxide and various fluorinated organic compounds.
5.3.	**Advice for firefighters**	Use water spray to keep fire-exposed containers cool. Approach fire from upwind to avoid hazardous vapours and toxic decomposition products. Fight fire from protected location or maximum possible distance. Dike area to prevent water runoff. Firemen should wear self-contained breathing apparatus and protective clothing.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1.	**Personal precautions, protective equipment and emergency procedures**	It is recommended to have a predetermined plan for the handling of spills. Empty, closable vessels for the collection of spills should be available. In case of large spill (involving 10 tons of the product or more): 1. Use personal protection equipment; see section 8 2. Call emergency telephone no.; see section 1 3. Alert authorities. Observe all safety precautions when cleaning up spills. Use personal protection equipment. Depending on the magnitude of the spill this may mean wearing respirator, face mask or eye protection, chemical resistant clothing, gloves and boots. Stop the source of the spill immediately if safe to do so. Avoid and reduce dust formation as much as possible, if appropriate by moistening. Remove sources of ignition.
6.2.	**Environmental precautions**	Contain the spill to prevent any further contamination of surface, soil or water. Wash waters must be prevented from entering surface water drains. Uncontrolled discharge into water courses must be alerted to the appropriate regulatory body.
6.3.	**Methods and materials for containment and cleaning up**	It is recommended to consider possibilities to prevent damaging effects of spills, such as bunding or capping. See GHS (Annex 4, Section 6). If appropriate, surface water drains should be covered. Minor spills on the floor or other impervious surface should immediately be swept up or preferably vacuumed up using equipment with high efficiency final filter. Transfer to suitable containers. Clean area with detergent and much water. Absorb wash liquid onto inert absorbent such as universal binder, Fuller's earth, bentonite or other absorbent clay and collect in suitable containers. The used containers should be properly closed and labelled. Spills which soak into the ground should be dug up and transferred to suitable containers. Spills in water should be contained as much as possible by isolation of the contaminated water. The contaminated water must be collected and removed for treatment or disposal.

6.4.	**Reference to other sections**	See subsection 8.2. for personal protection. See section 13 for disposal.

SECTION 7: HANDLING AND STORAGE

7.1.	**Precautions for safe handling**	Like most organic powders, the product can form explosive mixtures with air. Avoid dust formation and take precautionary measures against static discharge. Use explosion protected equipment. Keep away from sources of ignition and protect from exposure to fire and heat. In an industrial environment it is recommended to avoid all personal contact with the product, if possible by using closed systems with remote system control. Otherwise, the material should be handled by mechanical means as much as possible. Adequate ventilation or local exhaust ventilation is required. The exhaust gases should be filtered or treated otherwise. For personal protection in this situation, see section 8. For its use as a pesticide, first look for precautions and personal protection measures on the officially approved label on the packaging or for other official guidance or policy in force. If these are lacking, see section 8. Keep all unprotected persons and children away from working area. Remove contaminated clothing immediately. Wash thoroughly after handling. Before removing gloves, wash them with water and soap. After work, take off all work clothes and footwear. Take a shower, using water and soap. Wear only clean clothes when leaving job. Wash protective clothing and protective equipment with water and soap after each use. Persons working with this material for a longer period should be careful to minimise exposure. See section 11. Do not discharge to the environment. Collect all waste material and remains from cleaning equipment, etc., and dispose of as hazardous waste. See section 13 for disposal.
7.2.	**Conditions for safe storage, including any incompatibilities**	Storage at temperatures not exceeding 25°C is recommended. Keep in closed, labelled containers. The storage room should be constructed of incombustible material, closed, dry, ventilated and with impermeable floor, without access of unauthorised persons or children. A warning sign reading “POISON” is recommended. The room should only be used for storage of chemicals. Food, drink, feed and seed should not be present. A hand wash station should be available.
7.3.	**Specific end use(s)**	The product is an active ingredient for the production of registered pesticides which may only be used for the applications they are registered for.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. **Control parameters**

Personal exposure limits

	Year	
Flutriafol	2011	Not established. An internal PEL of 1.5 mg/m^3 (8-hr TWA) for flutriafol is recommended by the manufacturer.

However, other personal exposure limits defined by local regulations may exist and must be observed.

Flutriafol

DNEL ..... 0.135 mg/kg bw/day
PNEC, aquatic environment ..... 0.0062 mg/l

8.2. **Exposure controls** .....

When used in a closed system, personal protection equipment will not be required. The following is meant for other situations, when the use of a closed system is not possible, or when it is necessary to open the system. Consider the need to render equipment or piping systems non-hazardous before opening.

Respiratory protection

In the event of a discharge of the material which produces a heavy vapour or dust, workers should put on officially approved respiratory protection equipment with a universal filter type including particle filter.

Protective gloves .....

Wear heavy duty natural rubber gloves. The breakthrough time of these gloves for flutriafol is unknown, but it is expected that they will give reasonable protection. Generally, however, the use of protective gloves will give only partial protection against dermal exposure. Small tears in the gloves and cross-contamination can easily occur. It is recommended to limit the work to be done manually.

Eye protection .....

Wear safety glasses. It is recommended to have an eye wash fountain immediately available in the workplace when there is a potential for eye contact.

Other skin protection

Wear appropriate chemical resistant clothing to prevent skin contact depending on the extent of exposure. During most normal work situations where exposure to the material cannot be avoided for a limited time span, waterproof pants and apron of chemical resistant material or coveralls of PE will be sufficient. Coveralls of PE must be discarded after use if contaminated. In cases of appreciable or prolonged exposure, coveralls of barrier laminate may be required.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. **Information on physical and chemical properties**

Appearance ..... White solid (crystalline powder)
Odour ..... Odourless
Odour threshold ..... Not determined

pH	Not determined
Melting point/freezing point	Approx. 130°C
Initial boiling point and boiling range	Decomposes
Flash point	Not determined
Evaporation rate	Not determined
Flammability (solid/gas)	Not highly flammable
Upper/lower flammability or explosive limits	Not determined
Vapour pressure	7.1×10^{-9} Pa at 20°C
Vapour density	Not determined
Relative density	Not determined
	Density: approx. 1.40 g/cm^3
Solubility(ies)	Solubility of **flutriafol** at 21°C in:
	acetone 114 - 133 g/l
	ethyl acetate 29 - 33 g/l
	n-heptane < 10 g/l
	xylene < 10 g/l
	dichloroethane 20 - 25 g/l
	methanol 114 - 133 g/l
	water 130 mg/l at 20°C
Partition coefficient n-octanol/water	Log K_{ow} = 2.29
Autoignition temperature	Not determined
Decomposition temperature	Not determined
Viscosity	Not determined
Explosive properties	Not explosive
Oxidising properties	Not oxidising

9.2. **Other information** ..... No more relevant information is available.

SECTION 10: STABILITY AND REACTIVITY

10.1. **Reactivity** ..... To our knowledge, the product has no special reactivities.

10.2. **Chemical stability** ..... Stable at ambient temperatures.

10.3. **Possibility of hazardous reactions** None known.

10.4. **Conditions to avoid** ..... Heating of the product will produce harmful and irritant vapours. Excessive dust formation may pose a dust explosion hazard.

10.5. **Incompatible materials** ..... None known.

10.6. **Hazardous decomposition products** See subsection 5.2.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. **Information on toxicological effects**

Acute toxicity		The substance is harmful by ingestion. It is considered as less harmful by skin contact and by inhalation. The acute toxicity is measured as:
Route(s) of entry	- ingestion	LD_{50}, oral, rat: 300 - 2000 mg/kg (method OECD 423)
	- skin	LD_{50}, dermal, rat: > 2000 mg/kg (method OECD 402)
	- inhalation	LC_{50}, inhalation, rat: > 5.2 mg/l/4 h (method OECD 403)

Skin corrosion/irritation	Not irritating to skin (method OECD 404). Based on available data, the classification criteria are not met. (B.o.a.d.t.c.c.a.n.m.)
Serious eye damage/irritation	Not irritating to eyes (method OECD 405). B.o.a.d.t.c.c.a.n.m.
Respiratory or skin sensitisation ...	Not sensitising (method OECD 429). B.o.a.d.t.c.c.a.n.m.
Germ cell mutagenicity	Dominant lethal test was negative (method OECD 478). B.o.a.d.t.c.c.a.n.m.
Carcinogenicity	No carcinogenic effects have been observed in rats and mice. B.o.a.d.t.c.c.a.n.m.
Reproductive toxicity	No effects on fertility are found (method OECD 416) and no teratogenic (birth defects causing) effects are found for flutriafol (method OECD 414) at maternal non-toxic doses (10 mg flutriafol/kg bw/day). B.o.a.d.t.c.c.a.n.m.
STOT – single exposure	No specific effects after single exposure to flutriafol have been observed. B.o.a.d.t.c.c.a.n.m.
STOT – repeated exposure	Target organ: liver Repeated exposure to flutriafol may cause liver damage. The LOEL for this effect has been found to be approx. 150 mg flutriafol/kg bw/day in a 90-day feeding study in rats. B.o.a.d.t.c.c.a.n.m.
Aspiration hazard	The substance does not present an aspiration pneumonia hazard. B.o.a.d.t.c.c.a.n.m.
Symptoms and effects, acute and delayed	To our knowledge, adverse effects in humans have not been reported. When fed to animals at high dosage, the substance caused salivation, depression of activity, muscle spasms, ataxia and increased body temperature.

SECTION 12: ECOLOGICAL INFORMATION

12.1. **Toxicity** ..... The product is toxic to algae and harmful to fish, aquatic invertebrates and bees. It is not considered as harmful to birds and soil micro- and macroorganisms.

The ecotoxicity of flutriafol is measured as:

- Fish	Rainbow trout (*Salmo gairdneri*)	96 h-LC_{50}: 61 mg/l 28-day NOEC: 6.2 mg/l
- Invertebrates	Daphnids (*Daphnia magna*)	48 h-EC_{50}: > 78 mg/l 21-day NOEC: 0.31 mg/l
- Algae	Green algae (*Selenastrum capricornutum*) (*Scenedesmus subspicatus*)	96-h IC_{50}: 12 mg/l 72-h IC_{50}: 1.9 mg/l
- Earthworms	*Eisenia foetida foetida*	No effect found at 100 mg/m^2 soil in 180 days
- Birds	Mallard duck	LD_{50}: > 5000 mg/kg
- Bees	Honey bees (*Apis mellifera*)	LD_{50}, oral: > 2 µg/bee LD_{50}, contact: > 50 µg/bee

12.2.	**Persistence and degradability**	**Flutriafol** is not readily degradable. Primary degradation half-lives vary with circumstances, but are usually over 1 year in soil and water.
12.3.	**Bioaccumulative potential**	See section 9 for octanol-water partition coefficient. **Flutriafol** is not expected to bioaccumulate. The bioaccumulation factor of flutriafol is measured as 7 for whole fish (rainbow trout).
12.4.	**Mobility in soil**	**Flutriafol** has moderate mobility in soil. Absorption depends on soil pH and organic matter content.
12.5.	**Results of PBT and vPvB assessment**	The substance does not meet the criteria for being PBT or vPvB.
12.6.	**Other adverse effects**	Other relevant hazardous effects in the environment are not known.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1.	**Waste treatment methods**	Remaining quantities of the material and empty but unclean packaging should be regarded as hazardous waste.
	Disposal of product	According to the Waste Framework Directive (2008/98/EC), possibilities for reuse or reprocessing should first be considered. If this is not feasible, the material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.
	Disposal of packaging	Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials. Disposal of waste and packagings must always be in accordance with all applicable local regulations.

SECTION 14: TRANSPORT INFORMATION

ADR/RID/IMDG/IATA/ICAO classification

14.1.	**UN number**	3077
14.2.	**UN proper shipping name**	Environmentally hazardous substance, solid, n.o.s. (flutriafol)
14.3.	**Transport hazard class(es)**	9
14.4.	**Packing group**	III
14.5.	**Environmental hazards**	Marine pollutant
14.6.	**Special precautions for user**	Do not discharge to the environment.

14.7. **Transport in bulk according to Annex II of MARPOL 73/78 and the IBC code** ..... The product is not transported in bulk tankers.

SECTION 15: REGULATORY INFORMATION

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

Seveso category in Annex I, part 2, to Dir. 96/82/EC: dangerous for the environment.

The substance is covered by EU chemical legislation.

15.2. **Chemical safety assessment** ..... A chemical safety assessment has not been performed.

SECTION 16: OTHER INFORMATION

List of abbreviations .....

B.o.a.d.t.c.c.a.n.m.:	Based on available data, the classification criteria are not met.
CAS	Chemical Abstracts Service
CLP	Classification, Labelling and Packaging; refers to EU regulation 1272/2008 as amended
Dir.	Directive
DNEL	Derived No Effect Level
DSD	Dangerous Substance Directive; refers to Dir. 67/548/EEC as amended
EC	European Community
EC_{50}	50% Effect Concentration
EINECS	European Inventory of Existing Commercial Chemical Substances
GHS	Globally Harmonized classification and labelling System of chemicals, Fourth revised edition 2011
IBC	International Bulk Chemical code
IC_{50}	50% Inhibition Concentration
ISO	International Organisation for Standardization
IUPAC	International Union of Pure and Applied Chemistry
LC_{50}	50% Lethal Concentration
LD_{50}	50% Lethal Dose
LOEL	Lowest Observed Effect Level
MARPOL	Set of rules from the International Maritime Organisation (IMO) for prevention of sea pollution
NOEC	No Observed Effect Concentration
N.o.s.	Not otherwise specified
OECD	Organisation for Economic Cooperation and Development
PBT	Persistent, Bioaccumulative, Toxic
PE	Polyethylene
PEL	Personal Exposure Limit
PNEC	Predicted No Effect Concentration
Reg.	Regulation
R-phrase	Risk phrase
S-phrase	Safety phrase
STOT	Specific Target Organ Toxicity
TWA	Time Weighed Average
vPvB	very Persistent, very Bioaccumulative
WHO	World Health Organisation

Cheminova A/S
P.O. Box 9
DK-7620 Lemvig
Denmark

Phone (+45) 96 90 96 90
Fax (+45) 96 90 96 91
www.cheminova.com
CVR-No. DK 12 76 00 43

References	Data are available from published literature and can be found several places.	
Method for classification	Test data	
Used CLP hazard statements	H302	Harmful if swallowed.
	H411	Toxic to aquatic life with long lasting effects.
	EUH401	To avoid risks to human health and the environment, comply with the instructions of use.
Used R-phrases	R22	Harmful if swallowed.
	R51/53	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Advice on training	This material should only be used by persons who are made aware of its hazardous properties and have been instructed in the required safety precautions.	

The information provided in this safety data sheet is believed to be accurate and reliable, but uses of the product vary and situations unforeseen by Cheminova A/S may exist. The user has to check the validity of the information under local circumstances.

Prepared by: Cheminova A/S
Safety, Health, Environment & Quality Department / GHB