

MONSANTO COMPANY
Material Safety Data Sheet
Commercial Product

1. PRODUCT AND COMPANY IDENTIFICATION

Product name

Bullet® Herbicide

EPA Reg. No.

524-418

Product use

Herbicide

Chemical name

Not applicable.

Synonyms

None.

Company

MONSANTO COMPANY, 800 N. Lindbergh Blvd., St. Louis, MO, 63167

Telephone: 800-332-3111, **Fax:** 314-694-5557

Emergency numbers

FOR CHEMICAL EMERGENCY, SPILL LEAK, FIRE, EXPOSURE, OR ACCIDENT Call CHEMTREC - Day or Night: 1-800-424-9300 toll free in the continental U.S., Puerto Rico, Canada, or Virgin Islands. For calls originating elsewhere: 703-527-3887 (collect calls accepted).

FOR MEDICAL EMERGENCY - Day or Night: 314-694-4000 (collect calls accepted).

2. COMPOSITION/INFORMATION ON INGREDIENTS

Active ingredient

2-chloro-2',6'-diethyl-N-(methoxymethyl)acetanilide; { Alachlor }

6-chloro-N-ethyl-N'-(1-methylethyl)-1,3,5-triazine-2,4-diamine; { Atrazine }

Related atrazine compounds; { Related atrazine compounds }

Composition

COMPONENT	CAS No.	% by weight (approximate)
Alachlor	15972-60-8	25.4
Atrazine	1912-24-9	14.5
Related atrazine compounds		0.8
Sodium nitrate	7631-99-4	>=5 - <=10
Water and minor formulating ingredients		>=48.8 - <=53.8

OSHA Status

This product is hazardous according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

3. HAZARDS IDENTIFICATION

Emergency overview

Appearance and odour (colour/form/odour): Tan / Liquid / Vanilla

RESTRICTED USE PESTICIDE due to oncogenicity of alachlor plus ground and surface water concerns associated with atrazine.

The use of this product may be hazardous to your health. This product contains alachlor, which has been determined to cause tumours in laboratory animals.

CAUTION!
HARMFUL IF INHALED
MAY CAUSE ALLERGIC SKIN REACTION

Potential health effects

Likely routes of exposure

|| Skin contact, eye contact, inhalation

Eye contact, short term

|| Not expected to produce significant adverse effects when recommended use instructions are followed.

Skin contact, short term

|| May cause allergic skin reaction.

Inhalation, short term

|| May be harmful if inhaled.

Carcinogenicity

|| May cause cancer.

Refer to section 11 for toxicological and section 12 for environmental information.

4. FIRST AID MEASURES

Eye contact

Immediately flush with plenty of water.
Continue for at least 15 minutes.
If easy to do, remove contact lenses.
If there are persistent symptoms, obtain medical advice.

Skin contact

Immediately wash affected skin with plenty of water.
Use soap if available.
Take off contaminated clothing, wristwatch, jewellery.
Wash clothes and clean shoes before re-use.
If there are persistent symptoms, obtain medical advice.

Inhalation

Remove to fresh air.
If breathing is difficult, give oxygen.
If not breathing, give artificial respiration.
Get medical advice from a poison control center or doctor.

Ingestion

Immediately offer water to drink.
Never give anything by mouth to an unconscious person.
Do NOT induce vomiting unless directed by medical personnel.
If symptoms occur, get medical attention.

5. FIRE-FIGHTING MEASURES

Flash point

None.

Extinguishing media

Recommended: Water, foam, dry chemical, carbon dioxide (CO₂)

Unusual fire and explosion hazards

Minimise use of water to prevent environmental contamination.
Environmental precautions: see section 6.

Hazardous products of combustion

Carbon monoxide (CO), hydrogen chloride (HCl), nitrogen oxides (NOx)

Fire fighting equipment

Self-contained breathing apparatus.

Equipment should be thoroughly decontaminated after use.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions

Use personal protection recommended in section 8.

Environmental precautions

Minimise spread.

Keep out of drains, sewers, ditches and water ways.

Notify authorities.

Methods for cleaning up

Absorb in earth, sand or absorbent material.

Collect in containers for disposal.

Dig up heavily contaminated soil.

Refer to section 7 for types of containers.

Wash spill area with detergent and water.

Minimise use of water to prevent environmental contamination.

Refer to section 13 for disposal of spilled material.

7. HANDLING AND STORAGE

Good industrial practice in housekeeping and personal hygiene should be followed.

Handling

Only trained personnel should use this product.

Avoid contact with eyes, skin and clothing.

Wash hands thoroughly after handling or contact.

Wash contaminated clothing before re-use.

When using do not eat, drink or smoke.

Thoroughly clean equipment after use.

Do not contaminate drains, sewers and water ways when disposing of equipment rinse water.

Refer to section 13 for disposal of rinse water.

Emptied containers retain vapour and product residue.

Observe all labelled safeguards until container is cleaned, reconditioned or destroyed.

Storage

Maximum storage temperature: 50 °C

Incompatible materials for storage: mild steel, PVC

Keep locked up and out of the reach of children.

Keep away from living quarters.

Keep away from food, drink and animal feed.

Keep only in the original container.

Keep container tightly closed in a cool, well-ventilated place.

Protect from frost.

If frozen, place in warm room and shake frequently to put back into solution.

Minimum shelf life: 2 years.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne exposure limits

Components	Exposure Guidelines
Alachlor	MWPEG (Monsanto Workplace Permissible Exposure Limit): 0.11 mg/m ³ (TWA): 10 ppb (TWA) TLV (ACGIH): No specific occupational exposure limit has been established. PEL (OSHA): No specific occupational exposure limit has been established.
Atrazine	TLV (ACGIH): 5 mg/m ³ (TWA) PEL (OSHA): No specific occupational exposure limit has been established.
Related atrazine compounds	No specific occupational exposure limit has been established.
Sodium nitrate	No specific occupational exposure limit has been established.
Water and minor formulating ingredients	No specific occupational exposure limit has been established.

Engineering controls

Provide local exhaust ventilation.

Eye protection

If there is significant potential for contact:

Wear chemical goggles.

Applicators and other handlers must wear eye protection.

Skin protection

Wear chemical resistant gloves.

Applicators and other handlers must wear:

Wear long sleeved shirt, long pants and shoes with socks.

Follow manufacturer's instructions for cleaning/maintaining Personal Protective Equipment.

If no such instructions for washables, use detergent and hot water.

Respiratory protection

If airborne exposure is excessive:

Wear respirator.

Full facepiece/hood/helmet respirator replaces need for chemical goggles.

When recommended, consult manufacturer of personal protective equipment for the appropriate type of equipment for a given application.

9. PHYSICAL AND CHEMICAL PROPERTIES

These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

Colour/colour range:	Tan
Form:	Liquid
Odour:	Vanilla
Flash point:	None.
Specific gravity:	1.18 @ 20 °C / 4 °C
Dynamic viscosity:	~ 1.1 Pa.s @ 25 °C
Solubility:	Water: Readily dispersible.

Partition coefficient (log Pow):	3.3 (alachlor)
Partition coefficient (log Pow):	2.7 (atrazine)

10. STABILITY AND REACTIVITY

Stability

Stable under normal conditions of handling and storage.

Hazardous decomposition

Thermal decomposition: Hazardous products of combustion: see section 5.
When heated may give off toxic fumes.

11. TOXICOLOGICAL INFORMATION

This section is intended for use by toxicologists and other health professionals.

Data obtained on similar products and on components are summarized below.

Similar formulation

Acute oral toxicity

Rat, LD50: 8,900 mg/kg body weight
FIFRA category IV.

Acute dermal toxicity

Rabbit, LD50: > 5,000 mg/kg body weight
FIFRA category IV.
No mortality.

Skin irritation

Rabbit, 6 animals, OECD 404 test:
Days to heal: 2
Primary Irritation Index (PII): 0.3/8.0
FIFRA category IV.

Eye irritation

Rabbit, 6 animals, OECD 405 test:
Days to heal: 2
FIFRA category IV.
Slight irritation.

Skin sensitization

Guinea pig, Buehler test:
Positive incidence: 0 %

Alachlor

Mutagenicity

In vitro and in vivo mutagenicity test(s):
Not mutagenic on the basis of weight-of-evidence analysis.

Repeated dose toxicity

Rabbit, dermal, 21 days:
NOAEL toxicity: 1,000 mg/kg body weight/day
Target organs/systems: pituitary
Other effects: organ weight change

Carcinogenicity

Rat, oral, 25 months:
NOEL tumour: 0.5 mg/kg body weight/day
NOAEL toxicity: 2.5 mg/kg body weight/day

Tumours: nose, stomach, thyroid
Target organs/systems: nose, eyes, liver
Other effects: histopathologic effects, blood biochemistry effects
Tumours not relevant for man based on mechanistic data.

Mouse, oral, 18 months:

NOEL tumour: 331 mg/kg body weight/day
NOAEL toxicity: 20 mg/kg body weight/day
Target organs/systems: bone marrow, kidneys, liver
Other effects: decrease of body weight gain, organ weight change, histopathologic effects
No tumours.

Toxicity to reproduction/fertility

Rat, oral, 3 generations:

NOAEL toxicity: 10 mg/kg body weight/day
NOAEL reproduction: 30 mg/kg body weight
Target organs/systems in parents: kidneys
Other effects in parents: organ weight change
Other effects in pups: none

Developmental toxicity/teratogenicity

Rabbit, oral, 7 - 19 days of gestation:

NOEL toxicity: 100 mg/kg body weight
NOEL development: 150 mg/kg body weight
Other effects in mother animal: weight loss, decrease of food consumption
Developmental effects: none

EXPERIENCE WITH HUMAN EXPOSURE

Eye contact, short term, occupational:

Eye effects: irritation

Atrazine

Mutagenicity

Ames test(s):

Not mutagenic without metabolic activation.

In vivo chromosomal aberration test(s):

Not mutagenic.

In vitro DNA-repair test(s):

Not mutagenic.

Dominant lethal test(s):

Not mutagenic.

Repeated dose toxicity

Rat, oral, 90 days:

NOAEL toxicity: 3.3 mg/kg body weight/day
Target organs/systems: none
Other effects: decrease of body weight gain

Rabbit, dermal, 25 days:

NOAEL toxicity: 10 mg/kg body weight/day
Target organs/systems: spleen
Other effects: decrease of food consumption, weight loss, organ weight change, haematological effects, histopathologic effects, blood biochemistry effects

Carcinogenicity

Rat, oral, 24 months:

NOEL tumour: 0.45 mg/kg body weight/day
NOAEL toxicity: 3.5 mg/kg body weight/day
Tumours: mammary gland (adenocarcinoma)
Target organs/systems: eyes, kidneys, liver, mammary gland, prostate, skeletal muscle
Other effects: decrease of food consumption, weight loss, organ weight change, haematological effects, histopathologic effects, blood biochemistry effects

Tumours only at or above MTD. Tumours not relevant for man based on mechanistic data.

Mouse, oral, 91 weeks:

NOEL tumour: ~ 400 mg/kg body weight/day

NOAEL toxicity: 43 mg/kg body weight/day

Target organs/systems: heart

Other effects: decrease of food consumption, weight loss, organ weight change, histopathologic effects

Tumours not related to treatment.

Toxicity to reproduction/fertility

Rat, oral, 2 generations:

NOAEL toxicity: 50 mg/kg diet

NOAEL reproduction: 500 mg/kg diet

Target organs/systems in parents: none

Other effects in parents: decrease of body weight gain

Target organs/systems in pups: none

Other effects in pups: none

Developmental toxicity/teratogenicity

Rat, oral, 6 - 15 days of gestation:

NOAEL toxicity: 10 mg/kg body weight

NOAEL development: 10 mg/kg body weight

Other effects in mother animal: weight loss, decrease of body weight gain, decrease of survival

Developmental effects: weight loss, delayed ossification

Effects on offspring only observed with maternal toxicity.

Rabbit, oral, 7 - 19 days of gestation:

NOAEL toxicity: < 1 mg/kg body weight

NOAEL development: 1 mg/kg body weight

Other effects in mother animal: weight loss, decrease of survival

Developmental effects: weight loss, post-implantation loss, delayed ossification

Effects on offspring only observed with maternal toxicity.

Sodium nitrate

EXPERIENCE WITH HUMAN EXPOSURE

Inhalation, excessive, :

Respiratory effects: irritation of respiratory tract

Eye contact, excessive, :

Skin effects: irritation

Eye contact, excessive, :

Skin effects: irritation

Ingestion, , accidental misuse:

Skin effects: blue appearance (cyanosis), blueness of lips (cyanosis of lips)

Urological/renal effects: kidney inflammation (acute interstitial nephritis)

Haematological effects: methaemoglobinaemia, decreased red blood cells and/or haemoglobin (anaemia)

12. ECOLOGICAL INFORMATION

This section is intended for use by ecotoxicologists and other environmental specialists.

Data obtained on product and components are summarized below.

Aquatic toxicity, fish

Channel catfish (*Ictalurus punctatus*):

Acute toxicity, 96 hours, static, LC50: 41 mg/L

Slightly toxic.

Alachlor

Aquatic toxicity, invertebrates

Water flea (*Daphnia magna*):

Acute toxicity, 48 hours, flowthrough, EC50: 13 mg/L
Slightly toxic.

Aquatic toxicity, algae/aquatic plants

Blue-green algae (*Anabaena* sp.):

Acute toxicity, 120 hours, static, ErC50 (growth rate): > 19 mg/L
No more than slightly toxic.

Green algae (*Selenastrum capricornutum*):

Acute toxicity, 96 hours, static, EC50: 2.9 µg/L
Algistatic effect observed. Plant recovers when toxicant is removed.
Very highly toxic.

Diatom (*Skeletonema costatum*):

Acute toxicity, 120 hours, static, EC50: 0.21 mg/L
Highly toxic.

Duckweed (*Lemna gibba*):

Acute toxicity, 14 days, static, EC50: 2.3 µg/L
Very highly toxic.

Avian toxicity

Bobwhite quail (*Colinus virginianus*):

Acute oral toxicity, single dose, LD50: 1,536 mg/kg body weight
Slightly toxic.

Bobwhite quail (*Colinus virginianus*):

Dietary toxicity, 5 days, LC50: > 5,620 mg/kg diet
Practically non-toxic.

Mallard duck (*Anas platyrhynchos*):

Dietary toxicity, 5 days, LC50: > 5,620 mg/kg diet
Practically non-toxic.

Arthropod toxicity

Honey bee (*Apis mellifera*):

Contact, 48 hours, LD50: > 100 µg/bee
Practically non-toxic.

Honey bee (*Apis mellifera*):

Oral, 48 hours, LD50: > 94 µg/bee

Soil organism toxicity, invertebrates

Earthworm (*Eisenia foetida*):

Acute toxicity, 14 days, LC50: 387 mg/kg dry soil
Slightly toxic.

Bioaccumulation

Bluegill sunfish (*Lepomis macrochirus*):

Whole fish: BCF: 11
Compound aged 30 days in soil before test start. Rapid depuration after end of exposure.
No significant bioaccumulation.

Hydrolysis

25.00 °C, pH 6:

0 % within 30 days

Photochemical degradation

Soil:

Half life: 144.4 days

Dissipation

Soil, aerobic:

Half life: 8 - 17 days

Koc: 131 - 192

Water, aerobic:

Half life: 15 days

Atrazine

Aquatic toxicity, invertebrates

Water flea (*Daphnia magna*):

Acute toxicity, 48 hours, EC50: 6.9 mg/L
Moderately toxic.

Aquatic toxicity, algae/aquatic plants

Green algae (*Selenastrum capricornutum*):

Acute toxicity, 96 hours, static, EC50: 4 - 130 µg/L
Very highly toxic.

Duckweed (*Lemna gibba*):

Acute toxicity, 5 days, EC50: 170 µg/L
Highly toxic.

Avian toxicity

Bobwhite quail (*Colinus virginianus*):

Dietary toxicity, 5 days, LC50: > 5,000 mg/kg diet
Practically non-toxic.

Mallard duck (*Anas platyrhynchos*):

Dietary toxicity, 5 days, LC50: > 5,000 mg/kg diet
Practically non-toxic.

Mallard duck (*Anas platyrhynchos*):

Acute oral toxicity, single dose, LD50: > 2,000 mg/kg body weight
Practically non-toxic.

Arthropod toxicity

Honey bee (*Apis mellifera*):

Contact, 48 hours, LD50: > 97 µg/bee

13. DISPOSAL CONSIDERATIONS

Product

Excess product may be disposed of by agricultural use according to label instructions.
Keep out of drains, sewers, ditches and water ways.
Recycle if appropriate facilities/equipment available.
Burn in special, controlled high temperature incinerator.
Follow all local/regional/national/international regulations.

Container

See the individual container label for disposal information.
Empty packaging completely.
Triple or pressure rinse empty containers.
Do NOT contaminate water when disposing of rinse waters.
Ensure packaging cannot be reused.
Do NOT re-use containers.
Store for collection by approved waste disposal service.
Recycle if appropriate facilities/equipment available.
Emptied containers retain vapour and product residue.
Observe all labelled safeguards until container is cleaned, reconditioned or destroyed.
Follow all local/regional/national/international regulations.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

Not hazardous under the applicable DOT, ICAO/IATA, IMO, TDG and Mexican regulations.

15. REGULATORY INFORMATION

OSHA Hazardous Components

Alachlor
Atrazine
Sodium nitrate

SARA Title III Rules

Section 311/312 Hazard Categories
Immediate, Delayed
Section 302 Extremely Hazardous Substances
Not applicable.
Section 313 Toxic Chemical(s)
Alachlor, Atrazine, Sodium nitrate

CERCLA Reportable quantity

Not applicable.

16. OTHER INFORMATION

The information given here is not necessarily exhaustive but is representative of relevant, reliable data.

Follow all local/regional/national/international regulations.

Please consult supplier if further information is needed.

In this document the British spelling was applied.

|| Changes versus previous edition.

	Health	Flammability	Instability	Additional Markings
NFPA	2	1	1	

0 = Minimal hazard, 1 = Slight hazard, 2 = Moderate hazard, 3 = Severe hazard, 4 = Extreme hazard

Full denomination of most frequently used acronyms. BCF (Bioconcentration Factor), BOD (Biochemical Oxygen Demand), COD (Chemical Oxygen Demand), EC50 (50% effect concentration), ED50 (50% effect dose), I.M. (intramuscular), I.P. (intraperitoneal), I.V. (intravenous), Koc (Soil adsorption coefficient), LC50 (50% lethality concentration), LD50 (50% lethality dose), LDLo (Lower limit of lethal dosage), LEL (Lower Explosion Limit), LOAEC (Lowest Observed Adverse Effect Concentration), LOAEL (Lowest Observed Adverse Effect Level), LOEC (Lowest Observed Effect Concentration), LOEL (Lowest Observed Effect Level), MEL (Maximum Exposure limit), MTD (Maximum Tolerated Dose), NOAEC (No Observed Adverse Effect Concentration), NOAEL (No Observed Adverse Effect Level), NOEC (No Observed Effect Concentration), NOEL (No Observed Effect Level), OEL (Occupational Exposure Limit), PEL (Permissible Exposure Limit), PII (Primary Irritation Index), Pow (Partition coefficient n-octanol/water), S.C. (subcutaneous), STEL (Short-Term Exposure Limit), TLV-C (Threshold Limit Value-Ceiling), TLV-TWA (Threshold Limit Value - Time Weighted Average), UEL (Upper Explosion Limit)

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