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UPDATED BY: Ursula Potgieter

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MATERIAL SAFETY DATA SHEET

GLYPHOSATE 360 SL

1. PRODUCT IDENTIFICATION:

Name: Avima (Pty) Ltd
Address: No. 18 Aschenberg Street
Chamdor
Krugersdorp
Tel. Nr.: (011) 769 1300
Fax Nr.: (011) 762 5712
Emergency Tel Nr.: 083 326 3581 / 082 823 4473 **OR** 0800 –111 –229

2. COMPOSITION:

Chemical Family: Herbicide
Chemical Name: Glyphosate mono(isopropylamine) salt
UN Nr.: 3082
C.A.S. Nr.: 38641-94-0
Product Description: A non selective systemic post-emergence herbicide for the control of perennial and annual weeds in agriculture and industrial areas.
Odour: Practically odourless to slight amine-like odour
Formulation: Soluble liquid
Hazardous Components: Glyphosate 36 %

3. HAZARD IDENTIFICATION:

Health hazards (acute and chronic):

The irritating properties of the product are the most serious health hazard for all possible routes of exposure.

Eye contact:

The product may cause moderate to severe but temporary irritation to the eyes.

Skin contact:

The product may be slightly irritating to skin, especially on prolonged contact. It is not considered to be harmful by skin contact.

Ingestion:

The product can have irritating effects to the upper digestive tract. It may be slightly harmful if swallowed.

Inhalation:

The product may be slightly harmful if inhaled. The most serious effect of inhalation may be irritation of the respiratory tract, resulting in coughing and sneezing.

4. FIRST AID MEASURES:

Emergency and first aid procedures Immediate medical attention is required in case of eye contact. Obtain medical attention or advice as indicated for other exposure.

If in eyes: Immediately flush with plenty of water or eyewash solution, occasionally opening eyelids, until no evidence of chemical remains. Remove contact lenses after a few minutes and flush again. Get medical attention immediately.

If on skin: Remove contaminated clothing and shoes. Wash with plenty of water and soap. Get medical attention if irritation develops.

If swallowed: The product may cause gastrointestinal tract irritation. Immediately dilute by drinking milk. If not available, drink water. Do not induce vomiting. If vomiting occurs, drink fluids again. Call a doctor or get medical attention.

If inhaled: If experiencing any discomfort, immediately remove to fresh air and obtain medical advice if discomfort does not disappear.

5. FIRE-FIGHTING MEASURES:

Extinguishing media and procedure. Dry chemical or carbon dioxide for small fires. Water spray or foam for large fires. 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. Avoid heavy hose streams. Dike area to prevent water runoff. Firemen should wear self-contained breathing apparatus and protective clothing.

Hazardous decomposition or byproducts in a fire:

The essential breakdown products are carbon monoxide, carbon dioxide, phosphorus pentoxide and nitrogen oxides.

Unusual fire and explosion hazards:

The product does not present any unusual fire hazard. It is advisable for firemen to avoid direct contact with the product such as splashing.

6. ACCIDENTAL RELEASE MEASURES:

Personal protection

Observe all protection and safety precautions. Depending on the magnitude of the spill this may mean wearing eye protection, chemical resistant clothing, gloves and boots when cleaning up spills. Personal exposure by splashing must be avoided.

Steps to be taken in case of spill:

It is recommended to have a predetermined plan for the handling of spills. Stop the source of the spill immediately if safe to do so. Contain the spill to prevent any further contamination of surface, soil or water. Spills on the floor or other impervious surface should be contained or diked and then absorbed onto an absorptive material such as hydrated lime, universal absorbent, attapulgate, bentonite or other absorbent clays. Collect the contaminated absorbent and transfer to suitable containers (not metal). Thoroughly scrub the area with a strong industrial detergent and rinse with water. Washings must be prevented from entering surface water drains.

Large 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. Uncontrolled discharge into water courses must be alerted to the appropriate regulatory body. The used containers should be properly closed and labelled.

7. HANDLING AND STORAGE:

Precautions to be taken in handling:

In an industrial environment it is recommended to avoid all personal contact with the product, preferably by use of closed systems and remote system control. Otherwise adequate ventilation or local exhaust ventilation is required. The exhaust gases should be filtered or treated otherwise.

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. The precautions are primarily meant for handling of the undiluted product and for preparing the spray solution, but can be recommended for spraying as well.

The product or its spray solutions should be mixed, stored or applied using only stainless steel, aluminium, fiberglass, plastic or plastic-lined containers. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters.

Precautions to be taken in storing:

The product is stable under normal conditions of warehouse storage. Store in closed, labelled containers. Do not contaminate water, foodstuffs, feed or seed by storage or disposal.

Specific use:

This product is a registered pesticide, which may only be used for the applications it is registered for, in accordance with a label approved by the regulatory authorities.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Personal protection:

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 nonhazardous before opening.

Respiratory protection:

The product is not likely to present an airborne exposure concern during normal handling. In the event of an accidental discharge of the material which produces a heavy vapour or mist, 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 times of gloves for glyphosate are unknown, but it is expected that they will give adequate protection because of the low dermal toxicity of the product. It is recommended to limit the work to be done manually.

Eye protection:

Wear goggles, safety glasses or face shield. It is recommended to have an eye wash fountain immediately available in the work area when there is a potential for eye contact.

Skin protection:

Wear appropriate protective clothing to prevent skin contact. Applicators and other handlers must wear long-sleeved shirt, long pants, shoes plus socks and protective eyewear.

Work/hygienic practices:

Avoid contact with eyes, skin or clothing. Avoid breathing vapour or spray mist. Before removing gloves, wash them with water and soap. Wash thoroughly with water and soap after handling. Remove contaminated clothing immediately and wash before reuse. After work, take off all work clothes and shoes. Shower, using water and soap. Wear only clean clothes when leaving job. Do not wear contaminated clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Physical state:	Clear, viscous solution
Colour:	Yellow
Odour:	Practically odourless to slight amine-like odour
Melting point:	< 0°C
Boiling point:	113°C
Tap density:	1.165 g/ml at 20°C
Vapour pressure:	For glyphosate free acid: 1.75×10^{-7} mm Hg (1.31×10^{-5} Pa) at 25°C
Viscosity:	43 cS at 20°C, 18 cS at 40°C (kinematic viscosity)
Surface tension:	39 mN/m at 20°C (1% solution in water)
Solubility in water:	The product is miscible with water.
Solubility of glyphosate free acid:	10.5 g/l at 20°C.
Partition coefficient n-octanol/water:	$P = 4.5 \times 10^{-4}$; Log P = -3.3 (glyphosate free acid)
Ph:	4.5 at 20°C (1% solution in water)
Flash point:	None – water based
Autoignition temperature:	Not available
Explosivity:	Not explosive
Oxidising properties:	Not oxidising

10. STABILITY AND REACTIVITY DATA:

Chemical stability: The product is stable at ambient temperatures.

Hazardous decomposition or byproducts: None

Materials to avoid: **Do not mix, store or apply this product or spray solutions of this product in galvanised or unlined steel (except stainless steel) containers or spray tanks.**

This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture with air. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welders torch, lighted cigarette or other ignition source.

The product can react with caustic (basic) materials in an acid-base chemical neutralisation reaction which may be hazardous because of heat release.

11. TOXICOLOGICAL INFORMATION:

Acute toxicity: The product is practically non-toxic. However, it should always be treated with the usual care of handling chemicals. It may be slightly harmful if swallowed. No significant adverse health effects are expected to develop if only small amounts (less than a mouthful) are swallowed.

Ingestion of similar formulations has been reported to produce gastrointestinal discomfort with nausea, vomiting and diarrhoea. Oral ingestion of large quantities of one similar product has been reported to result in hypotension and lung oedema.

The acute toxicity of the product is measured to be: Route(s) of entry - Ingestion LD50, oral, rat: > 5000 mg/kg

Skin: LD50, dermal, rat: > 2000 mg/kg
Inhalation LC50, inhalation, rat: > 4.86 mg/l/4 h (maximally obtainable concentration; no signs of toxicity at this concentration)

Irritancy: The product is moderately irritating to eyes and mildly irritating to skin. It can have irritating effects on the upper digestive and respiratory tract. Repeated and prolonged exposure to high exposure levels may result in serious irritation.

Allergic sensitisation: No sensitising properties to guinea pigs are found in the Magnusson-Kligmann Maximisation test. No allergic effects on humans have been reported.

Chronic toxicity: In long-term studies, body weight and liver weight changes were noted in rats at exposure levels of 60-100 mg glyphosate/kg bw/day. There were no signs of toxicity at any level, including the highest exposure level of 4800 mg glyphosate/kg bw/day.

Carcinogenicity: No indications of carcinogenic effects are found. US-EPA has classified glyphosate in category E (evidence of noncarcinogenicity for humans).

Reproductive effects: A number of multigeneration studies did not indicate a specific hazard of glyphosate for reproduction. The effects seen at very high doses were the same as for chronic toxicity.

Teratogenicity: Glyphosate does not cause teratogenicity. Only at very high doses (4800 mg/kg bw/day) adverse effects on offspring were noted, such as reduced weight of fetuses.

Mutagenicity: Glyphosate was examined for mutagenicity in a wide range of tests covering all relevant endpoints *in vitro* as well as *in vivo*. Against the background of this large amount of data, it can be concluded that glyphosate does not exhibit a mutagenic risk.

Cholinesterase inhibition: Glyphosate has no inhibitory effect on cholinesterase and is not neurotoxic. Thus, the properties of glyphosate cannot be compared to those of other organophosphate pesticides.

12. ECOLOGICAL INFORMATION:

Ecotoxicity: The product is a herbicide and therefore expected to be toxic to all green plants. The product is harmful to fish and aquatic invertebrates. It is considered as less harmful to birds and soil micro- and macroorganisms.

The ecotoxicity of the product is measured to be:

Fish Rainbow trout (*Salmo gairdneri*): 96 h-LC50: 18.6 mg/l (static) 21-day NOEC: 0.43-0.81 mg/l

Bluegill sunfish (*Lepomis macrochirus*): 96 h-LC50: 11.9 mg/l (static)

Invertebrates Daphnids (*Daphnia magna*): 48 h-EC50: 21.6 mg/l, 21-day NOEC: 1.5 mg/l

Algae Green algae (*Scenedesmus subspicatus*): 72-h IC50: 17.4 mg/l, (*Selenastrum capricornutum*) 72-h IC50: 2.0 mg/l

Plants Duckweed (*Lemna gibba*): 7-day EC50: 27 mg/l

Earthworms *Eisenia foetida foetida*: 14-day LC50: > 1000 mg/kg dry soil

Birds Japanese quail (*Coturnix japonica*): LD50: 1900 mg/kg, 5-day dietary LD50: > 5000 ppm in feed

Bees Honey bees (*Apis mellifera*): 48-h LD50, acute oral: > 100 µg/bee, 24-h LD50, topical: > 20 µg/bee

Bacteria Activated sludge: IC50: > 100 mg/kg

Mobility: In the environment glyphosate is not mobile, but is rapidly deactivated by adsorption to clay particles. Glyphosate binds strongly to soil.

Persistence and degradability: Glyphosate is not readily biodegradable. It undergoes slow degradation in the environment and in waste water treatment plants. No adverse effects are found at concentrations up to 100 mg/l in waste water treatment plants. Degradation is mainly microbiological and aerobic, but anaerobic degradation does also occur.

Degradation half-lives in the environment vary much with circumstances, but are usually around 3-30 days in aerobic soil and water.

Bioaccumulative potential: Glyphosate is not expected to bioaccumulate. Several studies have been done on bioaccumulation of glyphosate, both in marine and freshwater systems. Only low bioaccumulation factors were found.

13. DISPOSAL CONSIDERATIONS:

Waste disposal method:

Material that cannot be reused or chemically reprocessed should be disposed of in a landfill approved for pesticide disposal. Other possible methods of disposal are controlled incineration with flue gas scrubbing or removal to a licensed chemical destruction plant. Contact appropriate state agency when considering a land spreading disposal option. Do not contaminate water, foodstuffs, feed or seed by storage or disposal.

Packaging/container disposal:

Emptied containers may retain vapour and product residue. Observe all labelled safeguards until container is cleaned or destroyed. **DO NOT CUT OR WELD ON OR NEAR THIS CONTAINER.** Triple rinse container (or equivalent) and offer for recycling or reconditioning. The packaging can also be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Other methods of disposal are controlled incineration with flue gas scrubbing or, if allowed by state and local regulations, by burning. If burned, stay out of smoke. Disposal of waste and packaging must always be in accordance with all applicable local regulations.

14. TRANSPORT INFORMATION:

ADR/RID CLASSIFICATION

Proper shipping name: Environmentally Hazardous Substance, Liquid, N.O.S. (Glyphosate isopropylamine salt)
Class: 9
UN no. : 3082
Packaging group: III

IMDG CLASSIFICATION

Not classified as hazardous material for transport by ship

IATA/ICAO CLASSIFICATION

Class: 9
UN no. : 3082
Packaging group: III
Proper shipping name: Environmentally Hazardous Substance, Liquid, N.O.S. (Glyphosate isopropylamine salt)

15. REGULATORY INFORMATION:

Contains: Glyphosate isopropylamine salt

R-phrases : R51/53: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

S-phrases: S60-61: This material and its container must be disposed of as hazardous waste. Avoid release to the environment.

Other mentions: To avoid risks to man and the environment, comply with the instructions of use.

16. OTHER INFORMATION:

The information contained in this material data sheet is believed to be reliable but no representation, guarantee or warrantee, of any kind is made as to its accuracy, suitability for a particular application or results to be obtained from them. It is however, ensured that the information contained in the material safety data sheet is relevant to the product manufactured / handled or sold as the case may be by us.