

Pesticide Labeling: Signal Words¹

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This document interprets signal words seen on pesticide labels and discusses the toxicity criteria used in determining the appropriate signal word for the pesticide. Examples of typical statements found on pesticide labels which convey information to the handler of the product are provided.

Introduction

When reviewing a pesticide label prior to handling the product, one may see a prominent display of one word on the front panel of the label. What does it mean to see one of the following signal words: “CAUTION,” “WARNING,” or “DANGER?” What does it mean if the product label has no signal word displayed? The signal word conveys a message to the product handler regarding its acute toxicity.

The signal word for a pesticide is typically determined by the results of the six acute toxicity studies performed with the product formulation. The acute oral, dermal and inhalation studies evaluate systemic toxicity by those routes of entry. The primary eye and skin irritation studies measure irritation or corrosion, while the dermal sensitization study evaluates the potential for allergic contact

dermatitis. With the exception of dermal sensitization, each acute study is assigned to a toxicity category based on the study results (Table 1).

Determining the precautionary labeling signal word

When required. A signal word is required for all registered pesticide products unless the pesticide product meets the criteria of Toxicity Category IV by all routes of exposure. If a pesticide manufacturer desires its label to list a signal word in this case, it must be “CAUTION.”

Determining the signal word. The signal word is determined by the most severe toxicity category assigned to the five acute toxicity studies seen in Table 1 or by the presence of methanol in concentrations of 4% or more. Table 2 lists the appropriate signal word based upon toxicity category. Examples of appropriate signal words based upon toxicity studies are provided in Table 3. Typical statements seen on pesticide labels for acute oral, dermal, and inhalation toxicity are shown in Tables 4, 5 and 6, respectively. Typical statements seen on pesticide labels for products which potentially cause primary eye irritation are shown in Table 7 and

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Use pesticides safely. Read and follow directions on the manufacturer's label.

statements for products which potentially cause primary skin irritation are shown in Table 8. Table 9 lists typical statements for dermal sensitization.

Location and prominence. The signal word is required to appear on the front panel of the label, and EPA requests pesticide manufacturers to place it on a separate line from the required Child Hazard Warning statement (Keep Out of Reach of Children). The signal word is also required on any supplemental label intended to accompany the product in distribution or sale.

Related information. Because of the potential for confusion, EPA historically has not approved labels containing the terms, “caution,” “warning,” or “danger,” except as the signal word for that label. For example: “CAUTION: Wash hands before eating, or smoking” on a label with the signal of “CAUTION.”

POISON – skull and crossbones symbol

When required. The word “POISON” and the skull and crossbones symbol are required for products classified as toxicity category I for acute oral, acute dermal, or acute inhalation toxicity studies. If the inert ingredient, methanol, is present at 4% or more in the product, EPA suggests that the manufacturer post the skull and crossbones symbol on the label. Examples are shown in Table 3.

Location and prominence. If required, the word “POISON” and the skull and crossbones symbol must appear in immediate proximity to each other. The word “POISON” must appear in red on a background of a distinctly contrasting color. In addition, EPA requests that the “POISON” and the skull and crossbones symbol appear near the signal word “DANGER” (Figure 1).



Figure 1. “POISON” and the skull-and-crossbones symbol should appear near the signal word “DANGER”.

Fishel, F.M. 2005. Interpreting pesticide label wording. UF/IFAS EDIS Document PI-34. <http://edis.ifas.ufl.edu/PI071>.

Fishel, F.M. 2005. Respirators for pesticide applications. UF/IFAS EDIS Document PI-77. <http://edis.ifas.ufl.edu/PI114>.

Fishel, F.M. 2008. EPA Approval of pesticide labeling. UF/IFAS EDIS Document PI-167. <http://edis.ifas.ufl.edu/PI203>

Nesheim, O.N., F.M. Fishel and M. Mossler. 2005. Toxicity of pesticides. UF/IFAS EDIS Document PI-13. <http://edis.ifas.ufl.edu/PI008>.

Additional Information

Dean, T.W. 2003. Pesticide applicator update: choosing suitable personal protective equipment. UF/IFAS EDIS Document PI-28. <http://edis.ifas.ufl.edu/PI061>.

Table 1. Toxicity categories.

Study	Category I	Category II	Category III	Category IV
Acute oral	Up to and including 50 mg/kg	>50 through 500 mg/kg	>500 through 5,000 mg/kg	>5,000 mg/kg
Acute dermal	Up to and including 200 mg/kg	>200 through 2,000 mg/kg	>2,000 through 5,000 mg/kg	>5,000 mg/kg
Acute inhalation*	Up to and including 0.05 mg/liter	>0.05 through 0.5 mg/liter	>0.5 through 2 mg/liter	>2 mg/liter
Primary eye irritation	Corrosive (irreversible destruction of ocular tissue) or corneal involvement or irritation persisting for more than 21 days	Corneal involvement or other eye irritation clearing in 8-21 days	Corneal involvement or other eye irritation clearing in 7 days or less	Minimal effects clearing in less than 24 hours
Primary skin irritation	Corrosive (tissue destruction into the dermis and/or scarring)	Severe irritation at 72 hours (severe erythema or edema)	Moderate irritation at 72 hours (moderate erythema)	Mild or slight irritation at 72 hours (no irritation or slight erythema)

*4-hour exposure.

Table 2. Signal word as determined by toxicity category.

Toxicity category	Signal word
I	DANGER
II	WARNING
III	CAUTION
IV	None required

Table 3. Examples of signal words based upon toxicity studies.

Type of study	Product A	Product B	Product C	Product D	Product E
Acute oral	III	IV	I*	III	II
Acute dermal	IV	III	III	IV	II
Acute inhalation	III	IV	III	III	II
Primary eye	III	II	I	I	II
Primary skin	IV	IV	II	IV	II
Contains \geq 4% methanol	No	No	No	No	Yes**
Signal word	CAUTION	WARNING	DANGER	DANGER	DANGER

*Product C must also bear the skull and crossbones symbol in close proximity to the word "POISON" which must appear in red on a contrasting background due to acute oral toxicity.

**Product E must also bear the skull and crossbones symbol in close proximity to the word "POISON" which must appear in red on a contrasting background due to its formulation containing at least 4% methanol.

Table 4. Typical statements for acute oral toxicity.

Toxicity category	Signal word	Statements
I	DANGER-POISON Skull and crossbones required*	Fatal if swallowed. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco.
II	WARNING	May be fatal if swallowed. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco.
III	CAUTION	Harmful if swallowed. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco.
IV	CAUTION (optional)	No statements are required. However, manufacturers may choose to use category III labeling.
*For products containing $\geq 4\%$ methanol, EPA believes that in order to mitigate potential risk the following statement should be added to the label: "Methanol may cause blindness."		

Table 5. Typical statements for acute dermal toxicity.

Toxicity category	Signal word	Statements
I	DANGER-POISON Skull and crossbones required	Fatal if absorbed through skin. Do not get in eyes, on skin, or on clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Wear (appropriate protective clothing listed here). Remove and wash contaminated clothing before reuse.
II	WARNING	May be fatal if absorbed through skin. Do not get in eyes, on skin, or on clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Wear (appropriate protective clothing listed here). Remove and wash contaminated clothing before reuse.
III	CAUTION	Harmful if absorbed through skin. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Wear (appropriate protective clothing listed here). Remove and wash contaminated clothing before reuse.
IV	CAUTION (optional)	No statements are required. However, manufacturers may choose to use category III labeling.

Table 6. Typical statements for acute inhalation toxicity.

Toxicity category	Signal word	Statements
I	DANGER-POISON Skull and crossbones required	Fatal if inhaled. Do not breathe (dust, vapor, or spray mist listed here). Wear (appropriate respiratory protection listed here). Remove and wash contaminated clothing before reuse.

Table 6. Typical statements for acute inhalation toxicity.

Toxicity category	Signal word	Statements
II	WARNING	May be fatal if inhaled. Do not breathe (dust, vapor, or spray mist listed here). Wear (appropriate respiratory protection listed here). Remove and wash contaminated clothing before reuse.
III	CAUTION	Harmful if inhaled. Avoid breathing (dust, vapor, or spray mist listed here). Remove and wash contaminated clothing before reuse.
IV	CAUTION (optional)	No statements are required. However, manufacturers may choose to use category III labeling.

Table 7. Typical statements for primary eye irritation.

Toxicity category	Signal word	Statements
I	DANGER	Corrosive.* Causes irreversible eye damage. Do not get in eyes or on clothing. Wear (appropriate protective eyewear such as goggles, face shield, or safety glasses listed here). Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove and wash contaminated clothing before reuse.
II	WARNING	Causes substantial but temporary eye injury. Do not get in eyes or on clothing. Wear (appropriate protective eyewear such as goggles, face shield, or safety glasses listed here). Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove and wash contaminated clothing before reuse.
III	CAUTION	Causes moderate eye irritation. Avoid contact with eyes or clothing. Wear (specify protective eyewear, if appropriate, here). Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco.
IV	CAUTION (optional)	No statements are required. However, manufacturers may choose to use category III labeling.

*The term "corrosive" is not required if corrosive effects were not observed during the study.

Table 8. Typical statements for primary skin irritation.

Toxicity category	Signal word	Statements
I	DANGER	Corrosive. Causes skin burns. Do not get in eyes, on skin, or on clothing. Wear (appropriate protective clothing and gloves listed here). Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove and wash contaminated clothing before reuse.

Table 8. Typical statements for primary skin irritation.

Toxicity category	Signal word	Statements
II	WARNING	Causes skin irritation. Do not get on skin or on clothing. Wear (appropriate protective clothing and gloves listed here). Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove and wash contaminated clothing before reuse.
III	CAUTION	Avoid contact with skin or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Wear (appropriate protective clothing and gloves listed here).
IV	CAUTION (optional)	No statements are required. However, manufacturers may choose to use category III labeling.

Table 9. Typical statements for dermal sensitization.

Study results	Statement
Product is a sensitizer or is positive for sensitization.	Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.
Product is not a sensitizer or is negative for sensitization.	No labeling is required for this result.