



No. 28: How to Read a Pesticide Label

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PARTS OF THE PESTICIDE LABEL

IDENTIFYING INFORMATION

Brand name

Each manufacturer has a brand or trade name for each of its products, and different manufacturers use different brand names for the same active ingredient. This is because most companies register each brand name as a trademark and do not allow any other company to use that name. The brand name is the one used in advertisements and by company sales people. It appears plainly on the front panel of the label.

Pesticide handlers should beware of choosing a pesticide product by brand name alone. Many companies use the same basic name with only minor variations to designate entirely different pesticide chemicals. Other times, several different companies sell the same pesticide product under very different brand names. Always read the ingredient statement to determine the active ingredients in a product.

Ingredient statement

Each pesticide label must list what is in the product. The *active ingredients* in a pesticide product are the chemicals that control the pest(s). Most pesticide products also have inert, or inactive, ingredients. *Inert ingredients* are added to make the pesticide safer and/or more convenient to handle; more effective; or easier to mix, measure, and apply. Both active and inactive (inert) ingredients, however, can potentially harm humans or the environment if they are not handled properly.

The ingredient statement must list the official chemical name or common (generic) name and amount of each active ingredient. Inert ingredients are not required to be named, but the label must show what percentage of the total contents they make up.

The *chemical name* is a complex name that identifies the chemical components and

structure of the pesticide. This name is almost always listed in the ingredient statement on the label. Because pesticides have complex chemical names, many are given shorter *common names*. Only common names that are officially accepted by the U.S. Environmental Protection Agency (EPA) may be used in the ingredient statement on the pesticide label. Both the chemical name and the common name identify the actual active ingredient, and one or the other (or both) must appear in the ingredients statement on pesticide product labels.

By purchasing pesticides according to the common or chemical names, consumers will always be sure to get the active ingredient they want. Additionally, if there is an accident or emergency, health professionals will need to know the common or chemical name of the ingredients.

Registration and establishment numbers

The *EPA registration number* (for example, EPA Reg. No. 3120280-AA) indicates that the pesticide label has been approved by EPA. If no registration number appears on the pesticide label, the product should not be purchased, because such a product has not been subjected to the testing requirements of EPA.

The only exception to the rule requiring inclusion of the EPA Registration Number is for products registered under a criterion designated minimum risk, or Section 25(b). The 25(b) products do NOT need to display a registration number, but they DO need to be listed officially as acceptable 25(b) products. You can find EPA's current list of 25(b) pesticide ingredients at www.epa.gov/opp00001/biopesticides/registools/25b_list.htm#activeingredients.

In addition, any inert ingredients in minimum risk products must be on EPA's list of approved inerts, available at www.epa.gov/opp001/inerts/section25b_inerts.pdf. You can find more information about Section 25(b) products in [*Pesticide information Leaflet 37: Section 25\(b\) Pesticides: Minimum Risk?*](#)

The *establishment number* identifies the facility where the product was made, in case there are questions or concerns about the pesticide product. This number (for example, EPA Est. No. 464-MI-1) appears either on the pesticide label or on the container itself. The registration and establishment numbers are needed in case of poisoning, claims of misuse, or liability claims.

The name and address of the manufacturer must also appear on the product label. Often, the manufacturer includes a toll-free number that can be called for general questions about the product or if a physician or other professional needs more specific information about the product.

Type of formulation

The front panel of some pesticide labels will tell what kind of formulation the product is, such as whether it is sold ready-to-use (RTU) or as a concentrate that needs to be diluted, and other factors. A single active ingredient is often sold in several different formulations, depending on the end use of the product. For example, one particular formulation may be safe to use on certain plants while a different formulation must be used only on other plants. Different formulations also may have different first aid procedures. Some of the more common formulations and their 1-3 letter abbreviations are listed below.

Emulsifiable concentrates (E or EC) usually contain a liquid active ingredient, one or more petroleum-based solvents, and an agent that allows the formulation to be mixed with water to form an emulsion (a colloidal suspension of a liquid in another liquid). When water is added, pesticide emulsions look like milk. Emulsifiable concentrates are easily absorbed through the skin.

Solutions (S) dissolve readily in a liquid solvent such as water or a petroleum-based solvent. When mixed with the solvent, they form a solution that will not readily separate or settle out. Formulations of these pesticides usually contain the active ingredient, the solvent, and one or more other ingredients.

Flowables (F or FL) are liquid formulations consisting of a finely-ground solid active ingredient suspended in a liquid.

Dusts (D) are ready-to-use and usually contain a low percentage of active ingredient plus a very fine, dry, inert carrier made from talc, clay, chalk, nut hulls, or volcanic ash. Dusts are always used dry, and they easily drift in the air. Dusts are more likely than some other formulations to irritate the eyes, nose, throat, and skin, and they may easily be inhaled.

Wettable powders (WP or W) are dry, finely ground formulations that look like dusts. However, they must usually be mixed with water and are applied as sprays. Wettable powders usually contain 50 percent or more active ingredient. Wettable powder particles do not dissolve in water; unless they are constantly agitated, they settle out quickly. They are less easily absorbed through the skin and eyes than emulsifiable concentrates and other liquids, but they may be inhaled

while pouring and mixing the concentrated product.

Granular (G) formulations are similar to dusts except that granular particles are larger and heavier and thus less likely to drift. The coarse particles are made from an absorptive material such as clay, corn cobs, or walnut shells. The active ingredient either coats the outside or is absorbed into the particles. The amount of active ingredient is relatively low, ranging from 1 to 15 percent.

Water-dispersable granules (WDG) or dry flowables (DF) are like wettable powder formulations, except that the active ingredient is prepared as granule-sized particles. Water-dispersible granules must be mixed with water to be applied. Once in water, the granules break apart into a fine powder which must be constantly agitated to remain in suspension. These formulations are less likely than wettable powders to be inhaled during pouring and mixing.

Microencapsulated (M) formulations are particles of active ingredient (liquid or dry) surrounded by a plastic coating. The formulated product is mixed with water and applied as a spray. The encapsulation process prolongs the effective life of the pesticide by providing timed release of the active ingredient. Microencapsulated pesticides are not easily absorbed through the skin or inhaled.

Aerosols (A) contain one or more active ingredients, usually at a low percentage, and a solvent. Aerosols are easily inhaled, and pressurized aerosols are hazardous if punctured, overheated, or used near an open flame.

Fumigants are pesticides that form poisonous gases when applied. Some active ingredients are liquids when packaged under

high pressure but change to gases when released. Other active ingredients are volatile liquids when enclosed in an ordinary container, and thus are not formulated under pressure. Still others are solids that release gases when applied under conditions of high humidity or in the presence of water vapor. Fumigants are highly toxic to humans and all other organisms and require the use of specialized protective equipment.

Baits (B) are made of active ingredients mixed with food or some other pest-attractive substance. The amount of active ingredient in most bait formulations is quite low, usually less than 5 percent. Baits can be attractive to children and pets, so users must be careful to place them in inaccessible areas.

CLASSIFICATION

Restricted use products

EPA categorizes every use of every pesticide as either general or restricted use. A pesticide is classified as a *restricted use product* (RUP) if it could cause harm to humans or to the environment even when used according to label directions. Pesticides classified as restricted use may be purchased only by certified applicators (persons who have received special training on the handling and use of pesticides, and who have demonstrated competence to use RUPs) or by persons using the pesticide under the supervision of the certified applicator.

If a pesticide is classified as restricted use, the label will state "Restricted Use Pesticide" in a box at the top of the front panel. Below this heading may be a statement describing the reason for the restricted use classification. A pesticide may be classified as restricted use on the basis of

concerns about safety of the applicator, safety of the general public exposed to residues, or concerns for the environment. For instance, one product may bear this classification because it has been found to leach into ground water under certain conditions, while another product might be classified for restricted use because the active ingredient has caused tumors when fed to laboratory animals. When all label directions are followed and when the principles learned during the pesticide applicator training and certification process are applied, the product should not pose an undue hazard to humans or the environment.

General use products

General use pesticides have no designation on the product label and may be purchased and applied by anyone. Remember that even these products may still cause harm to humans or the environment when not used properly. All directions on the label and any accompanying labeling must be followed precisely.

HAZARDS TO HUMANS AND THE ENVIRONMENT

The signal word

A *signal word* - DANGER, WARNING, or CAUTION - must appear in large letters on the front panel of the pesticide label. These words indicate how acutely toxic the product is to humans. The signal word appears immediately below the statement, "Keep out of reach of children," which also must appear on every label.

The signal word is based not on the active ingredient alone, but on all the contents of the formulated product. It reflects the hazard of any active ingredients, carriers, solvents, and inert ingredients in the product.

The signal word indicates the risk of *acute effects* (illnesses or injuries that appear immediately after exposure to a pesticide). It does not indicate the risk of chronic or delayed effects (illnesses or injuries that appear weeks to years after exposure) or allergic effects (effects such as skin rash or asthma that some people develop in reaction to pesticides). The signal word is best used to compare acute toxicity between products being considered for use.

The four routes of exposure to a pesticide product (*oral* – by mouth, *dermal* – through the skin, *inhalation* – through the lungs, and *eye*) have different risks of acute effects; the signal word for a product is based on the route with the greatest risk.

CAUTION means the pesticide product is slightly toxic if eaten, absorbed through the skin, or inhaled, or it causes slight eye or skin irritation.

WARNING indicates the pesticide product is moderately toxic if eaten, absorbed through the skin, or inhaled, or it causes moderate eye or skin irritation.

DANGER means that the pesticide product is highly toxic by at least one route of exposure. It may be corrosive, causing irreversible damage to the skin or eyes. Alternatively, it may be highly toxic if eaten, absorbed through the skin, or inhaled. If this is the case, then the word “**POISON**” must also be included in red letters on the front panel of the product label.

Hazards to humans

This section of the label indicates which route of entry (mouth, skin, eyes, and/or lungs) must particularly be protected and what specific actions should be taken to avoid acute effects from exposure to the

pesticide. Many pesticides can cause acute effects by more than one route.

If the pesticide can bind to cholinesterase, an enzyme necessary for proper nervous system transmission, the label must identify it as a *cholinesterase inhibitor*. See Pesticide Information Leaflet [No 7: Cholinesterase Testing](#) or [No. 30: Cholinesterase Monitoring: A Guide for the Health Professional](#) for more information.

If a pesticide product is known to have the potential to cause *allergic effects*, such as skin irritation or asthma, it must be stated on the label. Sometimes the labeling refers to allergic effects as "sensitization."

If the EPA considers a pesticide to have the potential to cause *chronic or delayed effects*, the label must warn of that possibility. Such statements tell whether the product has been shown to cause tumors, reproductive problems, or other delayed effects in laboratory animals. These products often have had certain mitigating requirements imposed, such as a reduction in the rate or number of times to be applied, an increase in the type or level of personal protective equipment (PPE) for the applicator, or other adjustments that will result in lowered exposure and risk reduction. These adjustments may have been required prior to initial registration of the pesticide. If an unacceptable risk is determined to exist for a product already on the market, EPA can either cancel or suspend the use of the product or change the labeling to reduce any potential risk. If such products are used with care and according to all directions on the label, there should be no unreasonable risk of adverse effects.

Personal protective equipment statements

Immediately following the statements about acute, delayed, and allergic effects, the

labeling usually lists *personal protective equipment (PPE)* requirements. These statements identify the minimum PPE that must be worn when using the pesticide.

Sometimes the statements will require different PPE for different pesticide handling activities. For example, an apron may be required only during mixing and loading or equipment cleaning. Sometimes the statements will allow reduced PPE when closed systems or enclosed cabs are employed. It is important to follow all PPE requirements; they are there to minimize exposure and prevent acute, delayed or chronic, and allergic reactions.

Worker Protection Standard (WPS) requirements

When used on farms, forests, nurseries, or greenhouses, pesticides are subject to certain requirements under the Worker Protection Standard (WPS). For these pesticides, the label will display a special section stating that the pesticide is subject to WPS requirements when used on these sites. The WPS was implemented to provide special protection for pesticide handlers (those who may mix, load, or apply pesticides as part of their jobs) and workers (those who may be exposed to pesticide residues on the job, as in cultivation, harvesting, or equipment maintenance).

WPS protections may include additional PPE or other measures not required for uses of the pesticide on sites other than farm, greenhouses, nurseries, or forests.

Statement of practical treatment (first aid)

Pesticide products are required to include instructions on how to respond to an emergency exposure. The instructions usually include first aid measures and may

include instructions to seek medical help. The directions are based on the formulation (*i.e.*, both active and inert ingredients). Some inert ingredients are corrosive and can cause more damage if a person is made to vomit. First aid instructions should always be followed very carefully.

Environmental hazards

This section of the pesticide labeling will indicate precautions for protecting the environment when using the pesticide. Some general statements appear on the labeling of nearly every pesticide. Most pesticide labeling, for example, will warn the user not to contaminate water when applying the pesticide, cleaning equipment, or disposing of pesticide wastes.

The labeling will contain extra precautionary statements if the pesticide poses a specific hazard to the environment. For example, the label may state that the product is highly toxic to bees or other wildlife, or that the pesticide is subject to leaching under certain conditions.

DIRECTIONS FOR USE

Directly under the heading "Directions for Use" on every pesticide product labeling is the following statement: "It is a violation of Federal law to use this product in a manner inconsistent with its labeling." It is illegal to use a pesticide in any way not permitted by the labeling. A pesticide may be used only on the plants, animals, or sites named in the directions. It may not be used at higher dosages, higher concentrations, or more frequent applications. All directions for use must be followed, including directions concerning safety, mixing, diluting, storage, and disposal. *These directions are not advice – they are requirements.*

Mixing, additives, and application instructions

The instructions on how to use the pesticide state the exact requirements for legal use of the product. The instructions tell you:

- the pests that the manufacturer claims the product will control;
- the plant, animal, or site the product is intended to protect;
- in what form the product should be applied;
- the correct equipment to use;
- how much pesticide to use;
- mixing directions;
- whether the product can be mixed with other products;
- whether the product is likely to cause unintended damage to plants, animals, or surfaces;
- where the material should be applied;
- when and how often it may be applied.

Re-entry and preharvest intervals

For many pesticide products, especially those for use in and around homes, the treated area may be re-entered once the spray has dried or the dust has settled. Pesticides used on other sites such as crops may require a specific amount of time to pass before people can re-enter the treated area. In such cases, the label will state the *restricted entry interval (REI)*, which is the number of hours or days to wait before reentry without specified PPE. Often, the REI will differ for different crops or sites. This may be because tests have shown that the pesticide degrades at different rates on different crops or sites; because the pesticide is applied at different rates to different crops, resulting in quicker degradation on crops receiving lower rates; or because specific data exist for certain crops but not for others. In the absence of

specific degradation data on each crop, EPA imposes a default REI that depends on the acute toxicity category of the pesticide. Default REIs are conservative; *i.e.*, they provide more protection than is likely to be needed, and are thus longer wait periods.

There may be special circumstances under which a treated area may be reentered early. For instance, workers in agricultural fields may reenter early, providing that they have received special early entry training, special protective gear is worn, only certain tasks are performed, and a minimum of four hours have passed since application.

Preharvest intervals (PHI), also called days to harvest, identify the number of days to wait before a treated crop can be harvested for consumption by humans or animals. By the end of the PHI, any remaining residues will have been degraded to a level at or below the tolerance (the legally allowable level that can remain at harvest). As with REIs, different crops bear different PHIs, depending on many factors.

Special requirements

Some directions that pesticide users must obey are contained in documents that are only *referred to* on the product labeling but may not be included when the product is sold. Such instructions include EPA or other government agency regulations or additional requirements concerning the safe use of the pesticide product.

In such cases, pesticide users are responsible for determining whether the regulation, bulletin, or other document referred to on the label applies to their particular situation and the intended use of the pesticide product. If the document is applicable, the user must comply with all the specific directions for use and other requirements

that it contains. These documents do not always accompany the pesticide product when it is sold.

Additional directions and requirements may have to be obtained from other sources, such as pesticide dealers or company representatives, industry or commodity organizations, land grant universities, or Extension representatives. This reference to other documents is a relatively new practice, and is necessary because there is no longer room on the traditional pesticide label to explain the requirements of all laws and regulations that may apply to the user.

STORAGE AND DISPOSAL

All pesticide labeling contains instructions for storing the pesticide. These may include both general statements, such as "Keep out of reach of children and pets," and specific directions, such as "Do not store at temperatures below 32° F." Pesticide labeling also contains some general information about how to dispose of excess pesticide and the empty pesticide container in ways that are acceptable under Federal regulations. State and local laws vary, however, so the labeling usually does not give exact disposal instructions.

READING THE PESTICIDE LABEL

The pesticide label should be read before purchase, prior to use, and before disposal. The buyer should be sure the pesticide:

- is labeled for the crop or site to be treated
- will control the pest(s) of concern
- will not harm wildlife or desirable plants near the treatment site
- will not contaminate the environment, given the conditions at the treatment site
- will not pose a storage problem

- does not require the use of application equipment or PPE not available to the user

In the event of an emergency involving overexposure to a pesticide, refer to the label for first aid directions. If the victim needs medical follow-up, the label (or, if available, a copy) should be taken along so that the physician or other medical personnel can determine the correct course of treatment for the particular product.

The pesticide label provides a great deal of general and specific information on how to use a product. For a more detailed description of potential health and environmental hazards, consult the Material Safety Data Sheet (MSDS) for the product as well as the label. For details on interpreting information on the MSDS, see [*PIL No. 29: How to Read a Material Safety Data Sheet \(MSDS\)*](#).

SOURCES

Code of Federal Regulations (CFR). Labeling Requirements for Pesticides and Devices. Part 156.64, Title 40, 2007.

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