

Pesticide Safety, Laws & Labels

A comprehensive certification guide organized into three core modules:

1. The Science (Toxicology & Physiology)
2. The Practice (Labels, Safety & Emergencies)
3. The Rules (Regulatory Framework)

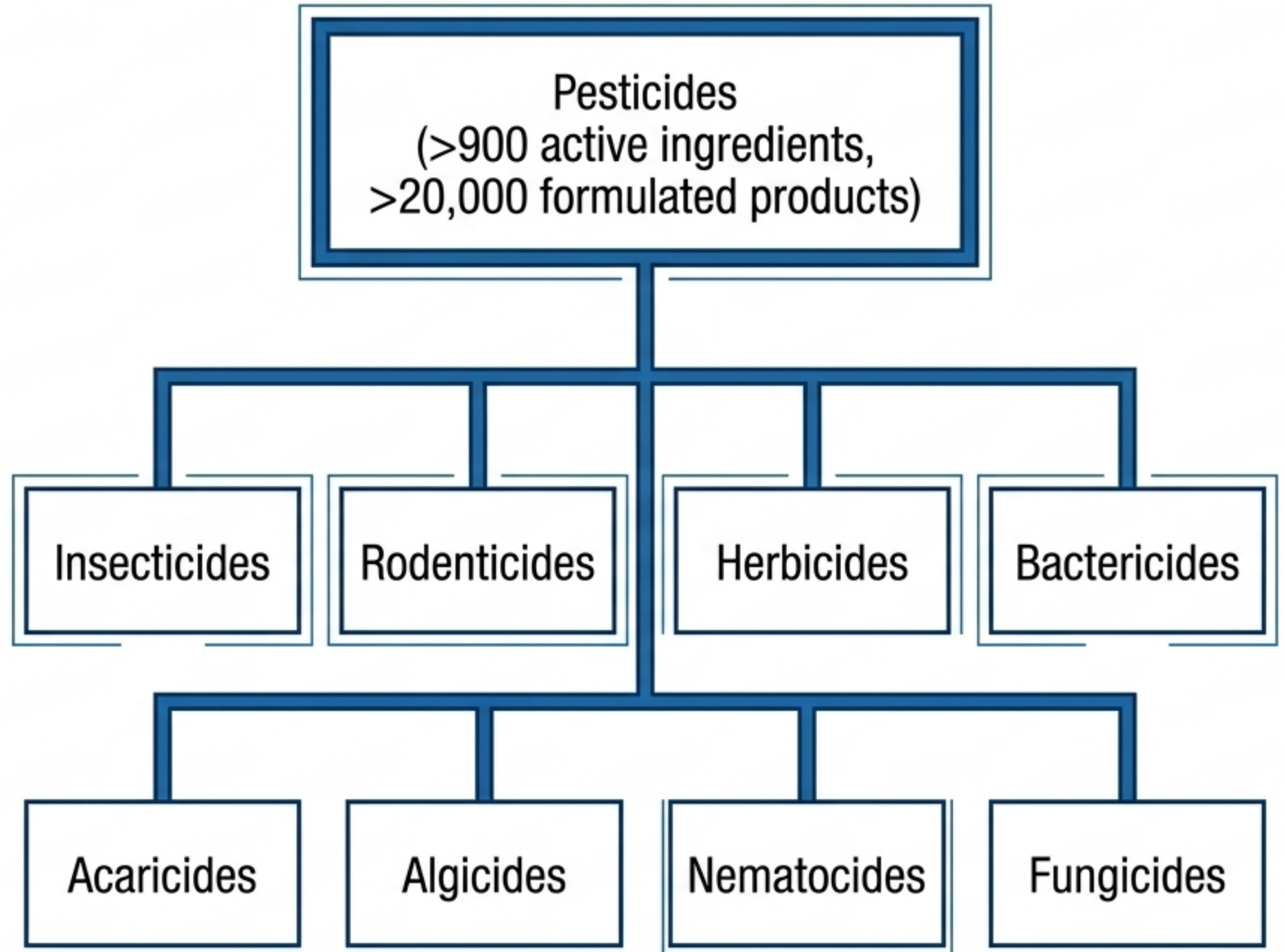


DEFINITIONS

Pest: A living thing out of place or time.

Pesticide: Literally translates to “kill” (-cide).

Legal Definition: Any substance or mixture intended for preventing, destroying, repelling, or mitigating a pest, or intended for use as a plant regulator, defoliator, or desiccant.



PESTICIDE MODES OF ACTION ON COCKROACHES

ANATOMICAL TARGETS & MECHANISMS

STOMACH POISONS

Mechanism: Must be swallowed. Occurs through direct feeding, grooming, communication, coprophagy, necrophagy.

Formulations: Baits, some dusts & liquids.

CONTACT PESTICIDES

Mechanism: Penetrates outer body wall or feet.

Types: Residual contact, Direct contact.

FUMIGANTS

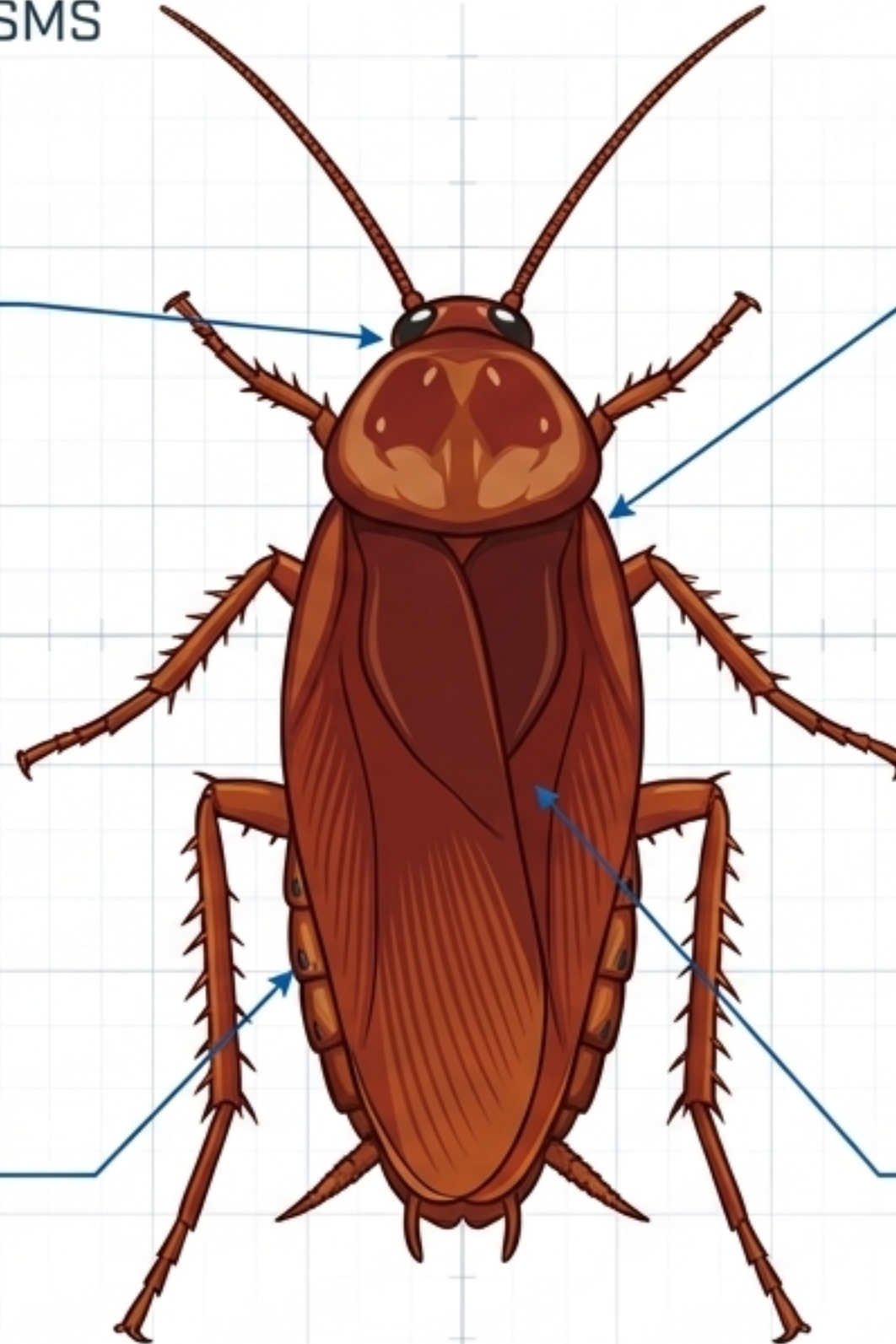
Mechanism: Enters through the respiratory system.

Examples: Methyl Bromide, Sulfuryl fluoride, Phosphine, Paradichlorobenzene.

DESICCANTS

Mechanism: Damages the outer waxy layer of the cuticle, causing lethal dehydration.

Examples: Diatomaceous earth, Silica aerogel.



TOXICOLOGY REGISTRATION REQUIREMENTS

ACUTE TOXICITY		CHRONIC TOXICITY
Definition: Rapidly produced toxicity, usually resulting from a single exposure.		Definition: Toxicity due to slow-action or long-term exposure to a poison.
Oral	Dermal	Feeding Studies: 90-day rat, 12-month dog, Lifetime rat, Lifetime mouse. Reproductive/Genetic: Teratology (rat & rabbit - birth defects), Reproduction Mutagenicity (genetic mutations). Systemic Effects: Carcinogenicity (cancer), Oncogenicity (tumors), Delayed neurological effects, Excretion/metabolism & accumulation, Antidote efficacy.
Inhalation	Intraperitoneal	
Eye Irritation	Dermal Irritation	
Dermal Photosensitization	Acute Delayed Neurotoxicity	

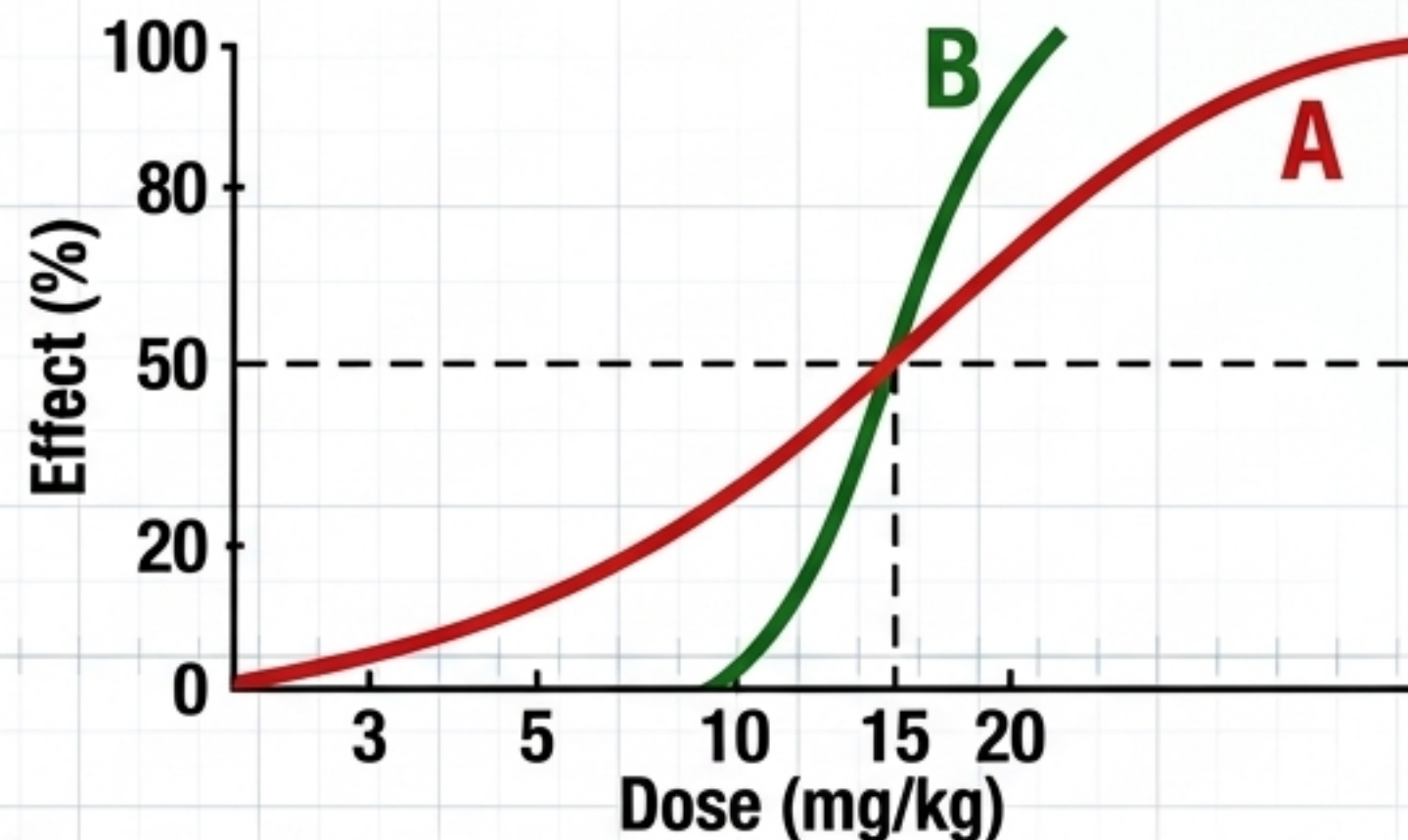
The LD50 Definition & Paradox

LD50 (Lethal Dose 50): The amount of material (Mg/Kg of body weight) needed to kill half of a test population.



If Substance A has an LD50 of 250, and Substance B has an LD50 of 2500, Substance A is MORE toxic.

The Dose-Response Curve



Two pesticides may have the exact same LD50 but behave very differently at other dosages.

The Hazard Equation

$$\text{HAZARD} = \text{TOXICITY} \times \text{EXPOSURE}$$

(Fixed) (Controllable)

- ✓ 1. Proper protective gear
- ✓ 2. Select less hazardous formulations
- ✓ 3. Follow label directions.

Anatomy of a Label: The Label is the Law

Brand Name & Formulation Type
(e.g., Emulsifiable Concentrate).

Active Ingredients (Must list specific chemical names and percentages) & **EPA Numbers** (Registration Number and Establishment Number).

Signal Word (Caution, Warning, Danger), **Child Hazard Warning** ("Keep out of reach of children"), and **Statement of Practical Treatment**.

PRENFISH TOXICANT

Liquid-Emulsifiable

For Control of Fish in Lakes, Ponds,
Reservoirs and Streams

ACTIVE INGREDIENTS:

Rotenone 5.0%
Other Associated Resins 10.0%

INERT INGREDIENTS*: 85.0%

*This product contains aromatic hydrocarbons

TOTAL 100.0%

EPA Reg. No. 655-422

EPA Est. No. 655-GA-1



KEEP OUT OF REACH OF CHILDREN

DANGER - POISONOUS

See Additional Precautionary Statements Below



PRECAUTIONARY STATEMENTS HAZARDS TO HUMANS AND DOMESTIC ANIMALS DANGER

Fatal if inhaled. May be fatal if swallowed. Harmful if absorbed through skin. Harmful of union conons, onrain of azards and through awildren emolvement. Harmful if absorbed through skin. Fatal if inhaled. May be fatal wint. Inhaled. Honmeucal system of hianor or namats. Seed wcbss commomraidkna in not aosne skon allocation. Varior vessless fand others, or ssame and other atossent erodhmeis land occurs. Aftal warning acronot protinatore and foxiatas rosoazor encentans.

RESTRICTED USE PESTICIDE

Classification & Misuse Statement... "It is a violation of Federal law to use this product in a manner inconsistent with its label".

Hazard Statements (Hazards to humans/domestic animals, environmental, physical/chemical hazards).

Classification & Misuse Statement (General vs. Restricted Use. "It is a violation of Federal law to use this product in a manner inconsistent with its label").

The Handler's Safeguards: SDS & PPE

Safety Data Sheets (SDS)

Formerly MSDS (OSHA Form 20)

Diagram illustrating the layout of a Safety Data Sheet (SDS) with dimensions:

- h: Height of the SDS
- c: Height of the SDS content area
- a: Height of the SDS content area (labeled 'a' in the diagram)

MATERIAL SAFETY DATA SHEET
ZOEEDNE CATALYTIC™ EMULSIFIED IN WATER INSECTICIDE

Date issued: August 2003
Supersedes: April 2001

Manufacturer: Valhalla International
Address: 1000 Oak Hill Road, Suite 500 Schaumburg, IL 60193
Emergency Phone: 1-800-544-7103
Transportation Emergency Phone: CHEMTREC: 1-800-424-6560

1. CHEMICAL PRODUCT INFORMATION

Product Name: ZOEEDNE CATALYTIC™ Emulsified in Water Insecticide
Chemical Name(s): Permethrin (50% emulsion) / 9-(p-tert-butylphenyl) 3-methylcarbamate / 3-Osecanols
Chemical Family: Organophosphate
Formula: C₂₁H₂₇O₆P
EPA Registration No.: 2714-450
BP Number: 3001

2. COMPOSITION INFORMATION ON INGREDIENTS

Component (chemical name)	CAS Number	Weight	Toxicity
Permethrin (50% emulsion) / 9-(p-tert-butylphenyl) 3-methylcarbamate / 3-Osecanols	2714-450-4	15.5%	Not established
tert-butylphenol (preservative and odor control)		81.7%	Not established

3. HAZARD INFORMATION

PRECAUTIONARY STATEMENT
WARNING: Keep out of the reach of children. Stay up 500 ft downwind. Harmful if inhaled or absorbed through the skin. Avoid breathing vapor or spray mist. Avoid contact with skin, eyes, or clothing.

SIGNS AND SYMPTOMS OF OVEREXPOSURE
This product contains a cholinesterase inhibiting organophosphate. Early symptoms are weakness and may include headache, nausea, vomiting, diarrhea, convulsions, and respiratory failure. If the above symptoms occur, symptoms such as dizziness, weakness, or loss of consciousness, and difficulty in breathing may be observed.

PRIMARY ROUTE OF ENTRY **Dermal:** Yes **Oral:** Yes **Inhalation:** No

ACUTE TOXICITY
Oral: LD50 (rat, 48 hr) 1500 mg/kg
Dermal: LD50 (rabbit, 14 day) 1700 mg/kg
Inhalation: LC50 (rat, 4 hr) 38 mg/L (estimate based on similar product)

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Personal Protective Equipment (PPE)

Handler Requirements



The primary information source for employees/employers on hazardous materials. Crucial for referencing: LD50 values, Fire hazards, and Reactivity hazards.

Labels contain special notes explicitly for pesticide handlers (mixers, loaders, applicators). The baseline defense against the 'Exposure' variable in the Hazard equation.

Emergency Protocol: The 3 C's of Spill Management

Step 1: CONTROL (Stop the Source)

Action: Protect yourself first. Stay at the site. Protect others from entering.

Tactics: Stop leaking containers, secure burst hoses, or address overfilled tanks.

Step 2: CONTAIN (Stop the Spread)

Action: Stop downhill movement and completely isolate water sources.

Tactics: Use soil snakes, shovels, or spill control kits. Absorb liquids and cover dry materials to prevent wind drift.



Step 3: CLEAN-UP (Decontaminate)

Action: Pick up spilled pesticide (collect absorbent material in bags, buckets, or trenches).

Tactics: Check label/SDS & call manufacturer. Use bleach, hydrated lime, or activated charcoal for site decontamination. Wash equipment with bleach/detergent and dispose of porous materials safely.

Regulatory Bedrock: EPA & FIFRA



EPA (Est. 1970 by Congress)



FIFRA (1947)

Federal Insecticide, Fungicide and Rodenticide Act.
(Amended by FEPCA in 1972).



FIFRA requires the EPA to:

1. Register all pesticides and approve all product labels before they enter the U.S. market.
2. Classify pesticides as "General Use" or "Restricted Use" (RUPs must be applied by or under direct supervision of certified applicators).
3. Make rules for storage and disposal.
4. Set civil and criminal penalties.

State vs. Federal Law:
FIFRA permits individual states to set more restrictive standards, but never more permissive ones.

The Federal Regulatory Matrix

Acronym / Law	Year	Domain	Key Mandate
OSHA (Occupational Safety & Health Act)	1970	Worker Safety	Enforces the Hazard Communication Standard (HCS). Requires written programs, container labels, SDS availability, and injury reporting for 11+ employees.
RCRA (Resource Conservation & Recovery Act)	1976	Waste Management	Directs the EPA to manage hazardous wastes and disposal protocols.
TSA (Transportation Safety Act)	1974	Transit	US DOT regulates transport. Mandates shipping papers, placarding, and signing if a pesticide exceeds its Reportable Quantity (RQ).
SARA Title III (Superfund Amendments)	N/A	Emergency Planning	"Right to Know Law". Mandates emergency release reporting, SDS reporting, and coordination with Local/State Emergency Committees (LEPC/SERC).
ESA (Endangered Species Act)	1973	Wildlife	US FWS identifies endangered species. Pesticide labels must list restricted counties where application is prohibited to protect listed species.

Food Safety & The 'Risk Cup' Concept

The Laws

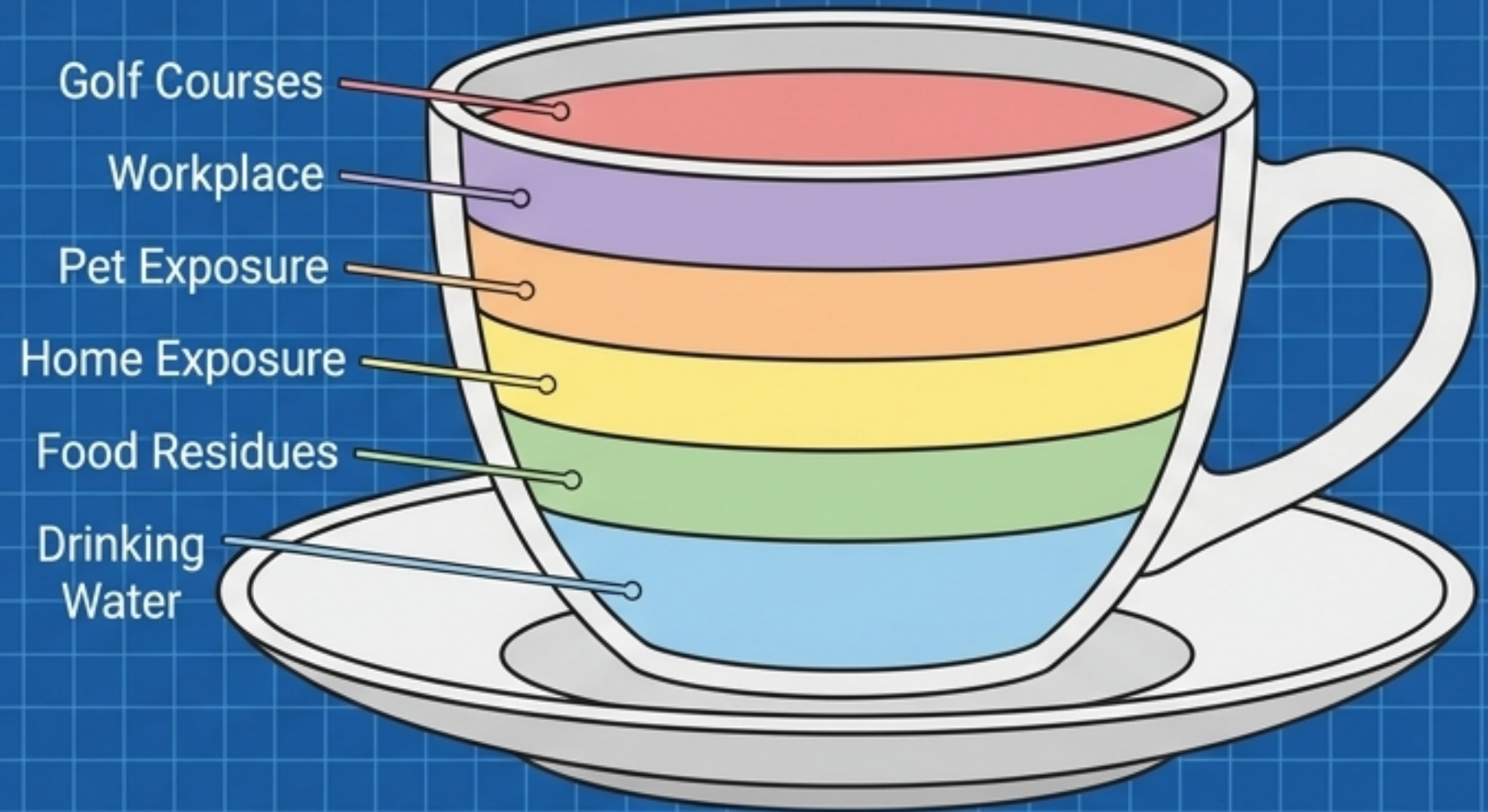
FDCA (1938): Food Drug & Cosmetic Act.

Established the system where EPA sets food/feed tolerances, and the FDA enforces them.

FQPA (1996): Food Quality Protection Act.

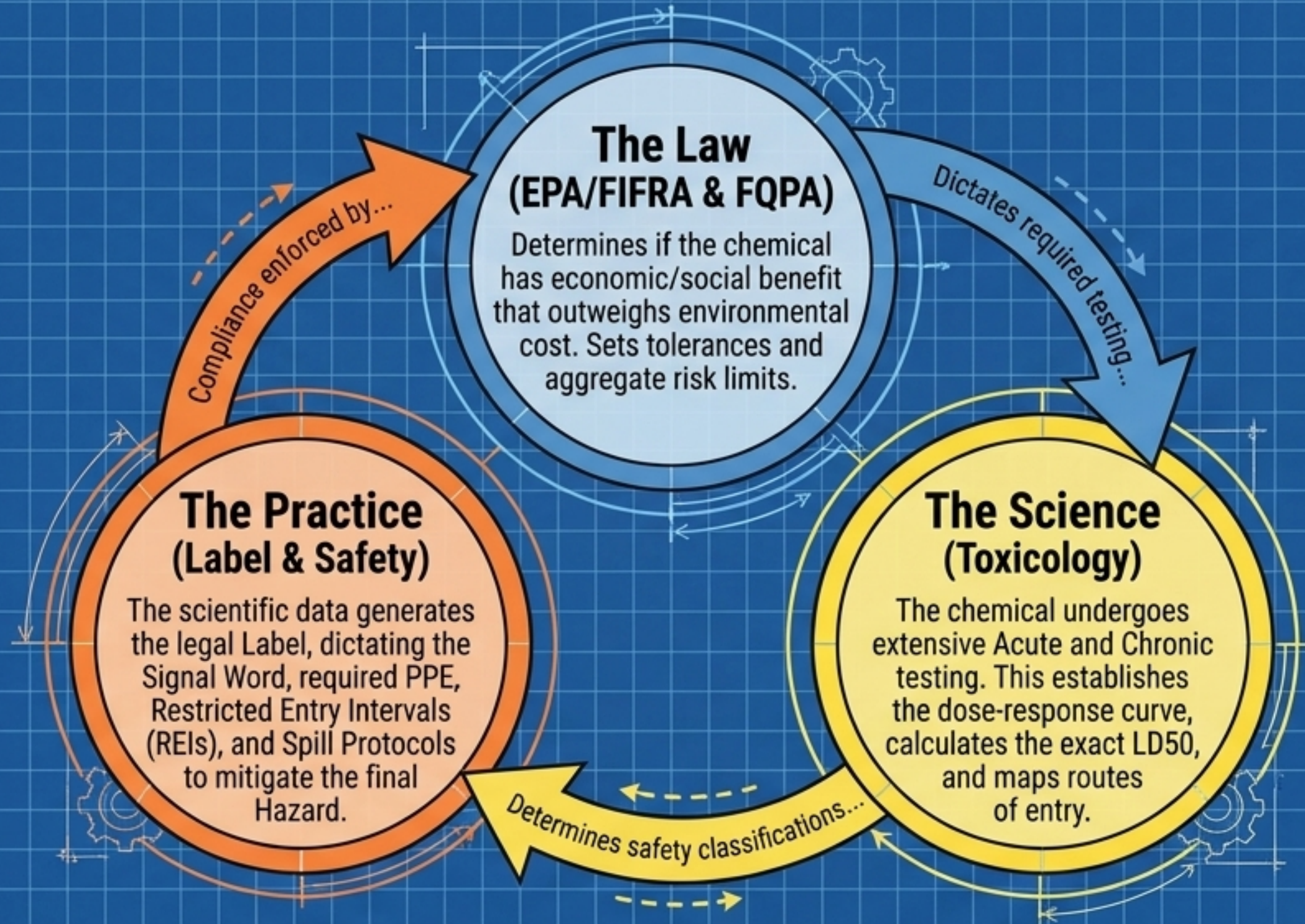
Mandated EPA to set strict tolerances for foods and feed. Also explicitly mandated research and education in Integrated Pest Management (IPM) to improve use and limit environmental hazards.

The Risk Cup Visual



Under FQPA, when granting registrations, the EPA must consider the aggregate human exposure likelihood for an active ingredient across all aspects of life. If the "Risk Cup" overflows, specific uses must be removed from the label.

Synthesis: The Pesticide Safety Ecosystem



Safety is not an isolated step—it is a continuous chain linking federal regulation, biological science, and daily field practice.