Chemical structure of organochlorine environmental sciences essay

There are a wide variety of tools available for pest control in residential environments, including the use of chemical pesticides as well as various non-chemical techniques. Broadly defined, a pesticide is any substance or mixture of substances intended to kill, repel, or control certain forms of plant or animal life that are considered to be pests. [4] Pests are living organisms that bother, injure, or cause damage to buildings, plants, humans, and animals, including pets. [1, 2] Pesticide is used in public health to kill vectors of disease, such as mosquitoes, and in agriculture, to kill pests that damage crops. [4]There are various way to classified pesticides for instant it can be categorized by the types of pests it control, the chemical composition of the pesticides, or by hazard of the pesticides. [5, 6] The most common method of classification would be according to the chemical composition of the pesticides itself as different pesticides may be composed of different chemical compound. The chemical category of pesticides includes organochlorine, organophosphate, carbamate, synthetic pyrethroids, inorganic, organic (botanical and microbial), and lastly the miscellaneous. [6] All of these chemical compound works in different routes in controlling pest as different chemicals may have different mechanism of action.

Organochlorine (OC)

Figure1. Chemical structure of organochlorine [7]Organochlorine pesticides are hydrocarbon compounds containing multiple chlorine substitutions. There are four main types of OC pesticides; dichlorodiphenylethanes; cyclodienes; chlorinated benzenes; and cyclohexanes. All share a similar pair of carbon rings, one ring being heavily chlorinated. They are the synthetic organic pesticides that are earliest discovered and used. Their characteristics

are broad-spectrum, long residual effect and relatively low toxicity. However, due to their stable chemical nature, they are hard to break down in the natural environment. Prolonged use in large quantities will easily lead to environmental pollution and accumulation in mammals, resulting in cumulative poisoning or damage. Organochlorine pesticides are therefore banned under general circumstances and gradually replaced by other pesticides. [7]

Organophosphate

Figure2. Chemical structure of organophosphate [8]Organophosphate pesticides are synthetic in origin and are normally esters, amides, or thiol derivatives of phosphoric, phosphonic, phosphorothioic, or phosphonothioic acids. They are characterised by their multiple functions and the capacity of controlling a broad spectrum of pests. Organophosphate pesticides (as well as sarin and VX nerve agent) irreversibly inactivate acetylcholinesterase, which is essential to nerve function in insects, humans, and many other animals. They are nerve poisons that can be used not only as stomach poison but also as contact poison and fumigant. These pesticides are also biodegradable, cause minimum environmental pollution and slow pest resistance. Temephos and F enitrothion are examples of organophosphate pesticides. [8]

Carbamate

Figure3. Chemical structure of carbamate [9]Carbamates are organic compounds derived from carbamic acid (NH2COOH). A carbamate group, carbamate ester, and carbamic acids are functional groups that are inter-related structurally and often are interconverted chemically. Carbamate

esters are also called urethanes. Carbamate pesticides work on the same principle as organophosphate pesticides by affecting the transmission of nerve signals resulting in the death of the pest by poisoning. They can be used as stomach and contact poisons as well as fumigant. Moreover, as their molecular structures are largely similar to that of natural organic substances, they can be degraded easily in a natural manner with minimum environmental pollution. Propoxur is an example of carbamate pesticides.[9]

Synthetic pyrethroids

Figure4. Chemical structure of synthetic pyrethroids [10]Synthetic-pyrethroid pesticides are a pesticide synthesized by imitating the structure of natural pyrethrins, which are taken from pyrethrum, the oleoresin extract of dried chrysanthemum flowers. The insecticidal properties of pyrethrins are derived from ketoalcoholic esters of chrysanthemic acid and pyrethroic acid. They are axonic poisons and cause paralysis of an organism by keeping the sodium channels open in the neuronal membranes. The sodium channel is a membrane protein with a hydrophilic interior. This interior is a tiny hole which is shaped precisely to strip away the partially charged water molecules from a sodium ion and create a favorable way for sodium ions to pass through the membrane, enter the axon, and propagate an action potential. When the toxin keeps the channels in their open state, the nerves cannot de-excite, so the organism is paralyzed. They are comparatively more stable with longer residual effects than natural pyrethrins. Synthetic-pyrethroid pesticides are highly toxic to insects but of only slight toxicity to mammals. A llethrin and Permethrin are examples of synthetic-pyrethroid pesticides. [10]

Inorganic pesticide

Inorganic pesticide refers to compounds that include heavy metals such as arsenic, copper sulfates, lead, cadmium, and mercury. They do not degrade readily and persist long in the system. Arsenic works by coagulates proteins, form complexes with coenzymes which is then inhibits the production of ATP. Like cadmium and mercury, it can substitute for phosphorous in some biochemical processes. Mercury has a strong affinity for sulfhydryl groups (SH) in proteins, enzymes, hemoglobin and serum albumin. The Central Nervous system is affected by damage to the blood-brain barrier; transfer of metabolites such as amino acids in the brain is not properly regulated. Cadmium affects enzymes responsible for the reabsorption of proteins in kidney tubules. It also affects the functioning of enzymes such as ADH (alcohol dehydrogenase). Cadmium is substituted for zinc as both metals are similar in solution. Arsenic was commonly used as arsenic trioxide (As_2O_3) or arsenous acid and mercury as mercuric chloride ($HgCl_2$). Inorganic pesticides were often used in powder, paste, or dip form. The pesticide residue stays on the object and continues to be an effective insect killer for a long time. [11]

Organic pesticide

Organic pesticides are carbon-based compounds that include pesticides such as Naphthalene and Paradichlorobenzene (PDB), two chemicals commonly known as mothballs. Naphthalene and PDB are applied as a solid (in mothball and flake form) and sublimate, acting as a fumigant. The fumes from these materials kill insects and work best in tightly closed spaces. The pesticide residue is expected to evaporate over time. Old collections often smell of

these pesticides and it is not clearly understood how long it takes for the chemicals to completely sublimate in the museum environment. [12]

Miscellaneous

There are wide variety of commercial product of miscellaneous pesticides including 4-Aminipyridine, calcium cyanamide, creosote, endothall, metakdehyde, and sodium chlorate. 4-aminopyridine is a highly toxic white powder used as a bird repellent. It works by making one or two birds acutely ill, thus warning off the remaining birds by cries of dostress. it is toxic to vertebrates. Calcium cynamide incorporated into soil to serve as fertilizer, fungicide, and herbicides. Creosote is extensively used as a wood preservatives, usually by high-pressure impregnation of lumber. it has also been used as an animal dip and disinfectant. Endothall can act as the free acid or as sodium, potassium, or amine salts. It is used as a contact herbicide, defoliant, aquatic herbicide, and algaecide. Methaldehyde is a four-unit cyclic polymer of acetaldehyde which has long been used to kill slug and snails, which attracted to it without the use of bait. Sodium chlorate is used in agriculture as a defoliant, nonselective contact herbicide, and semi-permanent soil sterilant. [13]

Pesticides Classified by Chemical Category

Category

Examples

Organochlorines*Aldrin, chlordane, DDTOrganophosphateschlorpyrifos (Dursban), diazinon, acephate (Orthene), malathionCarbamatescarbaryl (Sevin), propoxur (Baygon)Synthetic pyrethroidspermethrin, resmethrin,

cypermethrin, cyfluthrinInorganicboric acid, chlorates, cryolite, diatomaceous earth, silica aerogel, chromated copper arsenate (CCA)Organic (botanical)garlic, limonene, neem, nicotine, pyrethrum, rotenone, ryania, sabadillaMiscellaneousHorticultural oils, insect growth regulators, insecticidal soaps, insect pheromones

Table1. Major chemical classes of pesticides

Type of Pesticide

Activity

AlgaecidesControl algae in bodies of water, including swimming pools. AntimicrobialsKill microorganisms that produce diseaseAttractantsAttract specific pests using natural insect chemicals called pheromones that confuse the mating behavior of insects. AvicidesControl pest birds. BiopesticidesNaturally occurring substances with pesticidal properties. DefoliantsCause foliage to drop from a plant, typically to aid in the harvesting process. DesiccantsAid in the drying process of plants or insects, usually for laboratory purposes. FumigantsProduce vapors or gases to control air- or soilborne insects and diseases. FungicidesDestroy fungi that infect plants, animals, or people. HerbicidesControl noxious weeds and other vegetation that are growing or competing with a desired species. Insect Growth Regulators (IGRs)Accelerate or retard the rate of growth of insects. InsecticidesControl or eliminate insects that affect plants, animals, or people. Miticides (Acaricides)Kill mites that live on plants, livestock, and people. MolluscicidesKill snails and slugs. NematicidesKill nematodes, which are microscopic wormlike organisms that live in the soil and cause damage to food crops. OvicidesControl insect eggs through the application of low-sulfur

petroleum oils to plants and animals. PiscicidesControl pest fish. Plant Growth Regulators (PGRs)Accelerate or retard the rate of growth of a plant. PredacidesControl vertebrate pests. RepellentsRepel pests such as mosquitoes, flies, ticks, and fleas. RodenticidesControl mice, rats, and other rodents.

Table2. Types of pesticides

Pesticide Poisoning

Pesticide poisoning occurs after exposure to pesticides. It may occur shortly after a single exposure (acute poisoning) or gradually after repeated exposures over a period of time (chronic poisoning).[17]Acute poisoning presents symptoms like headache, dizziness, nausea and vomiting, stomach cramps, diarrhea, blurred vision, excessive eye watering, sweating and excessive saliva. More severe case of acute poisoning may also lead to changes in heart rate, chest tightness, muscle weakness and twitching, difficulty breathing and walking, constricted pupils and incontinence. In very severe case of acute poisoning, seizures and unconsciousness may occur.[17]Chronic poisoning presents symptoms like muscle weakness, fatigue, difficulty concentrating and remember things, and generally feeling unwell.[17]The type of symptoms, how long they last and how severe they are may vary depending on factors such as the type and concentration of the pesticide used, the type and concentration of the pesticide used, the degree of exposure and the health and age of the person exposed. Many of the potential symptoms are not specific to pesticide poisoning. They may be due to other conditions, such as illness or allergy.[17]

Most common pesticide poisoning: Mechanism of action/toxicity and signs and symptoms

Table 1 shows most common pesticide poisoning. It is classified according to the class of chemical ingredient contained in pesticide. It also shows mechanism of action or toxicity, sign and symptoms treatment of pesticide poisoning of each class.

Class

Mechanism of

action/toxicity

Signs and symptoms

Organophosphates

Acephate (Orthene)Chlorphoxim (Baythion-C)Chlorpyrifos (Dursban, Lorsban)DiazinonDimethoate (Cygon, DeFend)Ethoprop (Mocap)Fenitrothion (Sumithion)Fenthion (Baytex)Malathion (Cythion)Naled (Dibrome)Terbufos (Counter)Inhibit cholinesterase leading to excess acetylcholineCNS—anxiety, seizures, skeletal nerve-muscle junctions, autonomic ganglia—twitching, tachycardia, muscle weakness (nicotinic effects); peripheral cholinergic neuroeffector junctions— " all faucets on"— sweating, salivation, diarrhea, tearing (muscarinic effects); miosis (pinpoint pupils) most commonly, but 15 percent have mydriasis secondary to epinephrine release from adrenals due to nicotinic receptor stimulation.

Carbamates

Carbaryl (Sevin)Pirimicarb (Aphox, Rapid)Propoxur (Baygon)Timethacarb (Landrin)Other carbamatesReversible cholinesterase inhibition (carbamoyl-

acetylcholinesterase [AChE] complex dissociates much more easily and quickly than OP-AChE complex)Cholinergic crisis with " all faucets on"; CNS depression with coma, seizures, hypotonicity in serious toxic exposures

Organochlorines

ChlorobenzilateDicofol (Kelthane)Dienochlor (Pentac)EndosulfanLindane (Kwell)Induction of hyperexcitable state in central and peripheral nervous system by disruption of normal flow of sodium and potassium across the axon membrane; may antagonize GABA- mediated inhibition in CNS. Seizures, headache, dizziness, nausea, vomiting, paresthesias, incoordination, tremor/twitching following topical treatment for lice/scabies or accidental or intentional ingestion of liquid pesticide.

Pyrethrins/pyrethroids

AllethrinCyfluthrin (Baythroid)Cypermethrin (Barricade, Cymbush, Cynoff, Demon)DeltamethrinDimethrinFenothrinFenvaleratePermethrin (Ambush, Dragnet, Nix, Pounce)RemethrinPyrethrins are derived from chrysanthemums; pyrethroids are synthetic compounds with longer half-lives; both can produce toxic effects on the nervous system but are not well absorbed and are effectively and quickly detoxified by mammalian liver enzyme systems. The most severe symptoms are seizures, though highly uncommon unless highly exposed (usually through ingestion of large quantities); tremor, incoordination, salivation, vomiting; topical exposure can produce short-term paresthesias, especially of the hands and face; a small portion of the population (1 to 3 percent) is allergic to pyrethrins/pyrethroids —resulting in symptoms ranging from nasal stuffiness to asthma.

Bacillus thuringiensis

Variety aizawai (Agree, Mattch)Variety israelensis (Aquabac, Skeetal)Variety kurstaki (Bactur, Dipel)Wide range of products derived from several varieties of this organism; highly limited effects on mammalian systems. Mild irritative pulmonary symptoms in some involved in manufacturing process, not in mixers or appliers; theoretical risk of respiratory infection in immunocompromised individuals; single corneal ulceration reported, successfully treated with standard antibiotics; mild gastroenteritis with heavy ingestion.

Repellants

Diethyltoluamide— DEET (Muskol, Off!, Skeeter Beater, Skeeter Cheater, Skintastic for Kids, others)Mechanism of toxicity unknown. CNS depression followed by seizures; rare unless applied excessively under occlusion; mild skin irritating effects with repeated use; corneal and mucosal irritation; nausea and vomiting with ingestion and, rarely, hypotension, tachycardia with heavy dermal exposureTable 1: Most common pesticide poisoning: Mechanism of action/toxicity and signs and symptoms.[18]

Possible harm of pesticide to the environment

On objects, plants or animals:

Pesticides can move away from the release site when they are on or in objects or organisms that move (or are moved) offsite. Pesticides may stick to shoes or clothing, to animal fur, or to blowing dust and be transferred to other surfaces. When pesticide handlers bring home or wear home contaminated personal protective equipment, work clothing, or other items,

residues can rub off on carpeting, furniture, and laundry items and onto pets and people. [19]

Harmful effect on nontarget plants and animals:

Nontarget organisms may be harmed by pesticides in two ways. The pesticide may cause injury by contacting the nontarget organism directly. Another way is the pesticide may leave a residue that causes later injuries. [19]

Harmful effect from direct contact:

Pesticides may harm nontarget organisms that are present during a pesticide application. Poorly timed applications can kill bees and other pollinators that are active in or near the target site. Pesticides may harm other wildlife, too. Read the warnings and directions on the pesticide labeling carefully to avoid harming nontarget organisms during a pesticide application. Drift from the target site may injure wildlife, livestock, pets, sensitive plants, and people. For example, drift of herbicides can damage sensitive nearby plants, including crops, forests, or ornamental plantings. Drift also can kill beneficial parasites and predators that are near the target site.[19]

Harmful effects from residues:

A residue is the part of a pesticide that remains in the environment for a period of time following application or a spill. Pesticides usually break down into harmless components after they are released into an environment. The breakdown time ranges from less than a day to several years. The rate of pesticide breakdown depends mostly on the chemical structure of the

pesticide active ingredient. Persistent pesticides leave residues that stay in the environment without breaking down for long periods of time. These pesticides are sometimes desirable, because they provide long-term pest control and may reduce the need for repeated applications. However, some persistent pesticides that are applied to or spilled on soil, plants, lumber, and other surfaces or into water can later cause harm to sensitive plants or animals, including humans, that contact them. While using persistent pesticides, consider whether their continued presence in the environment is likely to harm plants and animals. Sometimes animals can be harmed when they feed on plants or animals that have pesticide residues on or in them. [19]

Harmful effects on surfaces

Sometimes surfaces are harmed by pesticides or pesticide residues. Some surfaces may become discolored by contact with certain pesticides. Other surfaces may be pitted or marked by contact with some pesticides. Some pesticides can corrode or obstruct electronic systems or metal. Sometimes a pesticide will leave a visible deposit on the treated surface.[19]

Safety Measures of the Use of Pesticide

Many types of pesticides are obtainable to eliminate a particular pest and a variety of pesticide formulations are available to the consumers. Thus, it is crucial to choose the correct pesticide in order to control the pest(s) in the house, garden or lawn. To select the more appropriate pesticide for the targeted pest(s), consumer should:[20]Identify the insect, weed, disease, rodent or other pest that one is attempted to control. Consider utilizing alternative nonchemical control procedures if applicable. Purchase the least

toxic pesticide product which will eliminate the pest. The pesticide should be purchased in a quantity for immediate use only. Before purchasing and using the pesticide products, consumers should read the label of the product.[20]

Pesticides Labels

Pesticides should be packed and labeled according to World Health Organization (WHO) specifications. The label should be in English and in local language. It is a legal document which should indicate the contents, safety instructions and possible measures in the events of swallowing or contamination. Table 1. 2 below has incorporated the information provided in the pesticide label.[21]

Trade, brand, or product names

The trade name is each company’s unique market name for the product.

Ingredient statement

This statement identifies every active ingredient, the percentage by weight for each active ingredient and the percentage by weight for all inert ingredients.

Use classification statement

The Environmental Protection Agency (EPA) classifies every pesticide product either as Restricted Use or Unclassified/General Use. The restricted use pesticides must include a special statement. Under law, only those persons who have been certified and receive specialized training can use these types of pesticides. Generally, most pesticide products used in and around the home setting are Unclassified/General Use pesticides.

Name and address of manufacturer

Emergency telephone number

Registration number

The EPA registration number indicates that the pesticide product has been registered and that’s its label has been approved by the EPA.

Signal words and symbols

These words and symbols provide the user with an indication of the relative acute toxicity of the product to humans and animals. The statement keep out of reach of children must also be printed on the front panel of the label. Signal wordsIndication On the ProductsCautionSlightly toxic either orally, dermally, or through inhalation or cause slight eye and skin irritation. WarningModerately toxic either orally, dermally, or through inhalation or cause moderate eye and skin irritation. DangerCause severe eye damage or skin irritation. Danger (with poison and the skull crossbones symbol)Highly toxic by any route of entry.

Precautionary statements

Statements to help applicators decide what precautions to take to protect other persons or animals who may be exposed.

Statement of practical treatment

First aid treatments recommended in case of a poisoning. In addition, instructions for physicians and medical personnel may be included.

Environmental hazards

Usually only for the restricted-use pesticides. Statements can indicate that a product is especially hazardous to wildlife and include common sense procedures to avoid contamination of the environment.

Physical or chemical hazards

Describes any special fire, explosion, or chemical hazards the product may pose.

Restricted entry level (REI)

Provides information on the duration of time must pass between the last application of a pesticide and when people can reenter a treated area.

Storage and disposal

General instruction for the appriopriate storage and disposal of the pesticide and its container.

Directions for use

Provides instructions concerning the method employed to use the product, the type of pest to be treated, the application sites and any application equipment to be usedTable 1. 2. Pesticide Label Information [20]In Malaysia, in order to facilitate the consumers to understand the level of toxicity of the pesticide products to human beings, there is a colour band indicating the toxicity class at the bottom of the label. The Malaysian Pesticide Board has classified all the registered pesticide into four classes (colors) according to their level of toxicity to human beings. http://www. mantegroup. com/images/ControlsPesticidesClasses. gifFigure: Classification of Pesticide

Products by the Malaysian Pesticide Board. The indication of each class (colour bands) are as follow:

Class

Colour Band

Toxic Level

Class 1Black band for Class 1aRed band for Class 1b(Both with a skull and crossbones symbol)Highly poisonous. Only used by trained personnels. Class 2Yellow band. PoisonousClass 3Blue band. HarmfulClass 4White bandLeast toxic groupTable: Indication of the toxicity of each classes of pesticide product with their respective colour bands.[19]

Protective Clothing During Pesticide Application

The type of protective clothing and equipment needed depends on the pesticide being used and the extent of the pest elimination plan (size of the garden or lawn). Users should refer to the personal protection equipment (PPE) on the label for selection of protective clothing and equipment. At a minimum, consumers should have the following protective items while handling pesticide:[20]Personal Protection Equipment (PPE)Proper ways of using PPEClean clothingLong-sleeved shirt, long trousers or coveralls made of tightly woven fabric or a water-repellant material. Cotton t-shirts or tank tops, shorts and sandals are unsuitable as they do not provide adequate protection during pesticide application. Rubber glovesUnlined and without a fabric wristband. Shirtsleeves should be worn over the gloves to prevent the spills from running down inside of the glove. Waterproof bootsPants legs should be worn over the boots and not tucked inside. Waterproof hatIf

required. Eye protectionSafety goggles should be worn if needed. Dusts mask or cartridge respiratorIf required. Table: Proper ways of using personal protection equipmentUserImage: An appriopriately clothed pesticide user. (Image taken from: http://web. extension. illinois. edu)

Safety Measures While Handling Pesticides

Generally, during pesticide application, the product might possibly enter the body via oral route, inhalation or dermal exposure. For oral exposure, user may ingest the pesticide through the mouth. For inhalation exposure, user may breathe in pesticide vapours, dust or spray particles. On the other hand, pesticide may also be absorbed into skin via dermal exposure to the product. Thus, it is essential to practice safety measures while handling the products in order to lower the risk of exposure to the pesticide.[20]

Mixing

During mixing, fill the spray tank about half full of water before adding in the chemical. Then, measure the recommended amount of chemical accurately according to the label instructions. Finish filling the spray tank with the correct amount of water, being careful not to spill or splash the mixture. All measuring utensils such as cups and spoons, containers and application equipment should be specifically marked and kept at the same place where pesticide are stored. After each use, the utensils should be washed thoroughly.[20]Use safe practices. Do not splash. Pour with care; illustration (37 Kb PDF file)Image: Proper technique in mixing pesticides (Image taken from: www. stewardshipcommunity. com)

Application of pesticides

Upon using, the discharge from the sprayer should be directed away from the body. Leaking of equipment should be repaired. Organophosphorus and carbamate compounds should not be applied for more than 5-6 hours a day and the hands should be washed after every pump charge. Users should guard against the drifts of pesticide sprays or dusts by performing the application when there is no wind as some chemicals may drift in considerable distances if the right conditions exist. Users should not eat, drink or smoke while applying pesticides.[20]

Spillage of Pesticide

Upon spillage, users should clean up the spill immediately by using absorbent material such as sawdust, soil in order to soak up any spillage. The spillage and contaminated waste should then be collected and put into a bag or container and to be disposed accordingly.[21]

Storage and disposal of pesticides

Storage of pesticides in quantity by certified applicators, wholesalers, dealers and retailers must comply with the following: All pesticides stored in quantity must be stored in securely locked well ventilated rooms, well away from all food or feed items. The pesticides should be stored in such manner as to prevent fumes from contaminating food or feed. Pesticides should be separated during storage, preferably in bins, depending upon the type of pesticide. Each type of pesticide, i. e., herbicides, insecticides, fungicides, etc., must be stored separately from each other. Herbicides must not be stored in a bin on top of, or located above, any other type of pesticide, to

preclude accidental contamination of other pesticides by leakage or spillage. Any pesticide container which is leaking or otherwise damaged must be immediately removed to an area where its contents will be fully contained in the event that its condition deteriorates further..[20]

Disposal of pesticide

For proper disposal of pesticide: Rinse each container at least three times, add the rinse to your spray tank, and apply the mix to a labeled site. Punch holes in metal, plastic or cardboard containers, crush them, wrap them in newspaper and put them in the household trash (if not prohibited by the label directions).[21]

Education for Household Pesticide User

Poisoning due to pesticides is usually acute and resulted from extensive skin contact or ingestion. Signs and symptoms vary with the type of pesticide and can sometimes be confused with those of other illnesses. Thus, upon suspected pesticide poisoning, first aid treatment must be given immediately to eradicate the pesticide from the body. Users should be well aware of some of the symptoms of pesticide poisoning and also a few fundamental first aid techniques.[20]

Immediate Action

If the pesticide has been spilled on the skin or clothing.

Strip off all clothing and thoroughly wash the affected skin with soap and waterIf pesticide has been inhaledGet the victim to fresh air. Have the victim lie down and loosen all clothing. To seek medical attention is preferable. If pesticide has been swallowedNever induce vomiting if the victim has

swallowed petroleum products (kerosene, gasoline, oil, lighter fluid), unless directed by the label or by a physician. Petroleum products drawn into the lungs can cause serious respiratory disorders. Never induce vomiting if the victim has swallowed a corrosive poison, a strong acid or alkali (base). The victim may experience severe pain and have extensive mouth and throat burns. Victim should seek for medical attention immediately. If acidic pesticide has been ingestedVictim should take the milk of magnesia (1 tablespoon to 1 cup of water) or baking soda in water. If alkaline pesticide has been ingestedVictim should take lemon juice or vinegar. In short, home pesticide products are safe if handled properly according to the instructions on the product label. Users should educate themselves about the product and the proper ways to use it. Besides, users should also be well educated of the first aids if pesticides were to spilled, ingested or swallowed.[20]