

Antidotes For Pesticides

Sr. No.	Classification of Pesticides		
1.	Organophosphates	Some of the leading molecules in group (Few examples)	<p>Acephate, Chlorfenvinphos, Chlorpyriphos, Diazinon, Dichlorvos, Dimethoate, Ethion, Edifenphos, Ethephon, Fenitrothion, Fenthion, Formothion, Kitazin, Malathion, Methyl Parathion, Monocrotophos, Oxy-demeton Methyl, Phorate, Phenthoate, Phosalone, Phosphamidon, Pirimiphos Methyl, Quinalphos, Temephos, Thiometon, Trichlorofon</p>
		SYMPTOMS	<p>Organophosphates are readily absorbed through skin, inhalation or by digestion and cause inhibition of blood cholinesterase. Treatment is required urgently. The diagnosis could be confirmed by determining blood cholinesterase activity.</p> <p>The symptoms of poisoning caused by various organophosphates do not differ very much. The initial symptoms are giddiness, headache and nausea. As poisoning progresses, cold sweating, possibly vomiting, cramp like abdominal pains, diarrhoea, blurred vision, muscular twitching (in the eyelids) may occur. In severe cases, laboured breathing, wheezing, excessive sweating, salivation, mental confusion, convulsion, progressive cardiac and respiratory failure and coma.</p>
		TREATMENT	<ul style="list-style-type: none"> • Maintain adequate respiratory and cardiac function. • Obtain and secure an unobstructed airway by suction, if necessary, from pharynx and trachea. IF necessary, give artificial respiration and/or oxygen. • Inject atropine sulphate intravenously in a dose of 2-4 mg. for an adult (0.04 to 0.08 mg/kg body weight for children) every 5-10 minutes until signs of atropinisation occur (e.g.) Dry mouth and usually dilated pupils. Maintain atropinisation for atleast 24-48 hours and carefully observe the patient as further atropinisation is stopped. It may be necessary to recommence treatment if signs of poisoning return. • Convulsions and anxiety can be treated with 5-10 mg. of diazepam injected intramuscularly. • While keeping the patient fully atropinised, administer also an oxime, if available, cholinesterase reactivator e.g. 2-PAM 1000-2000 mg IM or IV for adults (25 mg/kg body weight for children), or Toxogonin (Merck) 250 mg for adults (4-8 mg/kg body weight for children). Repeat if necessary after 1-2 hours. • Morphine, phenothiazines, Succinylchloride, xanthenederivative, epinephrine and barbiturates are contraindicated.

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2.	Carbamates	Some of the leading molecules in group (Few examples)	Aldicarb, Carbaryl, Carbofuran, Propoxur, Thiobencarb
		SYMPTOMS	The mode of action and symptoms of carbamates poisoning are similar and essentially identical as those caused by the Organophosphates; however, features tend to be of quicker onset and shorter duration.
		TREATMENT	<ul style="list-style-type: none"> • Atropine therapy as indicated for Organophosphorous compounds. • Oximes such as 2-PAM, P2S, Toxogonin should not be administered. • Morphine, Phenothiazines, succinylchloride, xanthenederivative, epinephrine and barbiturates are also contraindicated. • Convulsions can be treated with diazepam (valium, Roche)
3.	Organochlorines	Some of the leading molecules in group (Few examples)	Aldrin, BHC, Chlordane, DDT, Dicofol, Endosulfan, Heptachlor, Lindane.
		SYMPTOMS	Organochlorine pesticides are highly persistent and fat soluble which can cause systemic poisoning. The action of organochlorine compounds on the central nervous system is of paramount importance in acute poisoning. Symptoms include nervousness, headache, dizziness, nausea, vomiting, lack of co-ordination, tremors, diarrhea. Severe intoxication may cause convulsions and weakness in legs.
		TREATMENT	<ul style="list-style-type: none"> • Obtain and secure an unobstructed airway by suction, if necessary, from pharynx and trachea. If necessary, give artificial respiration. • Control convulsions by administering anticonvulsants like diazepam or paraldehyde, soluble barbiturates (Phenobarbital upto 0.7 gm per day or pentobarbital 0.25 to 0.5 gm per day) • 10% Calcium gluconate to be given I.V. • In severe cases, it is necessary to protect vital organs like liver by injecting corticosteroids and kidney by dialysis. • Give fat free diet with high proteins, carbohydrates and calcium. • Adrenalin derivatives are contraindicated, since they may induce ventricular fibrillation. • Do not give morphine, theophylline or aminophylline. • Patients who have had one or more convulsions should be kept under close observation for atleast 24 to 48 hours. •

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4.	Dithiocarbamates	Some of the leading molecules in group (Few examples)	Ferbam, Mancozeb, Maneb, Thiram, Zineb, Ziram
		SYMPTOMS	Dithiocarbamates are generally of low toxicity but exposure to them followed by alcohol ingestion may produce headache, palpitations, nausea, vomiting and flushed face.
		TREATMENT	No specific treatment is available and symptomatic therapy only is possible.
5.	Synthetic Pyrethroids	Some of the leading molecules in group (Few examples)	Cypermethrin, Deltamethrin, Fenpropathrin, Fenvalerate, Fluvalinate, Permethrin, Lambdacyhalothrin.
		SYMPTOMS	Synthetic Pyrethroid insecticides are of a moderate order of acute oral toxicity and a low order of acute percutaneous toxicity. Irritation of oro-nasal mucosae, salivation, convulsive seizures. Some pyrethroids may cause facial sensations, which are not associated with systemic poisoning. The effects are reversible and no specific treatment is necessary.
		TREATMENT	<ul style="list-style-type: none"> • In case of severe skin exposure in handling or application, typical sensations of exposed skin, especially of face may appear which can be described as tingling, burning or numbness. These sensations will wear off in the course of a few hours. • The treatment is symptomatic. • In case larger amounts have been ingested, perform gastric lavage. • Administration of activated charcoal followed by saline Cathartic with Sodium sulphate solution. • Control seizures with injectable diazepam or barbiturates. •

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6.	Dinitrophenolic Compounds	Some of the leading molecules in group (Few examples)	Binapacryl, Dinitrophenol, Dinoseb DNOC, PCP
		SYMPTOMS	Dinitrophenols affect oxidative phosphorylation and poisoning, thus lead to sudden increase in metabolic rate. Nitrophenols can be absorbed in toxic amount through oral, respiratory or dermal routes. They are toxic to kidney, liver and central nervous system. Yellow staining of the skin in the presence of white sclera may give a clue to exposure to some Dinitrophenols. Symptoms, increased respiratory rate, sweating, lethargy and insomnia, nausea, restlessness, thirst, raised body temperature, rapid heart beat or unconsciousness. In case of chronic poisoning, symptoms such as nervousness, sweating, unusual thirst and loss of weight have been observed.
		TREATMENT	<ul style="list-style-type: none"> • Reduce the fever by sponge wash, ice, fan, etc. • Administer oxygen therapy, if necessary. • Adequate emptying of stomach and the use of activated charcoal is important, followed by saline cathartic with Sodium Sulphate Solution. • Ensure adequate intake of fluid. • Do not use antipyretics.
7.	Bipyridyliums	Some of the leading molecules in group (Few examples)	Diquat, Paraquat
		SYMPTOMS	Bipyridyliums are dangerous when swallowed and harmful if inhaled or absorbed through skin, Lung fibrosis may develop. Prolonged skin contact causes skin irritation which may be severe. Initially (within hours) - irritation of mouth and throat with nausea, vomiting, abdominal pain and diarrhea (often bloody). Later (1-3 days) - signs of kidney and liver damage. Progressive pulmonary failure due to extensive lung damage might occur. For Diquat only - a profuse watery diarrhea also occurs which can lead to shock. For paraquat only 5-14 days after poisoning, progressive dyspnoea may occur resulting in death from respiratory failure.
		TREATMENT	<ul style="list-style-type: none"> • Induce vomiting unless unconscious. • Give gastric lavage and leave the gastric tube in situ. Give one litre of 30% aqueous suspension of Fuller's earth together with Sodium Sulphate. Repeat administration of Fuller's earth and Sodium Sulphate until Fuller's earth is seen in stool. This normally takes between 4 and 6 hours from starting the treatment. • If Fuller's earth is not available, give charcoal 50 gm in 150 ml of water or 8 beaten egg whites. • Avoid the use of oxygen therapy for the first 48 hours. • Induce hemodialysis or hemoperfusion if facilities

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			<p>available.</p> <ul style="list-style-type: none"> • Because of possible kidney damage, urine output must be monitored. • Large doses of Vitamin C and E as antioxidants are said to be helpful if given early.
8.	Zinc and Aluminium Phosphides	Some of the leading molecules in group (Few examples)	These phosphides react with water and hydrochloric acid in the gastro-intestinal tract to produce phosphine gas.
		SYMPTOMS	<p>If inhaled, phosphide causes fall of blood pressure, dyspnoea, pulmonary edema, collapse, vomiting, cardiac arrhythmia, convulsion and coma. Renal damage and leucopaenia after several days.</p> <p>If ingested severe gastroenteritis with nausea, vomiting and severe abdominal pain develops in case of poisoning. These symptoms are followed by cough, dyspnea and pulmonary edema. Severe poisoning might result in liver and kidney failure.</p>
		TREATMENT	<ul style="list-style-type: none"> • Gastric lavage, morphine for the relief of abdominal pain, administration of 100% oxygen for pulmonary edema, anticonvulsant therapy, high doses of corticosteroids and blood transfusion for the treatment of shock and haemorrhage.
9.	Anticoagulants - Rodenticides	Some of the leading molecules in group (Few examples)	Bradifacoum, Bromadiolone, Chlorophacinone Coumachlor, Coumoruryl, Warfarin
		SYMPTOMS	<p>The anticoagulant rodenticides cause inhibition of prothrombin synthesis. Exposure to multiple doses are required until prothrombin levels are sufficiently depleted to result in haemorrhage.</p> <p>Nausea, vomiting and diarrhea upon ingestion. Bleeding from nose, gums, gastrointestinal and urinary tracts, internal bleeding leading to shock and coma.</p>
		TREATMENT	<ul style="list-style-type: none"> • Remove ingested product by giving orally activated charcoal and saline cathartic. • Repeated prothrombin level determinations are important. • To restore blood clotting, give Vitamin K, Phytonadione 15-25 mg to adults and 5-10 mg to children orally in mild cases. • In several cases, give Agnamephyton 5-10 mg to adults, 1-5 mg to children, I.M or I.V.

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10.	Mercurials	Some of the leading molecules in group (Few examples)	MEMC, PMA
		<p>SYMPTOMS</p> <p>Mercury compounds are toxic and persistent. They affect the nervous system and may cause permanent damage. They may cause severe skin problems. Symptoms of poisoning may be slow and delayed. Tingling of fingers, tongue, tips may occur. Headache and shakiness may develop. In acute poisoning, there may be signs of gastro-intestinal irritation. There may be loss of peripheral vision, loss of coordination, especially in speech and gait. Contact with skin may cause blisters or dermatitis. Peripheral vascular collapse may also occur.</p> <p>TREATMENT</p> <ul style="list-style-type: none"> • Give milk or white of egg and then induce vomiting or perform gastric lavage. • Give gastric lavage, high colonic irrigation with sodium formaldehyde sulfoxylate solution. Inject freshly prepared 100 to 200 ml of sodium formaldehyde sulfoxylated solution intravenously. For later treatment, give sodium citrate 1 to 4 g. every 4 hours by mouth. • Give 100 ml of 10 per cent calcium gluconate solution intravenously for muscular spasm. 	
11.	Fumigants	Some of the leading molecules in group (Few examples)	Ethylene Dibromide, ED/CT, Methyl Bromide, Sodium Cyanide.
		<p>SYMPTOMS</p> <p>Fumigants present greatest hazards since used in enclosed areas. There are a variety of chemicals which are used as gases for controlling pests in stored products. The poisonous gases breathed in, cause respiratory irritation and damage to the lungs. They also depress the Central Nervous System and may cause liver damage. Itching dermatitis and blistering of skin and corneal ulceration are some of the typical effects. If ingested, there may be nausea, vomiting, dizziness, convulsions, staggering, coma and respiratory failure.</p> <p>TREATMENT</p> <ul style="list-style-type: none"> • Administer artificial respiration or oxygen. • Administer Aminophylline, initially with normal liver function, give 1 mg/kg slowly I.V. as a loading dose, followed by 0.6 mg/kg per hour as a maintenance regime. • Morphine : as needed, if there is no sign of respiratory depression. • Furosamide : Adults : 40 mg. slowly I.V. • Children 0.5 to 1.5 mg/kg slowly I.V. • Treatment given above is general and the instructions on the label should be followed for specific poisoning. 	
12.	Ureas	Some of the leading	Diuron, Diflubenzuron, Isoproturon, Methabenzthiazuron, Metoxuron

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		molecules in group (Few examples)	
		SYMPTOMS	Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight. Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.
		TREATMENT	No specific antidote, treat symptomatically
13.	Acids	Some of the leading molecules in group (Few examples)	Dalapon, 2,4-D (Na salt, amine and ester MCPA, TCA)
		SYMPTOMS	Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight. Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.
		TREATMENT	No specific antidote, treat symptomatically
14.	Triazines	Some of the leading molecules in group (Few examples)	Atrazine, Simazine
		SYMPTOMS	Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight. Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.

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		TREATMENT	No specific antidote, treat symptomatically
15. Amides		Some of the leading molecules in group (Few examples)	Alachlor, Butachlor, Propanil
		SYMPTOMS	Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight. Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.
		TREATMENT	No specific antidote, treat symptomatically
16. Anilines		Some of the leading molecules in group (Few examples)	Fluchloralin
		SYMPTOMS	Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight. Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.
		TREATMENT	No specific antidote, treat symptomatically
17. Benzimidazoles		Some of the leading molecules in group (Few examples)	Carbendazim, Thiphanate Methyl
		SYMPTOMS	Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight.

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			Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.
		TREATMENT	No specific antidote, treat symptomatically
18.	Morpholines	Some of the leading molecules in group (Few examples)	Tridemorph
		SYMPTOMS	Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight. Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.
		TREATMENT	No specific antidote, treat symptomatically
19.	Copper	Some of the leading molecules in group (Few examples)	Copper oxychloride, Copper sulphate
		SYMPTOMS	Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight. Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.
		TREATMENT	No specific antidote, treat symptomatically
20.	Carboxyanilides	Some of the leading molecules in group (Few examples)	Carboxin, Oxycarboxin
		SYMPTOMS	Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a

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			<p>cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight.</p> <p>Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.</p>
		TREATMENT	No specific antidote, treat symptomatically
21. Sulfones		Some of the leading molecules in group (Few examples)	Tetradifon
		SYMPTOMS	<p>Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight.</p> <p>Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.</p>
		TREATMENT	No specific antidote, treat symptomatically
22. Chlormequat Chloride		Some of the leading molecules in group (Few examples)	
		SYMPTOMS	<p>Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight.</p> <p>Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.</p>
		TREATMENT	Inject neostigmine as and when necessary