

Your Guide to Safe Pets: What Flea and Tick Products Are Safest?

Risk Category	Chemical Name	Major Manufacturers/ Brand Names	May Cause Cancer	Toxic to the Nervous System	Allergies and Asthma	Other Toxic Effects	Pet-Specific Concerns	Description
●	Flea Comb	<ul style="list-style-type: none"> Not Applicable 						Regular combing of a pet can help reduce fleas and also helps monitor the success of a flea control program. Fleas caught in the comb should be drowned in soapy water.
●	Vacuuming	<ul style="list-style-type: none"> Not Applicable 						Vacuuming picks up fleas and eggs from carpets, floors and crevices, and from under or on furniture. Immediately after vacuuming, bags should be thrown away to prevent fleas from escaping and re-infesting the area. Severe infestations may call for professional carpet cleaning with steam.
●	Regular Bathing	<ul style="list-style-type: none"> Not Applicable 						Soapy baths are a great way to control fleas since any soap will get rid of fleas. Pet bedding should also be washed in hot water once a week. Fleas tend to accumulate in bedding, so care should be taken not to spread the flea eggs and larvae contained in it.
●	Maintain Outdoor Areas	<ul style="list-style-type: none"> Not Applicable 						Keeping grass and shrubbery clipped short in areas where your pet spends time will increase dryness and sunlight, which will help reduce the flea problem. Nematodes—available at garden supply stores—can be used as a non-chemical, biological aid to help control fleas in these areas.
●	Essential oils of cedarwood, lemongrass, peppermint, rosemary, and thyme	<ul style="list-style-type: none"> “Herbal” or “Natural” flea control products containing these ingredients 	?		Potential			These herbs are commonplace in many cosmetics. However, products containing essential oils may be more concentrated and use should be monitored closely for allergic responses in humans and pets. In addition, little information is available on the efficacy of these oils for flea control.
●	S-Methoprene ^{a,b,c} (PRECOR, vIGRen, [Isopropyl (2E, 4E, 7S)-11-methoxy-3,7,11-trimethyl-2,4 dodecadienoate])	<ul style="list-style-type: none"> Hartz Advanced Care for Cats and Kittens Hartz One Spot for Cats and Kittens Hartz Ultra Guard for Cats and Kittens Zodiac Spot On for Cats and Kittens 	?					S-Methoprene is an Insect Growth Regulator (IGR), meaning that it halts the growth of chitin, the substance that creates the exoskeleton in insects. IGRs are effective against developing insects but not against adult insects with already developed exoskeletons. Because of this, IGRs are used to prevent an extended infestation. Since mammals do not produce chitin, insect growth regulators have little effect on humans. According to EPA S-Methoprene has a very low acute toxicity. ^{1,2}
●	Lufenuron	<ul style="list-style-type: none"> Program brand tabs Sentinel brand tabs 	?					Lufenuron is an IGR administered to dogs and cats in a tablet, as a food additive, or in an injection. Its risk to humans is very slight. There have been reports of vomiting, diarrhea, loss of appetite, lethargy, and itchy skin in some dogs and cats following use of this product. ³
●	Nitenpyram	<ul style="list-style-type: none"> Capstar 	?					Nitenpyram is administered to dogs and cats in a tablet. It is not a registered pesticide, but is a veterinary drug. Its risk to humans is very slight. Veterinary reports do not indicate cause for concern for animals although little safety information is available.
●	Spinosad ^d	<ul style="list-style-type: none"> Comfortis (dogs only) 						Spinosad is administered to dogs in a tablet. It disrupts the nervous system function of insects, but is not neurotoxic to mammals. Its risk to humans is very slight. Veterinary reports do not indicate cause for concern, although long term studies have not been conducted. EPA classifies Spinosad as not likely to be a carcinogen. ⁴
●	Pyriproxyfen ^{a,c} (Nylar) 2-(1-Methyl-2-(4-phenoxyphenoxy) ethoxy) pyridine	<ul style="list-style-type: none"> Adams brand stripe-on Breakthru! brand stripe-on Demize strip-on Scratchex brand strip-on 						Pyriproxyfen, like S-methoprene, is an IGR and has very little toxic effect on humans. According to EPA, pyriproxyfen has a very low acute toxicity and is classified as “Group E—Evidence of non-carcinogenicity for humans.” ⁵
●	Imidacloprid ^{a,b,c}	<ul style="list-style-type: none"> Advantage brand topical Advantage brand “Plus” topical (contains pyriproxyfen) 		X				Imidacloprid disrupts the nervous system of sucking insects and may be toxic to the human nervous system as well. It more readily binds to nerve receptors in insects than animals, reducing its toxic effects in humans. ⁶ Imidacloprid is classified by EPA as “Group E—Evidence of non-carcinogenicity for humans.” ^{7,8} Signs of toxicity in rats include lethargy, respiratory disturbances, decreased movement, staggering gait, occasional trembling, and spasms. ⁹
●	Pyrethrins ^a (not on cats)	<ul style="list-style-type: none"> 8 in 1 brand shampoo Adams brand “Flea Off” shampoo Adams brand “Plus” shampoo (contains pyriproxyfen) Bio-Groom brand dip Bio-Groom brand shampoo Boss Pet Products brand shampoo Cardinal brand shampoo Cardinal brand spray Country Vet brand pet dip Country Vet brand spray Ectosoothie brand shampoo Enforcer brand pet powder Enforcer brand shampoo Flea-B-Gon brand spray Four Paws brand soap Fresh ‘n Clean brand shampoo Happy Jack brand spray Harrison brand shampoo 	X	X	X		Very toxic to cats	Pyrethrins are compounds derived from pyrethrum, an extract of the chrysanthemum flower. Pyrethrins, like many other insecticides, inhibit the functioning of the nervous system of pests and can be toxic to the human nervous system as well. Additionally, they can cause allergic reactions and exacerbate asthma. They are typically used with another compound (usually piperonyl butoxide) which inhibits the enzyme that would normally inactivate the pyrethrins, potentially increasing the toxicity. EPA classifies pyrethrins as “Suggestive evidence of carcinogenicity but not sufficient to assess human carcinogenic potential.” ¹⁰ Signs of pyrethrin poisoning may include coughing, wheezing, shortness of breath, runny or stuffy nose, chest pain or difficulty breathing. ¹¹



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		<ul style="list-style-type: none"> ■ Hartz brand dip ■ Hartz brand shampoo ■ Hartz brand soap ■ Hartz brand spray ■ HydroSurge brand "Power Bath" shampoo ■ Pet Select Shampoo ■ Petcor brand spray (contains S-methoprene) ■ Perfect Coat brand Shampoo ■ Premium brand Shampoo ■ Raid brand "Flea Killer" (some contain S-methoprene & fenoxycarb) ■ Rigo's Best brand dip ■ Rigo's Best brand spray ■ Results brand pet powder ■ Sergeant's brand shampoo (contains pyriproxyfen) ■ Sergeant's brand spray ■ Unicorn brand pet dip ■ Unicorn brand shampoo ■ Virbac brand spray (some contain pyriproxyfen) ■ Zema brand pet dip ■ Zema brand pet powder ■ Zema brand shampoo ■ Zodiac brand spray (with S-methoprene) ■ Zodiac brand shampoo (some contain S-methoprene) 						
	D-limonene ⁶ , linalool, citrus oils ⁸ , essential oils of cinnamon, citronella, clove (eugenol) ⁷ , geranium, bay, eucalyptus, and rue	■ "Herbal" or "Natural" flea control products containing these ingredients	?		X		Very toxic to pets, especially cats	Several essential oils are known to cause allergic reactions, including severe dermatitis in people or pets. More severe reactions have been observed in pets, especially cats, including vomiting, salivation, muscle tremors, seizures, and death in a few cases. ^{12,13} Among the chief allergens for humans are d-limonene and other citrus oils; cinnamon oil, citronella, clove oil (eugenol), and geranium oil. ¹⁴ Rue oil is particularly worrisome because it sensitizes the skin to sunlight (photosensitivity), potentially resulting in severe sunburns with minimal sun exposure after contact. ¹⁵
	Tea tree and lavender oils	■ "Herbal" or "Natural" flea control products containing these ingredients			X		Very toxic to pets	Tea tree and lavender oils have been found to be estrogenic in humans, causing premature breast development in young boys who used consumer products containing these chemicals on their skin. ¹⁶ Tea tree oil also contains D-limonene and linalool which can cause allergic reactions in humans ¹⁷ and severe reactions have been reported in both cats and dogs. ¹⁸
	Selamectin ⁹	■ Revolution brand topical	?					Selamectin is a relatively new insecticide and little information exists on its toxicity. However, early evidence suggests that Selamectin has very low toxicity in mammals and chemically similar compounds have not been found to be carcinogenic. ¹⁹ Measurable transfer of residues from fur has been detected ²⁰ and further safety evaluations are needed.
	Metaflumizone	■ Promenis	?					This is a relatively new formulation of metaflumizone, insecticide and little information exists on its toxicity. At high doses it has been shown to cause general neurologic effects and liver toxicity in lab animals. ²¹ It can leave a residue on pet's fur and has been shown to be absorbed through the skin. Further safety evaluations are needed.
	Fipronil ^{a,b,c}	<ul style="list-style-type: none"> ■ Frontline brand spray ■ Frontline brand topical ■ Frontline Plus brand (contains S-methoprene) 	X	X				Fipronil is considered a possible human carcinogen. ²² It also blocks a neural pathway responsible for preventing excessive stimulation resulting in over-excitation of the nervous system in both insects and humans. ²³ Fipronil binds less readily with mammalian nervous receptors than insect receptors, reducing its toxic effect in humans. ²⁴ Signs of poisoning from fipronil may include sweating, nausea, vomiting, headache, abdominal pain, dizziness, agitation, weakness, and tonic clonic seizures. ²⁵ When exposed to sunlight, fipronil breaks down into a compound nine to ten times as potent as fipronil itself. ²⁶ Studies have shown that fipronil residues from pet fur can get transferred onto a wipe or a child's hand. ²⁷

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	Fipronil (continued)							Fipronil is also suspected to disrupt the endocrine system. ²⁸ ** <i>There are significant health concerns associated with fipronil but in areas with severe tick problems limited and careful use may be warranted**</i>
	Tetrachlorvinphos (Common synonyms: TCVP)	<ul style="list-style-type: none"> ■ Americare brand "Rabon" collars ■ Hartz brand collars (some contain S-methoprene) ■ Hartz brand sprays (some contain S-methoprene) ■ Hartz brand powders ■ Longlife "90 Day" collar with Rabon ■ InControl by Hartz collars ■ Pet Principles by Hartz collars 	X	X				Tetrachlorvinphos is the last organophosphate pesticide permitted for use in pet products. Tetrachlorvinphos is toxic to the nervous system and interferes with an essential enzyme (acetylcholinesterase) resulting in spasmodic over-excitation of the nervous system. Poisoning symptoms may include nausea, vomiting, diarrhea, wheezing, sweating, and tearing eyes. More severe poisoning can cause muscle twitching, drooling, seizures, respiratory paralysis, and death. Young children are particularly susceptible because their nervous system and brain are still developing, and their ability to metabolize these chemicals is impaired relative to adults. Tetrachlorvinphos is classified by EPA as "likely to be carcinogenic to humans." ^{29,30} Tetrachlorvinphos is also suspected to disrupt the endocrine system. ³¹
	Propoxur (Common synonyms: O-Isopropoxyphenyl methylcarbamate)	<ul style="list-style-type: none"> ■ Adam's brand "Plus" collars ■ Bansect brand collars ■ Bio Spot brand collars ■ Sentry brand "Dual Action" collars (contains permethrin) ■ Sergeant's brand "Sendran" collars ■ Sergeant's brand "Triple Protection" collars ■ Vet Kem brand "Tick Away" collars ■ Vet Kem brand "Plus" collars (contains S-methoprene) ■ Zodiac collars (some contain S-methoprene) ■ Zodiac FleaTrol collars 	X	X				Propoxur is considered a "probable human carcinogen" by EPA, ³² and is listed by the State of California as known to cause cancer. Propoxur, like tetrachlorvinphos, is a cholinesterase inhibitor, and has many of the same poisoning symptoms. See above.
	Amitraz	<ul style="list-style-type: none"> ■ Virbac brand "Preventic" collars ■ Virbac brand "Preventic Plus" collars (contains pyriproxyfen) ■ Promeris brand spot-on ■ Zema brand "Tick Detach" collars 	X					Amitraz is listed by the state of California as a known developmental toxicant ³³ in that it interferes with normal child development and can result in low birth weights, birth defects, and biological and psychological problems that manifest themselves as the child grows. The chemical is listed as a possible human carcinogen by the EPA. ³⁴ Symptoms of poisoning can include flushed skin, slow heart beat, low blood pressure, low body temperature, and sedation. ³⁵ Amitraz is also suspected to disrupt the endocrine system. ³⁶
	Permethrin	<ul style="list-style-type: none"> ■ Bio-Groom brand spray (some contain pyrethrins) ■ Bio Spot Shampoo (contains pyriproxyfen) ■ CAI brand spray (contains pyrethrins) ■ Defend brand "Exspot" spray (contains pyriproxyfen and pyrethrins) ■ Eagle-7 brand spray ■ Ectogard pet spray with Tenocide (contains fenoxycarb) ■ Ectosoothie brand shampoo (contains pyriproxyfen) ■ Enforcer brand spray (contains pyrethrins) ■ Enforcer brand "Plus" drops (contains S-methoprene) ■ Evercide brand spray (some contain pyriproxyfen and pyrethrins) ■ Evercide brand dust ■ Evercide brand pet dip ■ Exspot brand insecticide ■ Four Paws brand "Protector" spray (contains pyrethrins) ■ Happy Jack brand spray (contains pyrethrins) ■ Happy Jack brand "Kennel Dip II" 	X			<p>Suspected endocrine disruptor</p> <p>Suspected endocrine disruptor</p>	Very toxic to cats	Permethrin is one of a class of synthetic chemicals, called pyrethroids, that are derived from natural chemicals found in chrysanthemums. The synthetic varieties are significantly more potent and persistent than naturally occurring products, and permethrin has been classified by EPA as "likely to be carcinogenic to humans." ³⁷ Permethrin is also suspected to disrupt the endocrine system. ³⁸ Exposure to permethrin may cause numbing, tingling, or burning sensation on one's skin. Permethrin is known to be very toxic to cats, causing muscle tremors, seizures, salivation, vomiting and even death. ³⁹ Veterinarians caution against using permethrin containing products if there are cats in the home. ⁴⁰

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	Permethrin (continued)	<ul style="list-style-type: none"> ■ Hartz brand spot-on (some contain S-methoprene) ■ K9 Advantix brand (contains imidacloprid) ■ K9 Advantix brand "Plus" (contains imidacloprid and pyriproxyfen) ■ Natura brand collar ■ No More Fleas brand spot on (some contain S-methoprene) ■ Pet Logic brand spot-on ■ ProTICall brand spray (contains pyriproxyfen and pyrethrins) ■ Pyraperm brand spray (contains pyrethrins) ■ Rigo's Best brand dip ■ Rigo's Best brand spray (with pyrethrins) ■ Sentry brand shampoo ■ Sentry brand "Pro" shampoo (contains pyriproxyfen) ■ Sentry brand squeeze-on (some contain pyriproxyfen) ■ Sergeant's brand dip ■ Sergeant's brand powder (some contain pyrethrins) ■ Sergeant's brand squeeze-on (some contain pyriproxyfen) ■ Sergeant's brand shampoo (some contain pyriproxyfen) ■ Sergeant's brand spray (contains pyrethrins) ■ Sergeant's brand squeeze-on (contains pyriproxyfen) ■ Unicorn brand dust ■ Unicorn brand pet dip ■ Unicorn brand spray (some contain pyrethrins) ■ Virbac brand spray ■ Virbac brand "IGR" spray (contains pyriproxyfen) ■ Zema brand shampoo (contains pyriproxyfen) ■ Zema brand spray (some contain pyriproxyfen or pyrethrins) ■ Zodiac brand spot-on (contains S-methoprene) 				<p>Suspected endocrine disruptor</p> <p>Developmental toxin and suspected endocrine disruptor</p> <p>Suspected Endocrine disruptor</p>		
	Fenoxycarb	<ul style="list-style-type: none"> ■ Basis flea and tick household spray 	X					Fenoxycarb is a carbamate pesticide that is listed by the State of California as known to cause cancer. EPA classifies it as "likely to be carcinogenic to humans." ⁴¹ Concerns have also been raised that it may also be a potential developmental toxin. Fenoxycarb is also suspected to disrupt the endocrine system. ⁴²
	Pennyroyal oil	<ul style="list-style-type: none"> ■ "Herbal" or "Natural" flea control products containing this ingredient 	Insufficient data to determine toxicity				Very toxic to pets	Pennyroyal oil can cause seizures, coma, and death in animals. ⁴³ Human poisonings resulting from ingestion of pennyroyal oil or tea have also been documented with effects ranging from nausea and dizziness to coma and death. ⁴⁴

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Please note that while this table attempts to provide a reasonably comprehensive and accurate look at the insecticides most commonly found in pet flea control products, it does not claim to be an exhaustive list of products nor should it be used as such. Pet owners should take care to examine the active ingredients in all flea control products they buy.

^a Listed as a least-toxic chemical control by the *Integrated Pest Management Practitioner*.⁴⁵

^b Listed on City and County of San Francisco Integrated Pest Management Program 2007 Reduced-Risk Pesticide List.⁴⁶

^c Listed on EcoWise Certified IPM Program Materials List.⁴⁷

[?] Insufficient information to determine carcinogenicity.⁴

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