



Clean Like a Pro

How to Conquer Bad Odors Permanently

Human beings are remarkably sensitive to odors. Get a whiff of some chalk and instantly you're transported back to that old school classroom. Just a hint of that familiar smell of burning coals and suddenly the whole neighborhood knows about your barbecue. Odors descend upon us, and we can't help but to be carried along.

And our sensitive noses are always at work. According to a German study presented at the annual meeting of the American Academy of Otolaryngology, odors affect us even while we're sleeping. Participants in the study reported more pleasant dreams when exposed to a pleasant smell (that of roses), but when a stinky smell was introduced (rotten eggs), more negative dreams were reported.

So in addition to being highly sensitive to odors, we also can't get away from them.

Odors cannot be swept under the rug. They cannot be bundled away into a closet somewhere. They must be dealt with, and they must be dealt with *now*.

But how often is the average homeowner confronted with an unpleasant odor? People like to keep their homes clean. They do not allow trash to pile up, they vacuum regularly, they buy chemicals to clean their bathrooms and kitchens, and periodically they shampoo their carpets. After all, that instinct for cleanliness is why you, the dedicated homeowner is reading this article.

But when it comes to odors, most homes have one Achilles heel...

PETS

Yes, they're certainly cute, but our cats and dogs are also a primary source of unpleasant odors. After all, animals don't always abide by our rules for cleanliness. If

they get sick, they don't think to rush to the bathroom. Sometimes, if they need to go...they just go! Some pets will also use odors strategically, to mark their territory.

And, as the table below shows, whether you're a cat or a dog person, you've most likely got *at least* one in your home. That means that most people have a potential source of *very problematic* odors in their homes.

PET OWNERSHIP	Dogs	Cats
Percent of households owning	36.50%	30.40%
Number of households owning	43,346,000	36,117,000
Average number owned per household	1.6	2.1

And just as pets don't abide by human preferences for cleanliness, they also don't abide by human timetables. Company coming over? Your pet does not have its calendar marked. Party on Friday? Just another day to your cat. Tired after a long day at work?

Your dog might have missed you, but it might have also missed that pee pad.

So it makes sense that questions about how to eliminate pet urine odors are ranked in the top ten questions asked by pet owners to veterinarians. People need to get rid of unpleasant odors, they need to get rid of them now, and they want to be *sure that they're gone*.

So what's a pet owner to do?

Perhaps a desperate pet owner, plagued by the odors caused by their otherwise loveable companion, makes a bee-line to the pet store. Reasonable enough. There, they may be directed to an enzyme-based deodorizer. Ah, salvation at last. Or is it? Actually, enzyme-based deodorizers have a variety of drawbacks that can mean for some unpleasant surprises.

But first, in order to effectively combat unpleasant odors (what are referred to technically as "malodors"), we need to know what they are, how they function, and, most important, how they can be eliminated *permanently*. We'll also tell you about the special properties of Kitty-Scram that make it ideally suited to eliminating pet odors, as well as the other malodorous headaches that drive customers to you, their cleaning expert.

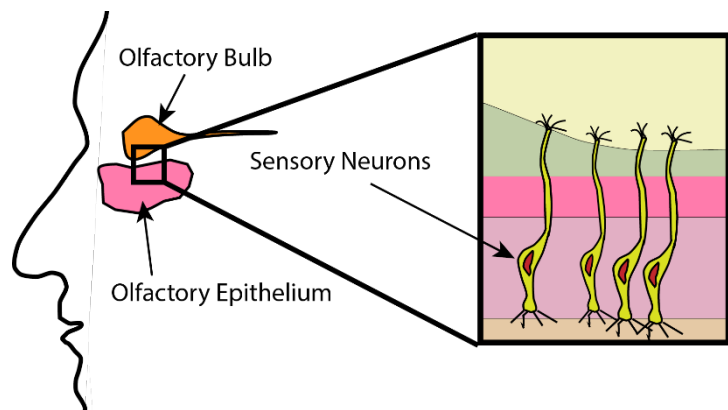
Odors: What Are They?

As we've already mentioned, the human nose is always at work. But just what is the work that it is doing? The technical name for the process is called *olfaction*. Olfaction is a process whereby molecules enter the nasal cavity and bind to one of the hundreds of different types of olfactory receptors. Most odorants are large molecules (greater than 20 atoms). Given their size, they have a wide variety of molecular conformations, and each olfactory receptor binds only to certain specific chemical features of the odor molecule.

Once the molecule has been captured by an olfactory receptor or receptors (one or multiple may be involved in the detection of a particular odor) information on that molecule can be processed and interpreted. It is this interpretation that we perceive as an odor.

For an odor to be perceived, a few things are required.

- It must be sufficiently volatile to get into a gas phase
- It must reach the olfactory receptor in the nasal cavity
- The molecule must have a hydrophilic as well as a hydrophobic character.



And, most important for our purposes, to possess a disagreeable smell, the molecule must conform to a particular chemical structure that will activate the corresponding olfactory receptor(s). When this chemical feature binds to certain receptor(s), it creates the perception of a disagreeable odor.

Some odors are more strongly perceived than others. For example, lilacs and gardenias are noted for their strong, unique scent, but other flowers like sunflowers and dahlias hardly have any scent at all. The relative strength of an odor can be quantified and the resulting measurement is called its nasal *impact factor*, or N.I.F. NIFs range from a low of zero to a high of a hundred.

Pet Odors

There are thousands of different odor molecules. Some are pleasant, some benign, and some malodorous. This article will concentrate on those odors associated with pets, because pet odors are especially tenacious and many people struggle to eliminate them. (But it is important to note that Kitty-Scram is by no means limited to the elimination of pet odors! Rather, due to its novel formulation, Kitty-Scram can combat a wide variety of different malodors.)

When it comes to pet odors, there's one that has an especially stinky reputation: urine. And, more specifically, cat urine. According to the ASPCA, the most common behavior problem reported by owners of cats is inappropriate elimination.

Urine, regardless of its source, is chemically complex, involving many different types of molecules. Some of the components are nitrogenous waste compounds such as urea, uric acid, and ammonia, or trace amounts of enzymes, carbohydrates, hormones, fatty acids, pigments, mucins, or inorganic ions such as ... sodium (Na⁺), potassium (K⁺), chloride (Cl⁻), magnesium (Mg²⁺), calcium (Ca²⁺), ammonium (NH₄⁺), sulfates (SO₄²⁻), and phosphates (e.g., PO₄³⁻).

The urea in urine is odorless, but can quickly be broken down into other nitrogen-containing compounds, such as ammonia and trimethylamine. Ammonia has a pungent smell. Trimethylamine is most notably the molecule responsible for the smell of decaying fish. These compounds are continuously created as urea breaks down. That is why stale urine smells so much worse than fresh urine. When a cat urinates, enzymes in the urine immediately start the process of creating odors. If a store bought bacterial enzyme solution is added to this process the odor will reach its peak in 12 to 24 hours.

Cat urine odor in particular is more difficult to deal with than the urine from other pets. One reason for this is that cats typically produce more highly concentrated urine than dogs. And with cats fed a dry food diet the odor is even stronger.

In addition to its concentration, cat urine contains certain compounds not found in the urine of other pets. Probably the most irritating of these is felinine.

Felinine is only produced by animals that belong to the Felidae family, including all domestic cats. An amino acid, felinine can be broken down by the activity of enzymes. So, use an enzyme and problem solved, right? Wrong! When broken down,

feline creates other chemicals. And these other chemicals are by no means benign. One of these decomposition products is a chemical known as ‘cat ketone’. Cat ketone is thought to be the urinary component for territorial marking.

Another product of feline decomposition is a thiol called 3-mercapto-3-methyl-1-butanol, also known as MMB, an extremely volatile putative odor. Thiols are among the odorous components in the scent of skunks, freshly chopped onions and are also used as warning odorants in fuel gases. They are also somewhat toxic.

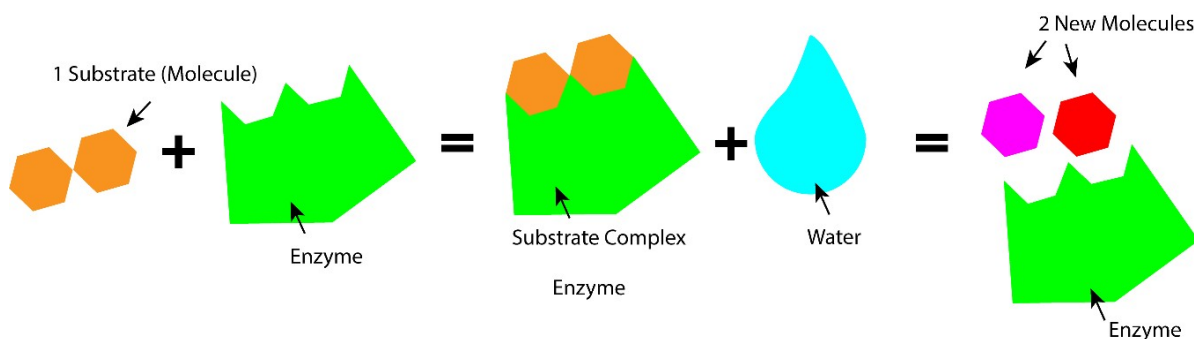
MMB is an extremely tenacious malodor. Its nasal impact factor is 96. This odor is so powerful it’s characterized as having a ‘catty odor’ at concentrations as low as 10-1000 parts per billion.

All of these odors: Cat Ketone, MMB, ammonia and trimethylamine are the result of the decomposing activity of enzymes.

Enzymes

One of the most common solutions suggested to remedy the problem of pet odors are bacterial enzyme deodorizers. In fact, Kleenco does manufacture several formulations containing these amazing molecules. They are ideal for removing stains from a wide variety of floor coverings, upholstery and clothing. In addition, they can clear drain lines and improve septic systems. However, Kleenco does not recommend them for removing odors emanating from urine. To find out why, let’s learn how enzymes work.

Enzymes are proteins produced by living organisms. They are found everywhere in nature. However, they are not themselves alive. They are chemical tools, designed to either break apart molecules or put them back together.



If the substrate in this illustration was urea, then the enzyme working to degrade it would be urease.

And they are specialized tools. Only when the right enzyme finds the right material can it go to work. In this sense enzymes are like keys, only fitting into particular locks. For example, the enzyme that turns starch into sugar (glucoamylase) cannot also be

used to break down the lactose found in milk. For that, the enzyme lactase is needed.

Enzyme reactions also require water. That is why the labels on most enzymatic deodorizers will say to use a generous amount or keep wet for up to 24 hours. While the enzyme is working moisture must always be present.

If biological activity ceases, as it does when the soil dries out (when all of the water, a critical ingredient for the reaction, has evaporated), the enzyme and the bacteria producing it become dormant and stop working. No water, no work. This means that the potential for the odor to be reactivated remains. Many people are surprised when they've successfully used an enzyme only to have the odor later return due to humidity or from extraction and shampooing operations. Once water is reintroduced the enzymes wake up and once again start to decompose the organic matter. The result: the smell returns.

Enzymes, once opened, also have a limited shelf life. Go to the supply closet and grab that bottle of enzyme you used two years ago and you'll likely be disappointed with the result.

So, although enzymes can be used to great effect on carpet stains, they *do* have properties that create problems when used to deodorize.

- They don't work immediately.
- They require moisture to work.
- If they dry out they stop working.
- Odors may reappear days or months later.
- They are substrate specific. One type of enzyme will not remove all organic material.
- They don't work to eliminate odors in the gas phase. In fact, the opposite occurs: they take non-odorous compounds and degrade them. This ensures that they become volatile, creating even more odors.
- They work only in a narrow temperature and pH range and can be deactivated when incompatible cleaning solutions or cleaning methods are used.

Given these complications, it's obvious that using an enzyme solution to break down the chemical substances present in urine, such as felinine, is not the best way to deodorize. After all, enzyme-based deodorizers require specific conditions in order to work and the resulting chemicals are extremely malodorous, contribute to territorial marking, and also may return at a later date.

So, remember that responsible pet owner who got the bottle of enzymes from the pet store? Perhaps they have company coming over in a few days. They use the treatment and the smell intensifies. But then, all seems to return to normal.

Wonderful. The day of their party comes. It's a hot and humid day and... the odor is back. Quickly, they grab the bottle of enzymes and reapply. To their horror, they discover that the smell intensifies *again*. An unpleasant surprise to say the least.

Fortunately, there is a better way...

Malodor Counteractants

The better way to eliminate pet malodors (cats, dogs, gerbils, mice and all other odors) is through a comprehensive approach.

Malodor counteractants both chemically transform malodors, so that they cannot bind to their corresponding olfactory receptors, and also eliminate the decomposition processes that result in the production of cat ketone and MMB. How is this accomplished?

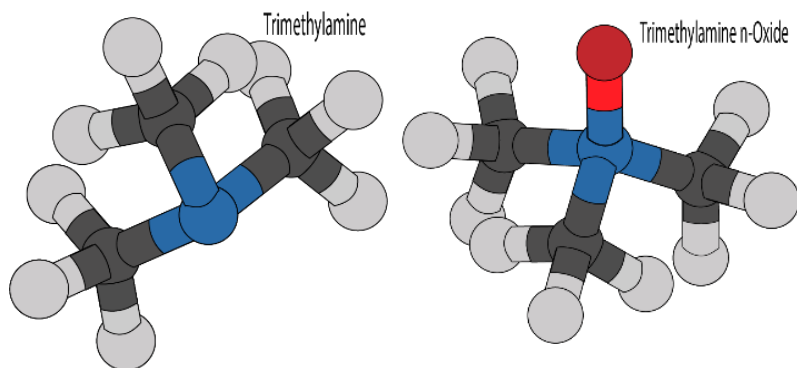
To find out, first we must distinguish between two types of malodors. The first are “active malodors”. These are in a volatile or vapor phase, and detectable by olfaction.

There are also “potential malodors”. These are in a pre-volatile stage, and must be dealt with using other methods.

First, let's deal with the active malodors. An enzyme, which works by decomposing urine, can do nothing to an active malodor. If your customer has a pet odor problem and wants to get rid of it immediately, an enzyme-based deodorant will not help them. The only solution that will immediately eliminate an active odor is a malodor counteractant. It can do this in one of two ways: through altering the molecular structure of the malodor (transforming it into another chemical with no malodor properties) or through the use of chemical sieves.

Chemical what?

Chemical sieves. We'll talk about those in a moment. First, we'll look at ***chemical transformation***. It can be remarkably easy to turn a malodor with a high nasal impact factor into another chemical with no nasal impact factor at all. For this, we'll look at trimethylamine.

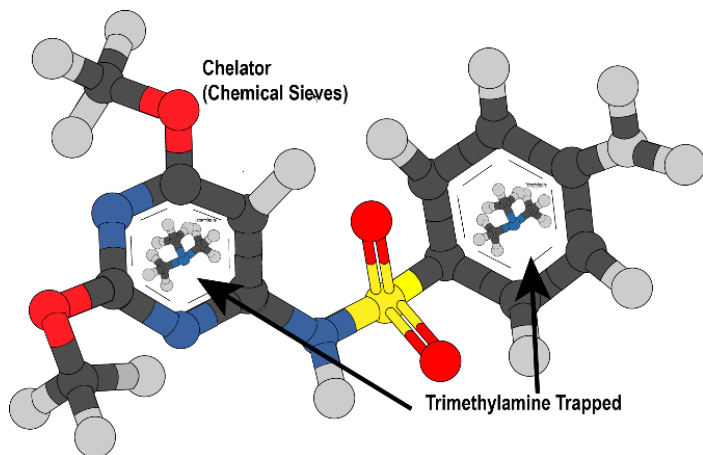
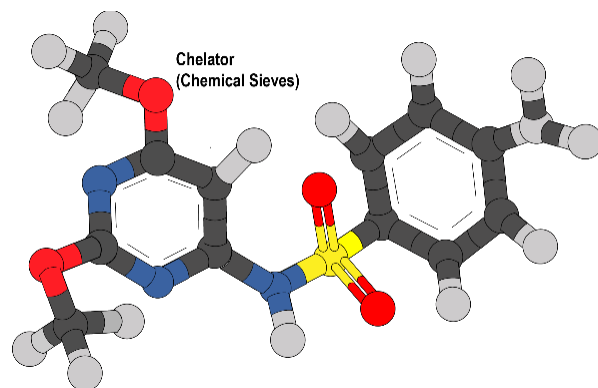


Trimethylamine is the chemical we mentioned earlier that's responsible for the smell of decaying fish and that's also present in urine. But trimethylamine has a cousin called trimethylamine n-oxide.

Importantly, trimethylamine n-oxide has *no odor*. The molecular difference may be miniscule, but the difference for the human nose is astronomical.

Transformations (taking an odorous molecule and turning it into a different molecule with no odor) like this are accomplished with *Lewis Acid Base Reactions*, which a malodor counteractant like Kitty-Scram uses to *instantly* neutralize a wide variety of smelly molecules, including all mercaptan and sulfur-containing compounds.

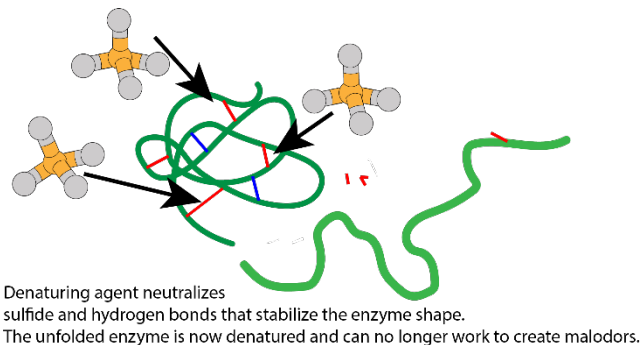
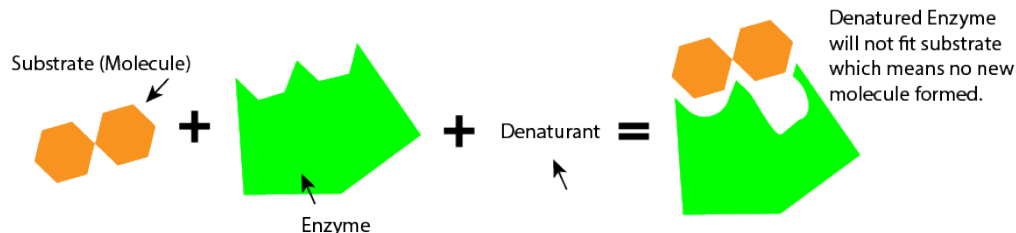
But that's not all Kitty-Scram can do. That's right, we're talking about chemical sieves (*molecular odor traps*). These special molecules physically entrap and surround



malodorous molecules, preventing them from binding to their corresponding olfactory receptors and thus preventing the activation of those neurons which create the unpleasant sensation of bad odors.

So the malodorous molecules have been neutralized, and the volatile odors are taken care of, resulting in immediate relief for any pet owner that wants an odor gone *now*. But, due to the activity of enzymes present in the urine, potential malodors may be transformed into volatile odors in the future. So, how can we deal with those?

A malodor counteractant neutralizes potential malodors by denaturing the enzymes responsible for the transformation of benign potential odors into active malodors with a high nasal impact factor. Denatured protein is also known as a protein hydrolysate. When a protein is hydrolyzed, its structure is permanently changed. The sulfide and hydrogen bonds that are present in the enzyme are broken in such a way that it cannot become active once again.



The Kitty-Scram formula uses a proprietary three pronged approach to odor elimination...

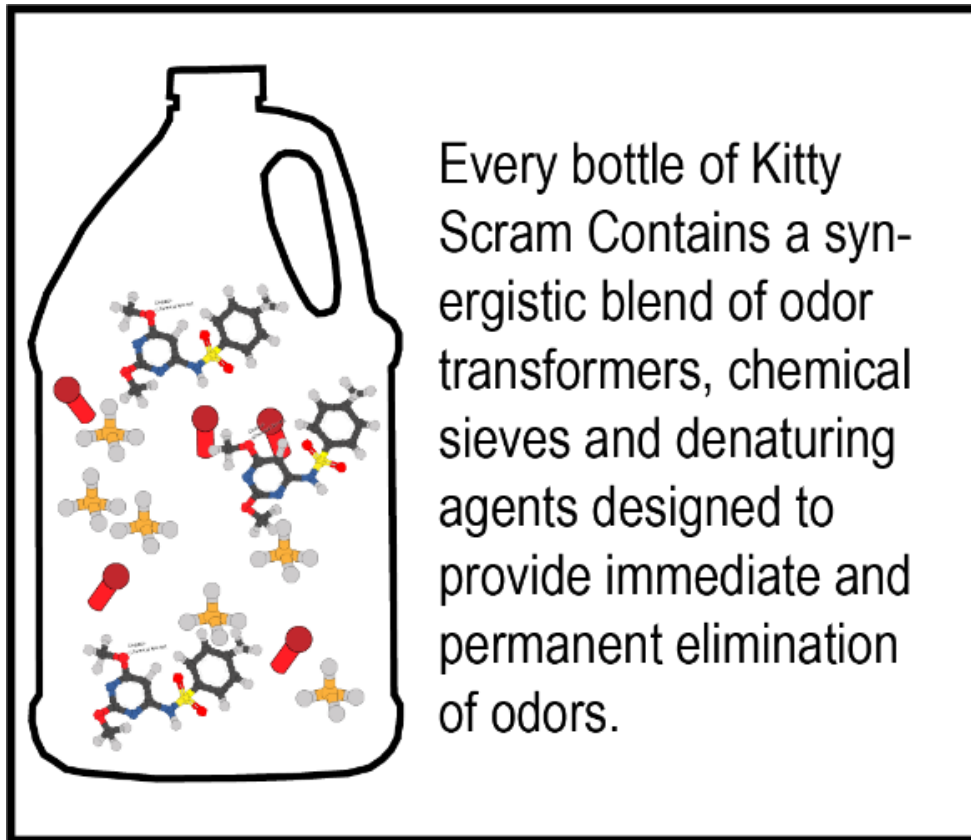
1. **Chemically transforming** (turning a bad odor molecule into a molecule with no odor).
2. **Chemical Sieves** (molecular odor traps).
3. **Denaturing** (stopping enzymes from creating bad odors).

So now both volatile malodors and potential malodors have been neutralized. This three pronged approach makes Kitty-Scram the ultimate odor destroyer. The pet owner gets **immediate relief** from odors and the assurance that the odor will not return at a later, inconvenient date.

To review, the advantages of Kitty-Scram include:

- Immediate odor elimination.
- No moisture requirement. Excessive amounts of product or applications of plastic wrap to treated area is not necessary.
- Since enzymes are denatured, odors will not reappear days or months later based on the introduction of moisture.
- Broad spectrum activity. Able to eliminate a wide variety of odors. Not limited to a specific biological odor source.
- Eliminates odors in the active, vapor phase.
- Stops territorial marking.

- Works over a wide variety of temperatures and pH solutions, making it compatible with a wide variety of cleaning solutions and methods.
- Indefinite shelf life.



KITTY-SCRAM

Perfect for Pet Owners
Immediate, Permanent Odor Elimination

When it comes to eliminating odors, especially pet odors, you don't want to wait to get rid of it.

You want the odor gone now. And you *don't* want it to return. Every home that has a pet must also have Kitty-Scram.

Kitty-Scram is a proven odor eliminator. It works instantly to chemically alter the structure of malodor molecules, immediately changing putrid odors into inoffensive non-odorous molecules. Formulated with the power of chemical sieves (molecular odor traps), Kitty-Scram can tackle the toughest, concentrated odors.

And once the immediate odor has been destroyed, special denaturing ingredients work to quickly and permanently to break the bonds of odor causing enzymes. The odor is gone and it will not return.

This three pronged, synergistic approach is unique to Kitty-Scram. It is what makes it superior to enzymes but also to other malodor counteractants.

Kitty-Scram is formulated as a concentrate. It can be diluted. It can be used in carpet extractors or shampoo machines. And when needed it can be used at full strength.

How to Use...

Simply spray on the source of the odor! That's all!

But sometimes sources are hard to find. In that case, a few methods are available.

The first is a thorough carpet cleaning with Kitty-Scram added. Or Kitty-Scram, diluted or full-strength, can be applied to a wide area. When dealing with old deposits, first identify the location of the odor using a black light. Once identified, topically spray the area with a concentrated solution using a trigger sprayer. If the urine spot is near a wall, pull the carpet away from the tack strip and treat the carpet backing as well as the pad, tack strip and subfloor. If not located near a wall, a large hypodermic needle can be used to inject Kitty-Scram into the carpet backing, pad and subfloor.

When kept in a tightly sealed bottle, Kitty-Scram has an indefinite shelf life. You can rest assured that when that odor emergency happens you will be ready to fully and permanently eliminate it.

