Nature's Natural Resource!

ZeoFill®

www.ZeoFill.com

Benefits of using ZeoFill "Infill" for Artificial Grass:

- Best solution to pet odor issues on artificial grass
- 100% Safe for children and pets
- Helps control pet odors on contact
- Will work instantly combined with any other turf infills
- Add ZeoFill to existing turf applications
- One time application for small to medium size dogs
- Purest pet deodorizer in the world & Made in USA (97.6% Pure)
- Keeps the grass cooler for longer periods of time than other infills
- Cools turf fibers and other infills by evapotranspiration
- 100% Permeable which will NOT clog drainage holes in your turf
- Will not shred turf fibers (Less impurities means pure quality)
- Save Precious Water / No need to water the urine out
- ZeoFill work better dry, but will still work wet
- Will work with liquid enzyme turf cleaners
- It will recharge itself with sodium ion from rainwater
- Tannish in color to match brown thatch (when wet it turns bright green)
- 100% Natural and Environmentally Safe with no additives
- Organic Certified through OMGI
- Recycle, Reuse, and Reduce

Only Pet Deodorizer - Approved by all Turf Manufacturers in USA

SYNLAWN® artificial grass never looked more natural

Zeolite Pet Odor Control for Lawns and Dog Runs

Ziolite Natural Pet Crystals are uniquely effective in adsorbing ammonia and hydrogen sulfide gasses. These naturally occurring properties make our natural Zeolite Crystals ideal for use in Natural and Synthetic Grass, Dog Runs and Horse Corrals to prevent emanation of irritating pet waste odors by effectivly controling the irritating gases and smells typically associated with family pets and horses.

Unlike other odor treatment products that mask offensive odors, Ziolite Natural Pet Crystals binds and captures many of the source gases in its naturally occurring matrix used for stalls, barns, kennels, dog runs, Synlawn, natural and Synthetic Grass areas.

Organic Zeolite crystals can be added to your Synthetic grass installation reducing 80% of the odors caused by the ammonia in pet waste. The good news is that in addition to eliminating the majority of pet odors, it naturally renews itself with each rain or by occasionally hosing it down. This product works well and proven to last the lifetime of your SynLawn product.

Zeolite is a naturally occurring mineral mined in the mountains high above California's Death Valley. It is safe for kids, pets and the environment. Natural Zeolite crystals are also used for drinking water purification, professional aquarium filter systems and also as a daily mineral supplement for natural healing and detoxifying.

Zeolite Installation Guidelines

Zeolite is currently available to SYNLawn in 2 forms, crystals that are installed in the base under
the turf and a topical product to be installed as top infill in the turf.

Crystal Installation

After base material is installed and is level, open the Zeolite bags and hand spread/pour bags over the entire area. Using a steel rake, mix in the Zeolite with base material then level, water down area and then use plate compactor to pack the base as normal—then install turf.

Top Installation

After turf is fully installed, evenly apply the Zeolite top infill using a drop spreader over the entire area—then broom turf as normal.

Recommended Installation Amounts

For households—apply 1 to 2 lbs per sq. ft. of the topdressing crystals (SYN1440).
For households with high use or multiple pets—apply 2 to 4 lbs per sq. ft. of the topdressing material (SYN1440) or a combination of 1 to 2 lbs per sq. ft. of the topdressing and 1 to 2 lbs per sq. ft. of the base material (SYN140).

Commercial Applications (Pet Facilities)

For commercial kennels and pet spas, use of both Zeolite products is recommended. Apply 3 lbs per sq. ft. (or more) of the top topdressing and 3 lbs per sq. ft. of the base crystals.

Important Note: For pet applications, we do NOT recommend using any top dressing other than Zeolite as it restricts the flow of urine and will inhibit the drainage process.

Product Codes & Description

1. **Syn140** – This is Steelhead Specialty Mineral's TSM 140, an off-white colored product in a 4x8 screen mesh particle size. This product is installed under the turf as part of the sub-base material. It is typically put down as part of a new installation.
2. **Syn1440 Top** – This is Steelhead Specialty Mineral's TSM 140 off-white product in a 14x40 screen mesh particle size. This is the topical product installed on top of the turf that settles to the base of the turf where it is out of view. It can be applied anytime after turf is installed. It can also be removed and/or re-applied but such a need is not considered likely.

Zeolite's Scientific Properties

The most fundamental consideration regarding the adsorption of chemical species and odors by Zeolite is molecular sieving. Species with a kinetic diameter which makes them too large to pass through a Zeolite pore are effectively "sieved." This "sieve" effect can be utilized to produce sharp separations of molecules by size and shape; thus providing for an excellent medium for odor absorption.

The particular affinity a species has for an internal Zeolite cavity depends on electronic

considerations. The strong electrostatic field within a Zeolite cavity results in very strong interaction with polar molecules such as water. Non-polar molecules are also strongly adsorbed due to the polarizing power of these electric fields. Thus, excellent separations can be achieved by Zeolite even when no steric hindrance occurs. Zeolite's unique odor absorption properties can continue to function for many years.

Adsorption based on molecular sieving, electrostatic fields, and polarizability are always reversible in theory and usually reversible in practice. This allows the Zeolite to be reused many times, cycling between adsorption and desorption. This accounts for the considerable economic value of Zeolite in adsorptive applications and odor control.

Steelhead Specialty Mineral's TSM 140 natural zeolite has three exceptional qualities important to the SynLawn application: 1) high Cation Exchange Capacity (CEC); 2) a natural ability to regenerate; and 3) high abrasion resistance.The high **Cation Exchange Capacity** means that it has a high capacity to remove ammonia and other odors, a unique and key component of the TSM 140 zeolite odor neutralizing ability. TSM 140 was one of the first zeolites to be used for odor control, Dating back to the early 1980's, when it was found to be very effective in removing the
ammonia and hydrogen sulfide gases generated by animal waste and urine. Both these gases, when released into the atmosphere, are irritating and, according to health officials, damaging when prolonged exposure occurs at relatively high levels. A remarkable feature of natural zeolites is that once the ammonia gas is captured by the process of **adsorption** (the sticking of the gas to the zeolite) the gas is converted to ammonium by natural **hydrolyzation**, which in turn, is captured by cation exchange within the porous structure of the zeolite, thus facilitating additional **adsorption**. The next step is that ever-present safe bacteria then feed on the ammonium, removing the hydrogen to produce nitrates. By this means, the SYN140 and SYN1440 Top are continuously being **regenerated** to perform the function of capturing the ammonia. In the normal course of the SynLawn being flushed by rain or by washing off with a hose, the nitrate thus produced is washed away. The benefit of the high **abrasion resistance** is that the product is not broken down to a powder in normal use. This unique characteristic makes Steelhead zeolites distinctive relative to most other zeolites making it particularly well suited to the SynLawn application.

ZEOFILL® MAY BE THE ONLY INFILL YOU'LL EVER NEED ESPECIALLY WHEN IT COMES TO PET ODOR

The non-toxic granule-tan substance, Artificial Turf Deodorizer is the most unpretentious component in the synthetic grass system. The odor controlling negatively charged property of ZeoFill® is the 21st century advancement in the science of pet deodorizers. At 97+% pure, ZeoFill® is recognized as having the purest ingredients in the world with the least impurities. Other companies advertising pet odor control granules which have nickel, chromium, lead, clay, silica and/or volcanic glass would have to use twice as much product to accomplish the same odor controlling effects as ZeoFill®.

ZeoFill® is most effective when mixed into the fibers of the turf, at a recommended rate of 1 pound per square feet for smaller dogs, 2 pounds per square feet for medium dogs and 3 pounds per square feet for large or multiple dogs. The surface of ZeoFill® granules are continuously adsorbing, trapping ammonia bacteria and preventing gases from escaping. Whether a dog urinates on ZeoFill® or near it, the odors will be adsorbed and helped controlled.

100% permeable, water will flow through ZEOFILLs porous, honeycombed like molecular structure and retain 55% of the moisture cooling the turf for longer periods of time than silica sand while still maintaining the odor controlling properties. Cools turf fibers up to 20 degrees using the evapotranspiration effect which is the sum of perspiration and evaporation which is nature's way of cooling real sod.

No need to replace after time, ZeoFill® will recharge itself with sodium ion from rainwater for continuous usage. A turf enzyme cleaner works great with ZeoFill® in drier climates where rain is scarce.

Unlike silica, ZeoFill® is 100% Natural and Environmentally Safe which will not harm the body if swallowed or inhaled. The ingredients of ZeoFill® are known for detoxing and removing hazardous materials from the body.

ZeoFill® is sold in 50-pound bags and is ZEOFILLs number one choice infill product. It is specifically engineered to keep a dog's lawn sanitary by help controlling annoying urine smell.

ZeoFill® with the amazing negative properties – Can even be applied on top of any existing infill no matter how long the turf was installed. Great product for your maintenance program!

The key ingredient in ZeoFill® is a non-toxic organic certified substance that adsorbs (not absorbs) the ammonia-based odors from pet urine, similar to a box of baking soda that removes odor from a refrigerator.

ZeoFill® naturally occurring micro porous mineral formed where volcanic ash reacted with pure alkaline groundwater millions of years ago. They have many other industrial and commercial uses – cleaning up oil spills, the production of medical-grade oxygen, any water purification including water treatment plants, swimming pool media, pond filtration, ice traction control, great soil amendment for plants, horse stall freshener which helps thrush and eliminate flies.

ZeoFill® is the perfect pet-protection product which is eco-friendly and contains no heavy metals or silica dust. 97+% pure means quality!

DID YOU KNOW?

Absorption involves a fluid that permeates the whole volume of a material, like water to a sponge. In *adsorption*, the atoms, ions or molecules from a liquid, gas or dissolved solid adhere to a surface … such as the granules of Artificial Turf Deodorizer

Zeolites for Cooling Synthetic Turf

Zeolite Cooling Properties

Zeolite cooling properties are similar to Transpiration which is water within a plant and the subsequent loss of water as vapor through stomata in its leaves. The natural mineral zeolite (e.g. porous aluminosilicate) has the property to naturally attract (adsorb) water vapor for long periods of time and to incorporate it in its internal crystal lattice while releasing heat at the same time:

Cooling System

A zeolite cooling system requires cycling between adsorption and desorption.
While heat is released in the zeolite, and cooling is seen at the evaporation level. If absorption proceeds in an evacuated environment the attraction of water by the zeolite is so forceful that the internal pressure drops dramatically. The remaining water in an attached vessel evaporates, cools down turf fibers immediately due to the effect of evapotranspiration resulting in cooler synthetic turf fibers. Evapotranspiration (ET) is the sum of evaporation and transpiration from the Earth's land surface to atmosphere which is an important part of the water cycle. Evaporation accounts for the movement of water to the air from the zeolite granule.

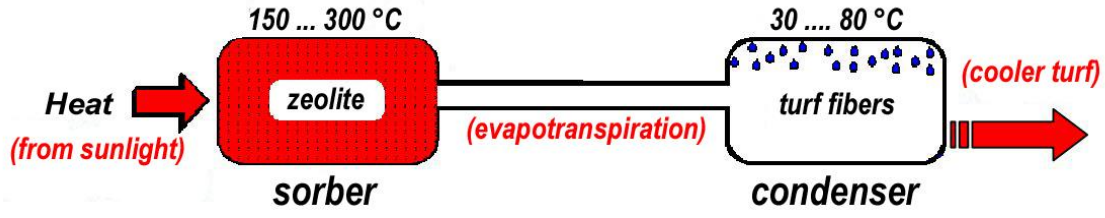

Figure 5: Desorption phase of a Zeolite system

Figure 5 shows the desorption phase. For a comparison to the absorption and transpiration of heat, the left container (sorber) in takes on the role of a single zeolite granule saturated with water under sunlight, and the right container is the (condenser) after evapotranspiration effect. When the zeolite is saturated with water either by soaking using any water source or condensation, desorption is initiated by heat from sunlight at high temperatures. The adsorbed water molecules are forced to evaporate (desorption), and condensation takes place in the condenser. The sequence of adsorption/desorption processes is completely reversible.

Advantages and Disadvantages

The adsorption of zeolites is very strong, thereby providing the family of materials with unique adsorption properties and permitting extremely high efficiencies for adsorption with artificial turf. Another advantage of zeolite systems is that they allow heating and cooling at the same time. One disadvantage of zeolite systems is that to provide continuous cooling, systems need to cycle between multiple sorption modules. Meaning; when the zeolite granules are dry, no evaporation occur resulting in comparable temperatures to standard silica sand infills. High humidity areas will benefit more than areas with low humidity.

Materials

Currently the zeolite mines produces more than 1.4 million tons of zeolite annually and it can be expected that the worldwide demand and consequently the production will further increase for a multiple of uses. Only 97% + pure zeolite is adequate for use as an infill for any synthetic turf application as lower purity can destroy turf fibers and/or cause drainage issues due to the negative elements it holds.

Questions and Answers About Steelhead Specialty Minerals (SSM) Zeolites

- **How safe are zeolite products for human and pet contact, and why?**

  SSM first introduced zeolites (Sweet PDZ – Horse Stall Refresher) for ammonia removal in animal environments in 1983. The product is the leading deodorizer of horse stalls on the marketed with national distribution. Even reported instances of mistakenly feeding zeolites in the powdered form to animals have not resulted in reports of sickness. SSM markets a product from its zeolites, (Zeo Prep) that is Water Quality Association approved for culinary water filtration.

- **Is there any worry with skin and foot pad irritations for dogs, cats, etc.?**

  The application of the SYN1440 is at the base of the turf and thus affords minimal contact with the feet of the animals. Even if direct contact happened on regular basis, experience in dog kennels where the zeolite is used as a direct treatment in open areas there have been no reported instances of pad irritation.

- **Does the Syn1440 Top continue to work after it gets wet from rain, etc.?**

  Zeolites, by their composition and structure, always contain water both within the channel structure of the crystals and **ad**sorbed on the surface. One benefit of rain or intentional washing is that the nitrogen oxide produced by the ammonium consuming bacteria are washed away thereby it re-exposes the exchange site for the exchange of the ammonium. The bottom line is zeolite can be completely saturated and still perform its odor capturing function.

- **Is there any worry or harm in the products being exposed to bleach and/or disinfectant products?**

  Zeolites have stability over the range of pH from 3 to 10 so that all but the most caustic of disinfectant would not have a detrimental effect on zeolites. Under acid conditions the positive ions (cations) held by the zeolite will be eluted, that is, washed away and the exchange site replaced by the hydrogen cation. This offers the opportunity to recharge the zeolites by washing with a weak acid, say of vinegar strength acidity. Additionally, the use of a bleach/water solution to disinfect the area should have no negative impact on the function of the zeolite.

- **What effect does humidity have on the effectiveness of the zeolite?**

  Humidity has no effect on the performance of the zeolite to adsorb odors because water is always a component of a zeolite.

- **Is hard (high calcium content) wash water harmful?**

Calcium is a favored ion in the cation exchange process, as evidenced by the need to remove calcium with zeolites in home water filter units. The means to recharge is to back wash with a 6% sodium salt brine solution. The same process could be used to unlock the exchange sites were a high calcium content water to be used to wash the turf. Should the effectiveness of the SYN 1440 be diminished by hard water washing, a sprinkling of sodium chloride (water softener salt), which when washed down, would act to re-establish sodium at the ion exchange site.

- **What effect does heat have on the effectiveness of the zeolite?**

Temperature does have an effect on the capacity of the zeolite to **ad**sorb ammonia with the higher temperatures reducing the capacity but only to a degree. The **ad**sorption rate is determined at an ambient temperature of about 70 degrees Fahrenheit, so the effectiveness is greater than assumed at lower temperatures but lower at higher temperatures.

Let us say that during a summer day the temperature rises from 50 degrees to 100 degrees Fahrenheit. At the top temperature there would be some loss of capacity, so it is possible, if the turf is in high use, the capacity could be inadequate; however as the temperature reduces in the evening the **ad**sorption would increase and the system would again be functioning (capturing odor) at its full effect. It would just depend upon the degree of capacity (which is dependent upon the degree of urination) in use at the lower temperature level as to whether there would be adequate capacity to function through the heat of the day.

The bottom line is in climates that can have fairly regular temperature swings that are extreme in nature (as described above), an additional amount of SYN1440 Top material is recommended. This additional product is specific to the SYN1440 Top product and **does not** pertain to the SYN140 base material. In these specific circumstances we suggest that the consumer is either left with an additional bag of SYN1440 Top for future application or advised that they may need to apply additional SYN1440 Top product some time in the future.

- **How long will the products last or be effective?**

As a natural mineral with submicron physical structure and high abrasion resistance, there should be no need to replace the zeolite during the guaranteed life of the SYNLAWN products. Chemical coatings that seal the channels could be detrimental, but a ten year period of effectiveness is a very safe guarantee.

- **What is the recommendation on reapplying the Syn1440 Top product?**

There should not be a need to reapply the SYN1440 Top product unless the product is washed out by power washing or similar methods that would dislodge the particles and wash them away. As described above, in certain geographical regions that have extreme temperature swings, additional SYN1440 Top may prove to be necessary to apply from time to time. It would be a good procedure to provide the customer with extra SYN1440 for heavier coverage in some portions of the cover after being in use for a period of time.