

## Zeolites Fact Sheet

A **zeolite** is a material (natural or synthetic) with a crystalline structure made up of silicon, aluminum, and oxygen in a regular pattern. These molecules act as a “cage” to trap certain molecules selectively.

### COOL FACTS

- Natural zeolites are all around us, but we call them clays.
- Zeolites can trap molecules selectively by size. Large molecules fit in the cage, but smaller ones will go right through.
- Zeolites can trap molecules selectively by charge. Synthetic zeolites made with more aluminum prefer to trap +2 ions over +1 ions. Exactly how this works is unknown.
- QuikClot is a zeolite product being used by the army to stop uncontrolled bleeding. It selectively absorbs water, but leaves platelets to clot.
- Some zeolites can be used as catalysts in chemical reactions; they trap molecules together in a small cage so that they react together.

Replace the box above with a picture. Write a two or three line caption for picture.

### FAQ's

**Q:** What is the zeolite in this demo made of?

**A:** That information is proprietary. Zeolites are composed of Si, Al and O organized into a crystallized structure.

**Q:** Where do zeolites come from?

**A:** Natural zeolites are clays, formed from volcanic ash that has been exposed to alkaline conditions (ancient lakes). Synthetic zeolites can be made like any other crystals (e.g. those in a “grow your own crystal garden kit”) through the nucleation of silicate/aluminate solutions.

**Q:** How does zeolite selectivity work?

**A:** This is not known. It is most likely due to size selection, charge selection or combination of the two. Size selection traps molecules that are the right size. Too big won't enter, but too small go right through. Charge selection traps +2 ions over +1 ions, and it is known the closer the Si:Al ratio is to 1, the more charge preference.

**Q:** Can this be used to get rid of harmful phosphates or sulfates?

**A:** No, zeolites are negatively charged, and thus can trap only positive (or neutral) molecules. Negative ions (such as  $\text{PO}_4^{3-}$  or  $\text{SO}_4^{2-}$ ) would be repelled.

**RELEVANCE TO OUR LIVES:** Zeolite selectivity can be used to remove dangerous chemicals from waste waters (e.g. heavy metal cations and ammonia.) Some can even be used to trap radioactive ions! They can also be used to clean up the air when used in car exhaust systems to absorb VOC (organic particles), or catalyze the reduction of  $\text{NO}_x$ .

### RESOURCES:

What are Zeolites?: <http://www.bza.org/zeolites.html>

Zeolyst International: Thousands of Applications: <http://www.zeolyst.com/html/app.html>

Z-Medica: Saving Lives Through Effective Solutions to Traumatic Bleeding:  
<http://www.z-medica.com>