



## The Society of Rheology K12 Outreach Activities

Science  
is  
FUN!

### Mystery Sand

This plain tub of sand is anything but ordinary. The sand particles inside this tub have been coated with a polymer that completely changes its “sandyness”. The expression, “The more you squeeze, the more sand trickles through your fingers” no longer holds and in fact, you can form a well-shaped sand ball right inside your fist! Dip your fingers into this magical tub of sand and try it for yourself!

#### What you will need to get started

- Tub of Kinetic Sand
- Probes – finger, plastic knives, spoons.
- Clean up - This is a no-mess sand! Just use a little clump of sand to pick up stray grains.

#### Let’s experiment!

1. Looking at this tub of sand, do you think that it is going to be any different from the sand you can find at the beach? In what way can it be different?
2. Now dip your fingers into the sand and take some into your hands. How does it feel? Do you notice anything different from beach sand?
3. Can you form the sand into a ball? Would that happen with sand from a beach? What if the beach sand was wet?
4. After you form a ball and let it rest in your hand or on the table. Watch closely. What happens to its shape over time?
5. Try to mold this sand into different shapes. Make some art. Make a castle. Cut it into pieces.





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### **How does it work?**

This tub of sand is sold by the name of 'Kinetic Sand' and it is made of 98% of sand mixed with 2% of a polymer such as polydimethylsiloxane (PDMS). The consistency of this polymer is quite similar to silly putty and when mixed with sand, the polymer transforms it into a Non-Newtonian fluid known as a yield-stress fluid. This type of fluid needs some amount of stress or force applied to it before it will begin to flow. As a result, with a large enough yield stress, a fluid like this Kinetic Sand can support its own weight and hold its shape after you mold it into a ball or a sand castle. And better than beach sand, which will do the same thing if you get it wet, the polymer coating in the Kinetic Sand won't dry out so your art will last a whole lot longer in the hot summer sun. The grainy feeling of beach sand has disappeared due to the polymer coating on the sand particles. The polymer coating lubricates the sand particle allowing them to slide past each other smoothly once you squeeze them hard enough to overcome the yield stress.

