

## Avalanche

*A snack version of Eric Thogerson's exhibit. The original version of this snack was created by Dr. Ken Brecher during his stay with the Teacher Institute in Summer, 2001. This phenomenon was discovered by one of Ken's graduate students.*

### Materials:

CD jewel case  
Scissors or pliers  
Safety goggles or glasses  
Sheet of newspaper or paper towel  
Black sand, or colored sand from a craft store  
Salt  
Masking tape  
Small zipper lock bag  
A piece of a straw (about 4 cm long)

### To Assemble:

Find one of the small holes in the side of the closed CD case. Put on safety goggles. Put tip of scissors or pliers into the hole and pry (and break) out a piece of the side. The piece that breaks out should be about 1 cm long. Place newspaper on table. Carefully tape around all four sides of the case except where you made the larger hole with the scissors.

Mix approximately equal amounts of sand and salt in the zipper lock bag. Without letting the sand/salt leak out, cut a small hole in one of the bottom corners of the bag. Insert straw piece into the hole. Tape the straw in place.

### To Do and Notice:

Hold the CD case so that the hole is "up" and the flat sides of the case face you. Insert the straw into the hole and let the sand/salt mixture fall into the CD case. Carefully observe what happens.

### What's Going On?

"Out of chaos, order." The combined effects of the Brazil nut effect and the angle of repose create interesting layers of the materials. Their different sizes and densities (and of course their different colors) are essential. If you shake a can of mixed nuts, the largest nuts (the Brazil nuts) always end up on top. In this snack, the larger pieces (in this case, the salt) always ends up on top. Each of these two materials has a different angle of repose - that is the angle at which the material can no longer support itself and will avalanche.

### See also:

Fineberg, Jay, "From Cinderella's Dilemma to Rock Slides" in *Nature*, Vol. 386, March 27, 1997.