A Winter Science Experiment

By Genee Bower, PTRS Member at Large

After giving participants ice cubes on a shallow plate or bowl, challenge them to pick up an ice cube with a string. They will find they cannot do it. Invite participants to wet their string and lay it across the ice cube. Next, have them sprinkle salt over the string. Set the ice cubes and string aside for at least a few minutes.

While waiting, begin the explanation of how salt melts ice. The basic concept relates to how molecules behave in different temperatures. Molecules are always in motion, but as temperature drops, that motion slows down, and as temperature rises. It speeds up. When the temperature drops enough, the molecules lock together and form a solid (ice), and when temperature rises enough, the molecules break apart and form a gas (steam). Salt is a solute, mixing with the water molecules. This makes it more difficult for the water molecules to lock together, effectively lowering the temperature at which the water freezes.

Magnets can be very helpful in demonstrating this concept. First scatter magnets on the table and invite participants to move them around. Eventually as they are moved, the magnets will become attracted and lock in or "freeze". Next, scatter any non-magnetic object among the magnets to represent salt, and repeat the process. Because of the salt molecules, the water molecules/magnets have a more difficult time locking in.

To dig even deeper, demonstrate a water molecule and its polarity. To do this, use one large circle to represent oxygen, and two smaller circles to represent hydrogen. Show how in most molecules, the hydrogens would be evenly spaced. With water, it's different. The hydrogen molecules line up close to each other, which gives water molecules a positively charged side and a negatively charged side, just like a magnet.

By the time these demonstrations are complete, the string and ice should be ready. It is wise to start several on the side, so they can be tested. While the demonstrations were being performed, the following should have occurred with the string and ice. The salt will melt the ice into water, which will eventually re-freeze around the string. When it is ready, if participants gently lift the string, it should lift the ice cube with it. It's an impressive finish that brings plenty of smiles. To explore further, try other substances, such as sugar.

Science is a lot of fun, encouraging curiosity and exploration. Experiments give opportunities for hands on exploration, as well as opportunities to develop skills that range from physical abilities like fine motor skills, to deductive reasoning and following directions.