

## Amazing Egg Experiments

Squeeze an egg as hard as you can without breaking it.

Squeeze an egg as hard as you can without breaking it. Learn how to tell a raw egg from a hard boiled egg without cracking the shell. Perform the amazing floating egg trick. It's Egg Olympics in your very own kitchen!



The old egg in the bottle trick!

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### Materials

- Eggs
- Salt
- Water
- Two tall containers to conduct the float and sink test

### Squeeze an Egg Without Breaking It

Eggs are amazingly strong despite their reputation for being so fragile. Place an egg in the palm of your hand. Close your hand so that your fingers are completely wrapped around the egg. Squeeze the egg by applying even pressure all around the shell. To everyone's amazement (mostly your own) the egg will not break. If you're a little nervous about the outcome, try sealing the raw egg in a zipper-lock bag before putting the squeeze on it, or hold the egg over the sink if you're in the super-brave category.

Eggs are similar in shape to a 3-dimensional arch, one of the strongest architectural forms. The curved form of the shell distributes pressure evenly all over the shell rather than concentrating it at any one point. By completely surrounding the egg with your hand, the pressure you apply by squeezing is distributed evenly all over the egg. However, eggs do not stand up well to uneven forces, which is why they crack easily on the side of a bowl. Be careful not to wear a ring while performing our squeezing act. The uneven pressure of the ring against the shell will result in an amusing display of flying egg yolk for your audience members.

### Hardboiled or Raw?

The answer is only a spin away. Simply spin the egg and pay close attention to how well it spins. If the egg spins well, it's hardboiled. However, if the egg wobbles and spins slowly, it's the raw one. A hardboiled egg is solid inside whereas a raw egg is fluid. When you spin the raw egg, its center of gravity changes as the fluid inside the egg moves around. This results in the wobbling motion you noticed in the raw egg. As soon as the raw egg starts spinning, touch it briefly with your finger just long enough to stop it. When you take your finger away, the egg will continue to spin for just a quick second. This is due to the inertia of the fluid inside the egg. When the hardboiled egg is spun, the solid center immediately moves with the shell, causing little resistance to the spinning motion.

### **The Floating Egg**

It's so simple and amazing. A raw egg will float in very salty water but will sink in plain tap water. Why? Salt water is more dense than regular water. You'll need to make a very saturated salt solution by dissolving roughly 4 tablespoons of salt in about 2 cups of water. Use pickling or Kosher salt to make a clear salt solution. Table salt may be used, but the solution will be somewhat cloudy due to the additives used to make the salt free-flowing.

Fill a glass half full with the salt water. Slowly add plain water by pouring it down the sides of the glass being careful not to mix the two liquids. Gently drop the egg into the water and watch as it sinks through the plain water only to abruptly stop when it hits the salt water. It's amazing to see how the egg floats on the top layer of the salt water (even more amazing if you don't know about the bottom layer of salt water!).

### **The Rising Egg**

Fill the bottom 1/5 of a tall glass with salt. Add just enough water to make a wet salt layer. Carefully lower an egg down on top of the wet layer of salt. Slowly add more water by pouring it down the sides of the glass so as not to disturb the bottom layer of water. Cover the top of the glass with cellophane and a rubber band. Notice how the egg rests on the layer of undissolved salt on the bottom of the glass.

Over the course of the next several weeks, the bottom layer of salt will begin to dissolve in the water above it. As the salt dissolves, the egg will rise off the bottom and float on the layer of salt water. As more time passes, the salt level continues to drop and the egg continues to rise. Be sure to put the glass in a place where no one will be able to disturb it. You can even record the egg's progress by marking on the outside of the glass using a felt tip marker. Remember, this process is supposed to take a long time (months!) which is why it is so interesting.

You might wish to substitute a golf ball in place of the egg to avoid the decay of the egg's shell over time. The "golf ball" idea was originally published by Bob Becker, a great chemistry teacher from St. Louis, Missouri.