Student experiment (5th - 10th grade)	The coin valve	⏱ **Time:** max. 15 min.

Instruments:
- glass bottle
- a coin which can completely cover the bottle opening
- cold water

Experiment:
- Cool the bottle with very cold water.
- Moisten the bottle mouth and place the coin over it so that it seals the bottle completely.
- Hold both hands around the bottle and use your body heat to slowly warm up the contents of the bottle.

Observations:
The warmed air in the bottle requires a larger volume due to the energy flowing into its molecules and increasing their velocities. Periodically, the increased pressure is sufficient to lift the coin and release some of the gas inside the bottle.

Results:
The bottle is a vessel with constant volume. Warming the bottle also warms the air inside it. Gay-Lussac's law dictates the an increase in temperature will increase the pressure inside the bottle. Increased energy in the air molecules makes them move more quickly, which translates into increased hits on the inside walls of the container or, in other words, increased pressure. The coin blocking the bottle mouth is the weak point and its weight can eventually be pushed upwards for a split second, thus releasing some of the pressure by allowing some gas molecules to escape. Escaping gas molecules lowers the pressure because their are less particles in the bottle to collide with the walls. The coin remains where it is until enough extra energy has again entered the air molecules to move it briefly aside again. At some point, the warmth will no longer be enough to excite the remaining gas molecules so that they are able to lift the coin.