

## Connected Soap Bubbles

### Equipment:

glass apparatus with three stopcocks  
small beaker

### Chemicals:

bubble solution

### Procedure:

Preparation: Some bubble solution is filled into the beaker.

Procedure: The stopcock in the middle of the glass apparatus is initially closed, the two stopcocks on the left and right are open. The lower end of one of the tubes is dipped into the bubble solution in the beaker. By carefully blowing into the upper end of the tube, a relatively small soap bubble is produced and the associated stopcock is closed. Subsequently, another soap bubble is produced in the same way at the lower end of the second tube, but it should be much larger than the first one; then the second stopcock is closed. Eventually, the stop cock in the middle is opened.

### Observation:

The smaller bubble “inflates” the larger one and disappears during this process.

### Explanation:

The capillary pressure  $p_\sigma$ , meaning the excess pressure in a soap bubble (with a radius  $r$ ) as a result of the surface tension  $\sigma$ , results in

$$p_\sigma = \frac{4\sigma}{r}.$$

The capillary pressure is thus inversely proportional to the radius of the soap bubble. Since the excess pressure in the small bubble is correspondingly larger than in the large one, the small bubble is able to “inflate” the large one.

