





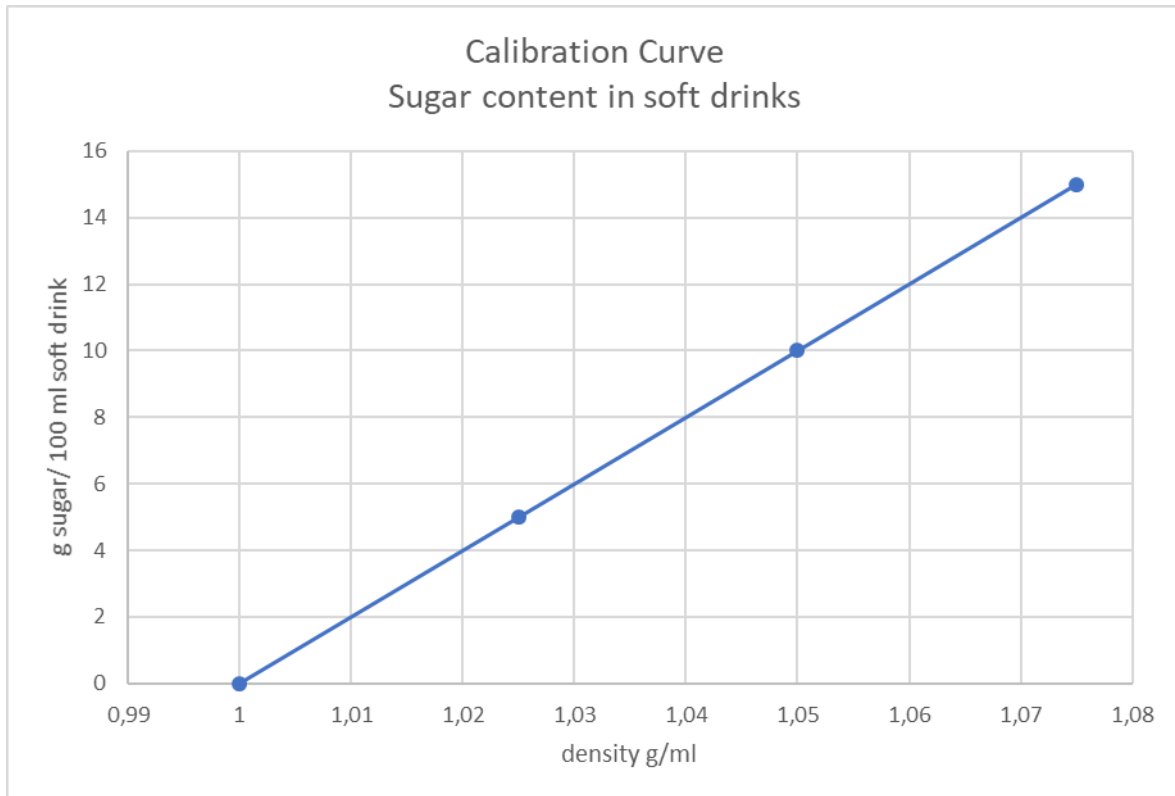


## 1.3 Density of liquids

<p><b>Basic information and collecting ideas</b></p> 	<p>Students very often have problems understanding the term “density”. For the students to understand the term “density” of liquids, you should ask a question for discussion: Students have to carry either 10 litres of water or 10 litres of cooking oil on a hike. Which liquid would you choose?</p> <p>They will certainly discuss the “weight” and composition of the two liquids and realize that 10 litres of cooking oil are lighter because cooking oil floats on water. Weight and volume must be considered together → density (g/ml) = mass (g)/volume (ml)</p> <p>If there is a confusion about weight and mass: Weight is related to gravity; mass is not.</p>
<p><b>Setting up and conducting experiments</b></p> 	<p>When students calculate the density of the water, they will notice that water always has a density of about 1 g/ml. If the result is not exactly 1 g/ml, it is because of our simple volume measurement with the syringes. The result also provides an opportunity to explain that one kilogram (kg) was defined as the mass of one litre of water.</p>
<p><b>Observing and documenting</b></p> 	<p>Water always has the same density of 1 g/ml or 1 kg/litre.</p>
<p><b>Analysing and reflecting</b></p> 	<ol style="list-style-type: none"> <li>1. The unit kilogram (kg) was defined as the mass of one litre of water.</li> <li>2. Buoyancy and density are closely linked: Liquids with a high density create strong buoyancy.</li> </ol>
<p><b>Doing further research</b></p> 	<ol style="list-style-type: none"> <li>1. The teacher provides saltwater (3.5 g of table salt in 100 ml of solution) and asks the different groups to determine the density.</li> <li>2. To determine the content of solutes in a solution more easily, students can use a calibration curve. If you know the density of a sugar solution, you can determine the sugar content using the calibration curve (see instructions on page 2)</li> </ol>
<p><b>Technical and vocational application</b></p> 	<ul style="list-style-type: none"> <li>▪ In the pharmaceutical, chemical, petrochemical, and food and beverage industries, density measurement is frequently used for quality control.</li> <li>▪ Winegrowers, for example, determine the density of their grape juice to check the sugar content.</li> <li>▪ Marine scientists measure the density of seawater to determine the salinity.</li> </ul> <p><b>All professions dealing with liquids</b></p>

**Example:**

If you determine a density of 1.025 g/ml for a soft drink, the sugar content is 5 g/100 ml.