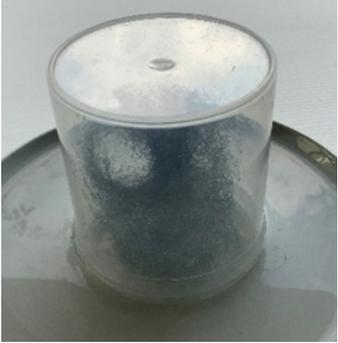


### 4.3 What are the differences between noble and base metals?

<p><b>Basic information and collecting ideas</b></p> 	<p>Question for discussion: What metals you would associate with “noble” or “base” metals? Give examples.</p> <p>Method “Think-Pair-Share”: The students should think about the meaning of the terms “noble” and “base” and the purposes the noble or base metals are used for.</p>
<p><b>Setting up and conducting experiments</b></p> 	<ol style="list-style-type: none"> <li>1. Make sure that the students wear safety goggles when they heat metals in a flame.</li> <li>2. They should heat the metals above a metallic or ceramic plate.</li> <li>3. Make sure that the students understand the intention of the second experiment: Steel wool reacts under different conditions with a gas (oxygen) which is used up (water rises in the cup).</li> </ol> 
<p><b>Observing and documenting</b></p> 	<ul style="list-style-type: none"> <li>▪ If you heat steel wool in a flame, it will immediately start burning or glowing (base metal). The copper wire will only change colour due to the formation of a thin layer of copper oxide on the surface (seminoble metal).</li> <li>▪ The wet steel wool will corrode, which reduces the volume of the oxygen and the water level rises. The thin layer of oil protects the steel wool from corrosion. Copper will not react with oxygen under these conditions.</li> </ul>
<p><b>Analysing and reflecting</b></p> 	<ol style="list-style-type: none"> <li>1. Base metals corrode very fast in the presence of oxygen, especially at high humidity.</li> <li>2. Base metals with a protected surface (paint, plastic, oil or grease) do not react due to a lack of oxygen.</li> <li>3. As a seminoble metal, copper will build a protective surface layer.</li> </ol>
<p><b>Doing further research</b></p> 	<p>When space shuttles return to Earth, they move at very high speed (12,000 km/h). Why do space technicians use a ceramic surface for space shuttles instead of a metal surface?</p> <p><i>&gt; The extreme speed results in strong friction closer to Earth. Metals would react with oxygen and burn up without the ceramic shield.</i></p>  <p>Wet steel wool (1) and iron steel coated with oil (2)</p>

