

### The scenario

<b>Subject</b>	<b>Mechanics / Conservation of momentum</b>
<b>Length</b>	2:08
<b>Main goals</b>	Get familiar with conservation of momentum
<b>Detailed goals</b>	to show that momentum is conserved when there is no external force acting on a system, especially during explosion
<b>Structure and description of experiments:</b>	
<b>1. Introduction</b>	Conservation of momentum is one of three most important conservation laws in mechanics, alongside conservation of energy and angular momentum. It concerns translational motion.
<b>2. Main subject</b>	Conservation of momentum
<b>Experiments</b>	We put some hot water inside the barrel and close it very tightly with a rubber stopper. Then we heat up the water inside by using a gas burner. Water boils, turns into steam, which has much bigger volume than water from which it was made (ca 1000 times) but it cannot expand because the barrel is sealed. So the pressure builds up, until force exerted by this pressure on the cork exceeds static friction force and the cork pops out. There was no momentum at the beginning, so after popping it's still zero. When the light cork pops with high velocity, much heavier cannon moves with lower speed in opposite direction so that the momentum is conserved.
<b>3. Summary, evaluation and remarks</b>	Water should fill small amount (e.g. $\frac{1}{5}$ ) of volume of the barrel so that there is a lot space for steam to build up pressure.  <b>Level:</b> secondary school