

## Bubbles in free fall

### Spherical bubbles have minimum surface area

#### You will need....

- ✓ A clear plastic bottle nearly full of water

#### Background:

Astronauts often demonstrate the formation of free floating spheres of water in the ISS (International Space Station). Air in water bottles similarly forms spherical bubbles.

The ISS is not actually in zero gravity; in fact the acceleration due to gravity at that height (300 to 400 km) is about 90% of its value on the Earth's surface.

However, because the ISS and its contents are all in free-fall it seems to those inside it that there is no gravity. It is the gravitational force between the Earth and the ISS that keeps it from flying off into space.

#### Follow these steps:

1. Throw the bottle upwards and observe what happens to the air inside it.

#### So what happened?

The air very quickly forms large free-floating spherical bubbles while the bottle is in 'free fall' — on the way up and on the way down. The surface area of the bubble is a minimum when it is a sphere.

#### What next?

1. Attach a bottle of water and a mini surveillance camera/transmitter to a ruler and drop the whole assembly from a height to someone with a good catch! Record and analyse the results.

