

## Iceberg Balloons

**Time:** 30 minutes preparation, 45 minutes investigation

**Introduction** As you travel through the Southern Ocean around Antarctica, you are regularly aware of beautiful, silent shapes in the form of frozen icebergs. 80% or more of an iceberg is hidden below the surface of the water, but how is it that the icebergs float at all, when ice is denser than water. Shouldn't icebergs sink?

### Learning Objective:

To understand that because salt water is denser than fresh water, it is easier for objects to float in it.

### Resources

- |                  |   |               |                    |
|------------------|---|---------------|--------------------|
| 1. Large balloon | 4. Large glass bowl                       | 6. Salt       | 9. Weighing scales |
| 2. Funnel        | 5. Measuring jugs and litre water bottles | 7. Tablespoon | 10. Freezer.       |
| 3. Torch         |   | 8. Tap water  |                    |

**1** On the afternoon before performing this experiment, tell the children that it is easier to float in the salty water of the sea than in a swimming pool. Ask the children if they have noticed this if they have swum in the sea before.

**2** In groups, ask the children to fill a balloon with water. Blow up the balloon first to stretch it, then, using a measuring jug and funnel, carefully pour 500ml of water into the balloon so that it is the size of a grapefruit. This is not an easy process so do it slowly. Keep blowing up and stretching the balloon before adding more water.  
You could also add a couple of drops of blue food colouring to the water.

**3** Once filled up, tie the neck of the balloon and place the balloon into a freezer. Name each group's balloon.

**4** The next day, cut off the rubber of the balloons to reveal the now frozen 'icebergs' to the class. Be careful that the frozen iceberg isn't too sticky from being frozen. You may want to wear gloves to hold it. Place one iceberg in a large glass bowl and look at it with a torch. Look for air bubbles trapped within the ice. Shine a torch against the iceberg-balloon and see what it looks like inside.

**5** Fill five glass bowls with 2 litres of water using different water conditions for each bowl. The key is that the icebergs can float so be sure to have enough water and the same amount in every bowl.

Here are some different water conditions the children could use, but ask the class to suggest the ideas. The key comparison though is between tap 'fresh' water and salt water.

- Cold freshwater

- Cold saltwater with 5 table spoons of salt dissolved into it
- Chilled water that has been kept in the fridge overnight and should go back in the fridge afterwards
- Warm water – 1 litre of hot and 1 litre of cold water
- Hot water from the tap.

**6** Before putting the icebergs in the bowls, weigh them to get a starting weight. Then leave the icebergs to float and discuss with the class how quickly they think the icebergs will melt and which ones will melt fastest. Plan how often you will weigh the iceberg balloons from now on. Once an hour should work well.

**7** Next, prepare a chart to predict and record the weights of the different icebergs in the different conditions every hour. You could use an Excel spreadsheet or similar to do this. Will any / all of the water conditions alter over that time? To see a sample chart log onto [www.2041.com](http://www.2041.com)

### Differentiation

Use the table above for those who need it and guide the weighing. Once you have the starting weights, you can use the table twice, once for predicting and once for the actual results.

For further discussion, is this test fair? How do the iceberg-balloons change in shape? Do they melt in one area first? How much of the iceberg is below the water-line?

### Success Criteria

The children understand that the condition of the water affects how quickly or slowly the iceberg / frozen water-balloon will melt. The colder the temperature and the saltier the water, the slower the melting process of the iceberg is.