

## Preparation of sodium bicarbonate ear drops

### Student worksheet

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#### Health and safety note

Wear eye protection.

#### Background

The British Pharmacopoeia (BP) contains information about a pharmaceutical preparation called 'Sodium Bicarbonate Ear Drops'.

The agreed IUPAC name for 'sodium bicarbonate' is sodium hydrogencarbonate. It is commonly used in health and hygiene products and in food products, can usually be found on labels under its older name.

Medicines are usually supplied to the pharmacist already prepared. Occasionally, a pharmacist formulates one or two medicines on the premises. These are called extemporaneous preparations. Instructions are given in pharmacopoeias such as the British Pharmacopoeia (BP). Here are the instructions in the British Pharmacopoeia for 'Sodium Bicarbonate Ear Drops'.

#### Sodium Bicarbonate Ear Drops

##### Definition

Sodium bicarbonate, 5 g

Glycerol, 30 cm<sup>3</sup>

Purified water, freshly boiled and cooled, sufficient to produce 100 cm<sup>3</sup>

**Content of sodium bicarbonate**, 4.75 to 5.25% w/w

**Weight per cm<sup>3</sup>**, 1.10 to 1.12 g

##### Extemporaneous preparation

Dissolve the sodium bicarbonate in about 60 cm<sup>3</sup> of purified water; add the glycerol and sufficient Purified Water to produce 100 cm<sup>3</sup> and mix.

##### Assay

To 5 cm<sup>3</sup> add 20 cm<sup>3</sup> of water and titrate with 0.10 mol dm<sup>-3</sup> hydrochloric acid using screened methyl orange as indicator. Each cm<sup>3</sup> of 0.10 mol dm<sup>-3</sup> hydrochloric acid is equivalent to 8.401 mg of sodium bicarbonate.

In this activity you will:

- prepare a 100 cm<sup>3</sup> of Sodium Bicarbonate Ear Drops;
- determine the density of the prepared Sodium Bicarbonate Ear Drops;
- assay the prepared Sodium Bicarbonate Ear Drops.

## Preparation of Sodium Bicarbonate Ear Drops

### Equipment and materials

- 250 cm<sup>3</sup> beaker
- 100 cm<sup>3</sup> measuring cylinder
- Glass rod
- Spatula
- Storage bottle
- Sodium hydrogencarbonate
- Glycerol
- Deionised water
- Balance

### Method

1. Weigh between 4.9 and 5.1 g of sodium hydrogencarbonate into a 250 cm<sup>3</sup> beaker.
2. Using a 100 cm<sup>3</sup> measuring cylinder, add 60 cm<sup>3</sup> of deionised water and stir with a glass rod until the solid has dissolved.
3. Pour the mixture back into the measuring cylinder and add enough glycerol to make the solution up to 100 cm<sup>3</sup>.
4. Pour the mixture into the beaker again and stir with the glass rod until it is thoroughly mixed.
5. Store the solution in a labelled bottle.

## Density of Sodium Bicarbonate Ear Drops

### Equipment and materials

- 10 cm<sup>3</sup> measuring cylinder
- 100 cm<sup>3</sup> beaker

### Method

1. Weigh a 100 cm<sup>3</sup> beaker.
2. Measure 10 cm<sup>3</sup> of Sodium Bicarbonate Ear Drops into the beaker.
3. Weigh the beaker and its contents.
4. Repeat steps 1-3 three more times.

### Calculations

For each measurement, calculate the density of the ear drops.

Comment on the repeatability of the measurements.

Does the preparation meet the British Pharmacopoeia standards?

## Sodium Bicarbonate Ear Drops assay

You are provided with 0.10 mol dm<sup>-3</sup> hydrochloric acid and screened methyl orange indicator.

Read the British Pharmacopoeia assay and rewrite it as a series of steps that other students could follow. List the equipment and materials needed.

Carry out a risk assessment and check with your teacher before carrying out the assay.

Once it has been checked, use the method to assay your preparation.