

Chlorination: The Modified Horrocks' Method

Introduction

With most chlorination methods the operator should make up a solution of known concentration. However, it may not be possible to do this accurately.

The Modified Horrocks' Method of chlorination described in the note can be carried out without prior knowledge of the chlorine content of the chlorine product.

For further information about chlorination, refer to note 7.



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Equipment

- 5 containers (any type — as long as they are all the same size. Plastic drinks bottles may be used).
- A measuring device to measure out the solid chlorine product. An oral rehydration therapy (ORT) spoon would be suitable. The exact size of the spoon is not critical, but identical amounts must be measured out each time, so use a level spoonful, for example. Use a spoon which measures out about 1g, as this will help in the calculations.
- A device to dispense small quantities of liquid (a small 1ml or 5ml syringe would be suitable).
- DPD test equipment

Method

1. Label the five containers 1 to 5.
2. Place one level spoonful of chlorine product (bleaching powder or HTH) into the first container. If the spoon

has a capacity of 1g, there is now 1g of chlorine product in the container.

3. Add a few drops of the water to be chlorinated, and mix to a paste (dissolving the chlorine-product powder).
4. Dilute the paste with enough water to fill the container. If the container holds one litre, it now contains one spoonful per litre, or in this case, one gram per litre. If we take 1ml out of this container, this will contain 1mg of chlorine product (1 litre = 1000ml, and 1g = 1000mg).
5. Fill containers 2, 3, 4, and 5 to capacity (1 litre) with the water to be chlorinated.
6. Transfer 2ml of the liquid from container 1 to container 2, 4 ml to container 3; 6ml to container 4; and 8ml to container 5. Container 2 will then have 2mg/l; container 3, 4mg/l; container 4, 6mg/l; and container 5, 8mg/l.

7. Leave containers 2, 3, 4 and 5 to stand for at least 30 minutes — this is the minimum contact time required for the chlorine to disinfect the water.
8. Test the water in each container for residual chlorine content using the DPD test kit (see note 17).
9. The container with the lowest concentration of chlorine equal to or more than 0.4mg/l indicates how much chlorine powder should be added to the water being disinfected.

Example

A water supply from a spring with a daily flow of 70 m³/day needs chlorinating to make it safe to drink. Tests on the water — using the Modified Horrocks' Method — indicated residual chlorine concentrations (after 30 minutes) of 0, 0.2, 0.5 and 1.0mg/litre in containers 2, 3, 4, and 5 respectively.

Therefore, container 4, with a residual concentration of 0.5mg/l, had the lowest residual chlorine concentration equal to or exceeding 0.4mg/l.

The concentration of chlorine product added to container 4 was 6mg/l.

For a supply of 70m³/day, therefore, the amount of chlorine product to be used is calculated as:

$$70 \times 1000 \text{ litres} \times 6\text{mg/l} = 420\,000\text{mg} = 420\text{g} = 0.42\text{kg}.$$

$$(1\text{m}^3 = 1000 \text{ litres})$$

Further information

Refer to note 7 for further information about chlorination.

This note was adapted from:

SHAW, R.J. (ed.) *Running Water – More technical briefs on health water and sanitation*. ITDG Publishing: Rugby, UK.

Also available online at <http://www.lboro.ac.uk/well/resources/technical-briefs/46-chlorination.pdf> [viewed 23/01/2017].

About this note

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