

Methods of analysis of

Wood preservatives and treated timber —

**Part 3: Quantitative analysis of
preservatives and treated timber
containing copper/chromium/arsenic
formulations**

NOTE It is essential that this Part is read in conjunction with Part 1 “Guide to sampling and preparation of wood preservatives and treated timber for analysis”.

Confirmed November 2008

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Wood Preservation Standards Policy Committee (WPC/-) to Technical Committee WPC/11, upon which the following bodies were represented:

- Association of Consulting Scientists
- British Drier Manufacturers' Association
- British Wood Preserving and Damp-proofing Association
- Department of the Environment (Building Research Establishment)
- Ministry of Defence

This British Standard, having been prepared under the direction of the Wood Preservation Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 28 February 1991

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First published February 1979
Second edition February 1991

The following BSI references relate to the work on this standard:
Committee reference WPC/11
Draft for comment 89/50550 DC

ISBN 0 580 18580 X

Amendments issued since publication

Amd. No.	Date	Comments

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Foreword

This Part of BS 5666 has been prepared under the direction of the Wood Preservation Standards Policy Committee.

This Part of BS 5666 was first published in 1979. This edition introduces technical changes but it does not reflect a full review or revision of this Part of the standard, which will be undertaken in due course. This edition supersedes BS 5666-3:1979 which is withdrawn.

CAUTION. Attention is drawn to the Health and Safety at Work etc. Act 1974, and the need for ensuring that the methods of test specified in this standard are carried out with suitable precautions.

The procedures described in this standard are intended to be carried out by qualified chemists or other suitably trained and/or supervised personnel. Normal safety precautions should be observed throughout the use of the methods.

Attention is drawn to the general safety precautions mentioned in clause 3 of BS 5666-1:1987.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 5666 details procedures for the determination of copper, chromium and arsenic in preservatives and in treated timber containing those water-borne preservative compositions which consist essentially of copper, chromium and arsenic compounds. The wood sample may be in the form of sawdust, wood flour, or thin sections. There is no inter-elemental interference during the determinations and the procedures are specific for arsenic even in the presence of phosphorus compounds.

The procedure for the analysis of preservatives has been primarily designed for solutions complying with the requirements of BS 4072; for samples of other compositions it may be necessary to make adjustments. It is difficult to make recommendations as to the quantity of sample to be taken in the case of treated wood because the predominant factor is the quantity of preservative within the wood rather than the mass of the wood itself. The digestion procedure has been designed to deal with wood samples up to 8 g in mass, but it may be necessary to adjust the concentration of the resulting solution before a satisfactory analysis can be carried out.

Two methods are described, the first involving atomic absorption spectrometry and the second colorimetry.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Method 1. Atomic absorption spectrometric method

2.1 Principle

Copper, chromium and arsenic compounds are leached quantitatively from the wood sample with a mixture of dilute sulphuric acid and hydrogen peroxide solution. Preservatives are treated with the same mixture. The resulting solutions, after addition of sodium sulphate solution, are analysed using atomic absorption spectrometry¹⁾.

2.2 Reagents

Reagents shall be of recognized analytical reagent grade, and water complying with the requirements of grade 3 of BS 3978 shall be used throughout.

WARNING NOTE. Sulphuric acid ($\rho_{20} = 1.84$ g/mL) and hydrogen peroxide solution (100 volumes) are corrosive and cause burns. Care should be taken to avoid their contact with eyes and skin.

2.2.1 Sulphuric acid solution, $c(\text{H}_2\text{SO}_4) = 2.5$ mol/L. Cautiously add, with stirring and cooling, 280 mL of sulphuric acid ($\rho_{20} = 1.84$ g/mL) to 1 600 mL of water. Cool and dilute to 2 litres with water.

2.2.2 Hydrogen peroxide solution, $c(\text{H}_2\text{O}_2)$, 300 g/L (100 volumes).

2.2.3 Sodium sulphate solution, $c(\text{Na}_2\text{SO}_4) = 30$ g/L. Dissolve 30 g of anhydrous sodium sulphate in water and dilute to 1 litre with water.

2.2.4 Sulphuric acid solution, $c(\text{H}_2\text{SO}_4) = 0.5$ mol/L/sodium sulphate 3 g/L solution. Dilute 200 mL of sulphuric acid solution (2.2.1) plus 100 mL of 30 g/L sodium sulphate solution (2.2.3) to 1 litre with water and mix.

2.2.5 Standard solution (1 mL μ 500 μ g of copper, 1 000 μ g of chromium and 1 000 μ g of arsenic). Dissolve 0.9825 g of copper sulphate pentahydrate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$) in a little water and transfer the solution to a 500 mL one-mark volumetric flask. Dissolve 1.4135 g of potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) in a little water, add 50 mL of sulphuric acid solution (2.2.1) and 10 mL of hydrogen peroxide solution (2.2.2), boil until evolution of oxygen ceases and all the hydrogen peroxide is decomposed, cool and transfer the mixture to the one-mark volumetric flask containing the copper sulphate solution. Dissolve 0.6600 g of arsenic trioxide (As_2O_3) by boiling it in a solution containing 50 mL of sulphuric acid solution (2.2.2) and 75 mL of water. Continue boiling until evolution of oxygen ceases and all the hydrogen peroxide is decomposed, cool and transfer it to the one-mark volumetric flask. Add 50 mL of sodium sulphate solution (2.2.3) to the volumetric flask, dilute to the mark with water and mix.

2.3 Apparatus

2.3.1 Volumetric glassware, complying with the requirements for class A quality in accordance with BS 700-2 (type 2), BS 846, BS 1583 or BS 1792, as appropriate.

2.3.2 Atomic absorption spectrometer, together with suitable sources of resonance radiation for copper, chromium and arsenic, e.g. hollow-cathode lamps.

¹⁾ For reference, see Williams, A.I., *Analyst*, 1970, 95, 670.