

## Chromium (VI) and cement

### European test method for chromium (VI) content of cement

#### Introduction

Clause 47 of *Annex XVII* of the REACH Regulation regulates cement and cement-containing preparations for their water-soluble chromium (VI) content. It has the objective of minimising the occurrence of chromium (VI)-related allergic dermatitis which can arise from contact with wet cement during use [see Fact Sheet 10.1 in this series]. In order to be able to quantitatively determine the chromium (VI) content of cement, the European Commission has officially acknowledged a test method - EN 196-10 - developed by CEN, the European Committee for Standardisation.

#### Background to development of the European test method for the water-soluble chromium (VI) content of cement

European test method, EN 196-10, *Determination of the water-soluble chromium (VI) content of cement*, is based on an amalgamation of a modified version of the former Danish Standard DS 1020 and a mortar-based extraction procedure developed by ATILH, the French cement industry R&D Association. During development, careful consideration was given to: the principles of the German TRGS 613 regulatory method, the (former) BCA's 'inherent colour' method, the European method for cement-based adhesives drafted by CEN/TC193/WG1 and the final draft of CEN/TR 14589 developed in CEN/TC292 (Characterisation of Waste). In addition, a number of technical issues were resolved by reference to the USA Portland Cement Association's, R&D report Serial No. 2554 *Review and evaluation of analytical methods for the determination of hexavalent chromium in hydraulic cements and clinker* by Waldemar A. Klemm.

#### Status and principles of the European test method BS EN 196-10

This European method was published in UK as BS EN 196-10 in mid-January 2007. Its principles have been accepted by the EU Commission and it was referenced in the *Official Journal of the European Union* in January 2005. In principle, the method comprises three stages:

- test specimen preparation;
- an extraction procedure, followed by;
- analysis of the filtered extract.

A test portion of cement is used to make a standard mortar with CEN Standard sand and water in accordance with current standard BS EN 196-1. The mortar is mixed for a specified time and then filtered. An aliquot of filtrate is first treated with *s*-diphenylcarbazide reagent and then acidified within a narrow range of pH (2.1 to 2.5). In acid solution, chromium (VI) forms a red-violet complex with the reagent and its absorption/colour is measured using a visible light spectrophotometer set at a wavelength of 540 nanometres although other instrumental/end-point procedures are permitted. The

content of water-soluble chromium (VI) is determined from a calibration curve and is expressed to the nearest 0.00001%.

## Can the method be modified for use with cement-containing preparations/formulations?

The method includes an informative annex B, *Application of this European Standard to the determination of the water soluble chromium (VI) content of cement-containing preparations*, which provides guidance on how the method may be modified. Possible modifications to each of the practical stages are described and the reporting stage outlined. Results need to be reported in % by mass of the dry cement content of the preparation and this, in turn, requires the cement content to be either 'known', determined or declared. The analyst is advised to contact the producer for further information about cement content.

NOTE. For a description of the content and purpose of normative Annex A in EN 196-10, see Fact Sheet 10.7 in this series.

## Health and safety

Reducing agents do not make cement safe to handle without PPE (personal protective equipment). Cement, when wet, can cause two types of contact dermatitis, *allergic* dermatitis and *irritant* dermatitis. Reducing agents only protect against allergic dermatitis. The same PPE is required for handling wet cement since reducing agents were introduced as was previously required. Correct PPE would ensure users do not suffer allergic dermatitis, irritant dermatitis or burns.

## Where can I find out more?

For product-specific information, contact your supplier/manufacturer directly. For generic information, contact: C McCague, Tel: +44(0)20 7963 8000, [colum.mccague@mineralproducts.org](mailto:colum.mccague@mineralproducts.org)

### MPA Cement

#### Mineral Products Association

Gillingham House

38 - 44 Gillingham Street

London SW1V 1HU

Tel +44(0)20 7963 8000

Fax +44(0)20 7963 8001

<http://cement.mineralproducts.org>

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