Australian Standard®

Methods of test for supplementary cementitious materials for use with portland cement

Method 11: Determination of manganese content

PREFACE

This Standard was prepared by the Standards Australia Committee on Supplementary Cementitious Materials for use with Portland Cement.

METHOD

1 SCOPE This Standard sets out the reference method for determination of the manganese content in supplementary cementitious materials.

WARNING: OBSERVE SAFE PROCEDURES FOR DILUTING CONCENTRATED ACIDS AND ALKALIS AND WHERE TOXIC GASES ARE GENERATED.

2 REFERENCED DOCUMENTS The following documents are referred to in this Standard.

AS
2162 Code of practice for the use of volumetric glassware
3753 Recommended practice for chemical analysis by ultraviolet/visible spectrophotometry.

3 PRINCIPLE A test portion is digested in nitric acid to extract the manganese. The filtrate is then acidified with phosphoric acid and oxidized with potassium periodate to form the purple permanganate ion which, after stabilization, is determined spectrophotometrically as manganese trioxide (Mn_2O_3) by comparison to standard permanganate solutions.

4 REAGENTS

4.1 General All reagents shall be of analytical reagent grade and free from impurity levels which will significantly interfere with the determination of manganese by this method.

Distilled or demineralized water shall be used throughout the analysis.

4.2 Solutions and solids The following are required:

(a) Ammonia solution (ρ_{20} 0.880 kg/L).

(b) Nitric acid (ρ_{20} 1.420 kg/L).

(c) Phosphoric acid (ρ_{20} 1.750 kg/L).

(d) Potassium periodate crystals (KIO_3).

(e) Standard potassium permanganate solution (1 mL ≡ 0.1% Mn_2O_3). Weigh between 0.499 g and 0.501 g of potassium permanganate and dissolve in approximately 100 mL water. Quantitatively transfer into a 250 mL volumetric flask by filtering through a glass wool plug followed by increments of water to rinse out the weighing container and filtering apparatus. Dilute to the mark and mix thoroughly. Cover the flask with a light impervious material e.g. aluminium foil. It is essential that the solution be freshly prepared before each calibration.

NOTE: Although potassium permanganate solution is not regarded as a primary standard, it is not considered necessary to standardize the solution for routine accuracy. However, where high accuracy is required, and in cases of dispute, it is essential that the solution be standardized against a primary standard such as arsenic(III) oxide or sodium oxalate.