

Geological Society Engineering Group

Technical Aspects of Professional Petrography in Denmark and the World

By Dr. Peter Laugusen 21 September 2009 at the Geological Society

A Summary of the Presentation given at the APG Meeting

The method of dealing with the preparation of concrete core samples was described and included cutting the core longitudinally, drying at 35°C and impregnation with a yellow fluorescent resin under vacuum in sealed plastic bag. Study of cut impregnated slices allows the appropriate locations for thin sections to be marked. The materials dealt with by the Pelcon laboratories include, aggregates, concrete, stone and ceramics. Petrographic investigation of concrete provides information on constituents, mix design, condition assessment, damage analysis and quality control to be obtained.

The types of cutting and automatic thin-section making equipment and the sequence of steps in preparing thin-sections of concrete were described. It was suggested that a three day training programme would provide the necessary skills to produce sections of 30 x 45mm x 20µm size. The problem of damage artefacts could be minimised by the use of sharp clean tools working at low pressure with adequate cooling. The problem of the limited depth of penetration of epoxy resin is best dealt with by minimising the amount ground from the surface prior to mounting on the glass slide.

The determination of w/c ratios is accomplished by calibrating the UV intensity through a resin filled void at 100%, then measuring intensities at a number of locations in the cement paste in both a series of standard concretes of known w/c ratio and the concrete under investigation. Details of mix design and subsequent treatment can influence cement hydration and hence apparent w/c ratio, so standard mixes should be made to a similar specification.

The observations and deductions that can be drawn from crack styles and patterns were illustrated with examples and the value of using a fluorescent resin stressed. The alkal-silica and alkali-carbonate reactions were illustrated with micrographs from case studies and care in the thin-section preparation emphasised. Alkali-carbonate reaction was considered to be a dolomitization process within aggregate particle and was illustrated with photomicrographs.

In the production of petrographic reports the importance of all laboratories using the same terminology, particularly in identifying aggregate particles was stressed, together with the improvement that could be achieved in modal analysis precision by using of a closer 'grid spacing' (0.5 x 0.5mm) for counting.

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