Pergamon

Available online at www.sciencedirect.com

SCIENCE DIRECT®

Cement and Concrete Research 34 (2004) 1961

CEMENT AND CONCRETE RESEARCH

Discussion

Reply to the discussion by H.M. Jennings and J.J. Thomas of the paper "The BET-specific surface area of hydrated Portland cement and related materials"☆

Ivan Odler

Institute of Non-metallic Materials, Technical University Clausthal, 38678 Clausthal-Zellerfeld, Germany

Received 23 February 2004

Thanks to Drs. Jennings and Thomas for their interest in my paper. In it, I tried to present a plausible explanation for the existing differences between BET values, as determined by water vapor and nitrogen adsorption, based both on data published in literature and on our own hitherto nonpublished results. I appreciate that Jennings and Thomas agree with my conclusion, according to which the BET_{N2} value does not represent the total surface area of the material and that the exclusion of nitrogen from a fraction of the total pore system is likely for kinetic reasons. This fact does not diminish the usefulness of BET_{N2} measurements, as it makes it, in principle, possible to obtain additional information about the pore structure of the studied material by comparing BET_{N2} values determined under different experimental conditions such as at different temperatures of adsorption, at different equilibration times, etc. It was not my intention to test within my paper the validity of a particular theory on the structure of the C–S–H phase. However, one must say, in general, that any new theory must be in line with the experimental data available at that time.

In 2000, one of the authors of the submitted discussion (Jennings) presented a new theory on the structure of the C–S–H phase [1]. According to this theory, the material consists of basic C–S–H units, which are clustered into larger globules and those randomly into the final C–S–H structure. In the original text, it is presumed the existence "...of two types of C–S–H, one into which nitrogen can penetrate and one into which nitrogen cannot penetrate". My pointing at the existence of a discrepancy between the forwarded theory and the available experimental results was based on this statement in the paper of Jennings [1].

In the presented discussion of my paper, the original claim of an inability of the high-density form of C–S–H to pick up nitrogen was amended, in so far as there is assumed that, also, here "few pores of larger size exist...so little surface area is measured by nitrogen". It is further stated that, on the other hand, also "the LD C–S–H contains a significant proportion of porosity that is not normally accessed by nitrogen". Such amendments may help to reconcile the Jennings theory [1] with the experimentally found BET_{N2} results.

References

[1] H.M. Jennings, A model of the microstructure of calcium silicate hydrate in cement paste, Cem. Concr. Res. 30 (2000) 101–116.

☆ *Cem Concr. Res.* 33 (2003) 2049–2056.

E-mail address: ivanodler@aol.com (I. Odler).

doi:10.1016/j.cemconres.2004.03.002