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A REPLY to a Discussion by M.J. Ridge of the paper "THE KINETICS OF HYDRATION OF CALCIUM SULPHATE HEMIHYDRATE: A CRITICAL COMPARISON OF THE MODELS IN THE LITERATURE"*

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Whilst I wish to thank M.J. Ridge for his critical comments on my paper I am not persuaded by them to alter my conclusions. In particular I dispute Ridge's statement that the Avrami equation is irrelevant to the description of the hydration of calcium sulphate hemihydrate. As indicated in (1) the Avrami equation has previously been applied to the hydration of gypsum plasters by Combe *et al.* (2). They obtained better agreement when they used the Avrami equation (in the case of $m = 3/2$) to analyse their experimental data than when they used either Ridge's or Schiller's equations to analyse their data; however it should be noted that they only considered Schiller's equation for the special case $K_1 = K_2$. It was on this basis that I used the Avrami equation to generate 'data' which was subsequently analysed using the equations of Ridge and Schiller.

The successful analysis of 'data' generated by the Avrami equation using both Ridge's and Schiller's equations indicates that experimental comparisons of the equations are required; neither Ridge and Schiller, to my knowledge, published an actual comparative study using the different equations on one set of data. As stated above Combe *et al.* (2) did publish some comparative data but they only considered one special case of Schiller's equation. Since the publication of (1) it has been drawn to my attention that some comparative fits of experimental data have been undertaken by Beretka and van der Trou (3). These authors showed that Ridge's equation, Schiller's equation and Combe *et al.*'s version of the Avrami equation all failed to provide good fits to their data. They obtained significantly better fits using either a modified form of Ridge's equation:

$$\frac{d\alpha}{dt} = k\alpha^{\theta_1}(1-\alpha)^{\theta_2}, \qquad (1)$$

where θ_1 and θ_2 are temperature dependent rates, or Taplin's generalised version of Schiller's equation (4) which is only to be expected as it contains 4 empirical constants! Thus the experimental data and analysis of Beretka and van der Trou (3) serve to reinforce my earlier conclusion that it is impossible to recommend the use of one of the Avrami, Ridge or Schiller equations over the other to describe the hydration of gypsum. Instead, based on their evidence, equation 1 is a rather better equation to describe the hydration of gypsum plasters.

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Acknowledgments

I would like to thank J. Beretka for drawing reference (3) to my attention.

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