



# Hydration of cementitious materials, present and future

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## ABSTRACT

This paper is a keynote presentation from the 13th International Congress on the Chemistry of Cement. It discusses the underlying principles of hydration and recent evidence for the mechanisms governing this process in both Portland cements and other cementitious materials. Given the overriding imperative to improve the sustainability of cementitious materials, routes to reducing CO<sub>2</sub> emissions are discussed and the impact of supplementary materials on hydration considered.

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## 1. Introduction and scope

Hydration is absolutely central to cementitious materials. It is the, almost magical, process by which a fluid suspension is transformed into a rigid solid, at room temperature, without the need for heat or other external processing agents and with minimal bulk volume change. We take it for granted, but just think if we had no previous experience of hydration and someone invented it how sensational that would be!

Because it is so central to the formation and property development of cementitious systems it is critical to understand the underlying mechanisms in order to progress; particularly on the most burning challenge facing the world today—the need to continually lower environmental impact, to do more with less. More specifically, better knowledge of the mechanisms governing hydration can, for example, lead the way to the incorporation of higher amounts of supplementary cementitious materials or to the development of new clinkers. For this reason we try in this paper not only to give a perspective on the current knowledge on the hydration of Portland cement, but of that of other reactive phases and, in addition, to discuss our knowledge of the impact of supplementary cementitious materials on hydration.

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