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OPTIMAL COMPOSITION OF CALCIUM ALUMINOSILICATE GLASS PARTICLES USED AS SUPPLEMENTARY CEMENTITIOUS MATERIALS

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Abstract.

5% of the global CO_2 emissions from human activity come from the production of Portland cement clinker. Most of this CO_2, normally referred to as "process CO_2", originates from the calcination of limestone used in the production. In this presentation we report a new approach, by which these emissions can be reduced by replacement of Portland cement clinker with suitably reactive glass particles. We have found the optimum composition of the glass particles used as supplementary cementitious materials with respect to local availability of raw materials, limestone consumption, melting temperature, glass forming ability and physical properties of the glass. In addition, we have investigated the pozzolanity of the glass, i.e., the ability of the glass particles to participate in the strength developing reactions taking place during cement hydration. The pozzolanity is determined as the reactivity of the glass in a saturated $Ca(OH)_2$ solution which reproduces the conditions in a cement paste. The glass is observed to be pozzolanic reactive and thus exhibits potential to be used as a supplementary cementitious material.