



Discussion

Reply to discussion of the paper “Use of cactus in mortars and concrete”¹

S. Chandra ^{a,*}, L. Eklund ^b, R.R. Villarreal ^c

^a*Applied Concrete Chemistry, Civil Engineering, Chalmers University of Technology, S-41296, Goteborg, Sweden*

^b*Swedish Ceramic Institute, Box 5603, 40229, Goteborg, Sweden*

^c*Institute of Civil Engineering, UANL, San Nicolas de Garza N.L., Mexico*

The authors thank Professor Bensted for his keen interest in our paper and the exclusive comments he has made. Professor Bensted in his discussion has emphasized the quasi-pozzolanicity of the cactus extract, whereas the paper deals with the interaction of cactus extract that works like a natural polymer and not as a pozzolanic material, such as pulverized fuel ash, condensed silica fume, metakaolin, and natural pozzolans. The polysaccharide and proteins that are the constituents of the cactus extract interact with the divalent calcium ions and make complexes [1]. These complexes sit like cushions in between the aggregates. This hinders the cracks formation and their further propagation. These complexes fill up the pores. In case these are of insufficient quantity to do so, they just cover the pores and thus seal them. Porosity of the material may not be influenced much by this activity, but its permeability will be significantly decreased.

CEX addition introduces hydrophobicity that slows down the drying process. This subsequently decreases the crack formation during the drying process. The polysaccha-

rides improve the workability that improves the packing and provides a much more homogeneous microstructure. Besides, small crystallites are formed due to the interaction instead of big portlandite crystals. This further decreases the risk of crack formation due to the big portlandite crystal formation. It influences the crystallization process and modifies the crystal structure. These are the factors that help in the strength development. Nevertheless, the increase in the strength is not so significant. It shows that the CEX addition does not have deleterious effect on the strength development. The significance of CEX addition is the improvement in the durability properties that are of great concern. However, as suggested by Professor Bensted, we agree that more work is to be done to optimally enhance this effect.

References

- [1] S. Chandra, Y. Ohama, *Interaction of Polymers and Concrete*, CRC Press, Boca Raton, USA, 1994.

* Corresponding author. Tel.: 46-3-772-2301; Fax: 46-3-772-2260.

¹ Cem Concr Res 28 (1998) 41–51.