America's Cement Manufacturers™

Portland Cement Association
5420 Old Orchard Road
Skokie, Illinois 60077-1083
847.972.9162 Fax 847.972.9163
www.cement.org

Lesson 3: A Further Look at the Content of Concrete

Age: Grades 7-12
Subjects: Science
Skills: Proportions, evaluation, listing, observation, reading, reporting
Duration: 45 minutes with an overnight break
Setting: Laboratory or classroom
Key Vocabulary: Aggregate, paste, volume, Mortar, particles

Objective
Students will learn about proportioning concrete mixes.

Method
Leave a very wet concrete mix and mortar mix in a jar overnight to see how concrete particles layer from heavy to lightweight.

Background
Paste, or mortar, in concrete is composed of portland cement, water and entrapped air or purposely entrained air. Cement paste ordinarily constitutes about 25% to 40% of the total volume of concrete.

Materials
Jar, dry concrete mix, water

Procedure
Students can see proportioning in action by adding 3 to 5 times more water than required to cement and concrete mixes. This will demonstrate how many sizes of particles are needed in a concrete mix. Students will test two mixes: water mixed with concrete mix (cement, small and large aggregate), water, and water mixed with mortar (cement and small aggregate).

Place one part concrete mix to five parts water a jar. Shake the mixture and let it set for an hour or overnight.

Remove larger sized aggregate from a dry concrete mix (or use a mortar mix) and pour one part of the finer mixture into a jar and add five parts water. Shake the contents and let it settle for an hour or overnight.

Measure each layer to calculate the percentage of aggregate of each size in both mixes. Compare

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the two mixes to understand that different particle sizes play a role in quality concrete and see the difference between concrete and mortar.