CONVERSION OF SOLID WASTE IRON ORE TAILINGS INTO CONCRETE COMPOSITE AND CARBIDE STEEL COMPOSITE

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The samples of iron ore tailings from Sunshine Mine in Wyoming were analyzed for their mineral content and prepared through a systematic process to use as an admixture in cement in the development of a concrete composite. It appeared from the compressive test analysis that the extended drying time increased the bond strength between the cement composite and aggregate. Stress/Strain graphs indicated that cracking was slow and intermittent and no immediate or brittle failure. Compressive strength decreased with the increased percentage of iron ore tailing content. Also the modulus of elasticity and ductility increased with the increased percent of iron ore tailing content. An SEM analysis was employed on samples at two different magnifications between the ranges of 900x – 2500x. Distinct spines were identified in the cement paste similar to regular cement paste.

The samples of iron ore tailings were also used to develop a steel composite. They were analyzed to be amorphous, which facilitate in the equal distribution of particles in the development of carbide steel composite. Three simple oxides Titanium Oxide, Zinc Oxide and Aluminum Oxide were chosen for their compatibility with Iron oxide based on their content of iron, hardness, cleavage and specific gravity. The Rockwell Hardness test revealed that the solidified samples fall in the hardness range of carbide steel and have a corresponding tensile strength up to 351 ksi. Sample SM-3 exhibited crystal structures compared to an increased carbon content of carbide steel in the SEM analysis.

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