

A Comparative Study of Corn Starches with Varying Viscosities as Supplemental Iron Ore Binders

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Abstract

Organic binders have been studied for decades as a partial or full replacement for bentonite as the standard iron ore concentrate binder. This is because bentonite adds unwanted silica back into the final product pellets that the concentrator had originally removed resulting in higher processing costs in order to meet product specifications. One organic binder of interest is corn starch due to its relative ease of processing and general availability. Corn starch can be “fine-tuned” to meet the desirable structure as defined by the consumer, but for use as a binder the desired structure and properties are yet unknown. For the tests conducted two different starches were used; a high viscosity high solubility unmodified pre-gelled starch, and a low viscosity low solubility unmodified starch. These were used in a mixture with bentonite at a constant dose of 6.6 kg/ton to determine whether starch could be a direct replacement for bentonite. It was found that both starches, when the ratio was increased, increased the dry compressive strength of the dry ball with the highest strength at a 100% starch mixture. Further testing proved that once the dry balls had been heated at 500°C that all of the starch had been burned away leaving no residual strength behind and barely exceeding the industrial minimum strength requirement. These tests are just the beginning of a study to determine starch’s viability as an organic binder for iron pellet production.