

**FEASIBILITY STUDIES FOR THE
PREPARATION OF SECONDARY FUEL
MIXTURES FROM INDIGENOUS COALS
(TI-GYIT AND SAMLAUNG) FOR
INDUSTRIAL FIRING PURPOSES**

Ph D DISSERTATION

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ABSTRACT

The present research placed its emphasis on exploring alternative uses of low rank indigenous coals, particularly *Ti-gyit* (sub-bituminous — based on proximate and ultimate analyses) and *Samlaung* (lignite — based on proximate and ultimate analyses) as *Secondary Fuel Mixtures* (SFM). Some suitable *polymer/polymeric* substances were used as *admixture / binders* for *agglomeration* and *clustering*. The effect of partial carbonization (pyrolysis) on the SFM premixed with some admixture was also determined, since *pyrolyzed secondary fuel mixtures* (PSFM) would have reduced environmental impact emitting less smoke and foul smell and better physical properties, relatively hardened mass and semi-coke like properties that would assist in handling and storage.

Ti-gyit and *Samlaung* coals could be used as a *Secondary Fuel Mixtures* (SFM), in the form of an economically attractive *Coal-Water-Mixture (C-W-M) / Fluid Carbon (FC)*. An appropriate amount of (- 200) mesh sized coal to water, 60:40, and stabilizer (sodium-stearate) and initiator (petroleum-diesel) would have a viscosity such that it would behave like a truly fluid mixture in the piping system during test-firing. The mechanism being creation of a single layer of molecules around each particle, keeping them apart and preventing the coal from settling into a solid mass at the bottom of the tank. (New Scientist Journal, 1986).

The present research also found that among the two indigenous coals, *Ti-gyit* and *Samlaung* being tested, *Ti-gyit* conformed to most of the data being mentioned in the literature. Using sub-bituminous coal is an advantage in making *C-W-M / FC* (or) *Coal-Water-Fuel*, because with higher-grade

bituminous coals, the fine coal particles settle out of the liquid and do not remain suspended.

Expansive additives are needed to keep the coal particles in suspension. Because of certain chemical properties, the sub-bituminous coal particles remain suspended, however, and no additives are needed (Willson, Alaska Journal of Commerce, October 17, 2004, [www. metso minerals. com/intet minerals / mm -poj. nsf / print view](http://www.metso minerals. com/intet minerals / mm -poj. nsf / print view)).

The prepared C-W-M / FC firing / combustion characteristics would be simulated by *two diverse firing systems : improvised static firing in Makeshift Cylindrical Furnace and Continuous Dispersion / Injection System*. In the test-firing of C-W-M / FC by Continuous Dispersion / Injection System, water vapour in the flames catalyses and accelerates the combustion of the carbon residue and exhibited continuous self-sustaining complete combustion. These facts in a way supported the fact that Ti-gyit coal has a great potential for use as a C-W-M / FC in Myanmar if the need arises, as an SFM for alternative substitute liquid fuel or gaseous fuel.

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