IASH 2007, the 10th International Conference on
Stability, Handling and Use of Liquid Fuels
Tucson, Arizona
October 7-11, 2007

POSTER

EFFECTS OF POTENTIAL ADDITIVES TO PROMOTE SEAL SWELLING ON THE THERMAL STABILITY OF SYNTHETIC JET FUELS

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Synthetic fuels derived from the Fischer-Tropsch (F-T) process using natural gas or coal-derived synthesis gas as feedstocks have drawn increased interest as replacements or supplements to petroleum-derived liquid fuels for the powering of ground vehicles, aircraft and ships. The increased attention being given to F-T fuels is because of the associated benefits of reduced dependence on petroleum feedstocks and less impact on the environment due to reduced emissions.

Because of their chemical and physical properties, F-T fuels will probably require additives in order to meet specifications with respect to lubricity and seal swell capability for use in ground and air vehicles. These additives can include oxygenates and compounds containing other heteroatoms that may adversely affect thermal stability. In order to understand what additives will be the most beneficial, a comprehensive experimental and computational study of conventional and additized fuels has been undertaken. The experimental approach includes analysis of the trace oxygenate and nitrogen-containing compounds present in conventional petroleum-derived fuels and trying to relate their presence (or absence) to changes in the desired properties of the fuels.

In the short term, potential problems associated with seal swelling may be mitigated by blending conventional fuels with synthetic fuels to maintain the levels of active compounds above the necessary threshold. In the long term, the problem will likely be solved by adding components to synthetic fuels that allow better compatibility with existing fuel systems.

This presentation will describe the results of efforts to test the thermal stability of mixtures of synthetic and petroleum-derived fuels as well as synthetic fuels containing single-component additives identified in earlier research as the best potential additives for promoting seal swelling in synthetic fuels.