The role of heteroatoms in jet fuel instability.

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Abstract

Accelerated and ambient storage stability tests (including 1-mo storage in presence of sunlight), conducted using model nitrogen compds. in jet-A fuel, n-decane model compd., and 2 naphthas, indicated that the rate of sediment formation was dependent on the structural features of nitrogen compds. and storage conditions. The pyrrole and indole derivs. did not produce any appreciable sediment except 2,6-dimethylpyrrole. Air, temp., dissolved oxygen, and light all strongly accelerated the process of sediment formation. On the other hand, removal of dissolved oxygen significantly reduced sediment formation. The reaction has a low apparent activation energy and appears to involve a free radical oxidative self-condensation of nitrogen compds. The lower O/C ratios of sediment also supported the view that oxidn. is a key aspect of jet fuel thermal instability. Approx. 25 different types of possible structures were identified from av. properties of sediments, as analyzed by elemental anal., IR, and mass spectrometries.