

Thermal Stability of Jet Fuels and Its Improvement

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Jet fuel is a kind of aviation fuels composed of various hydrocarbon compounds. Since the jet fuel circulation in aircrafts works for cooling the fuel systems, aircraft performance depends on the circulation efficiency and fuel degeneration in high temperatures. Although JP-8 is the dominant grade in the case of military uses, current JP-8 fuel has low thermal stability temperature limit, 163 °C. Elevated temperatures above the temperature limit cause oxidative degradation of the fuels and formation of both bulk insolubles and surface deposits to reduce the aircraft performance and heat transfer efficiency. The known factors influencing the thermal stability are the dissolved oxygen concentration, additives and chemical species of hydrocarbons in JP-8. In this study, we reviewed previous work and proposed the theoretical strategy to improve the thermal stability of jet fuels through deriving the interaction between components in the jet fuels as well as thermal deposition mechanisms using reference materials: JP-8 and JP-8+ 100. This study could offer preliminary data for the development of high efficiency jet fuels.