Proton magnetic resonance thermal analysis of petroleum derived asphaltene. Hayashi, Eiji; Iwamatsu, Eiji; Sanada, Yuzo; Ali, M. Asharaf; Hamid, Halim; Webster, David S.; Yoneda, Toshikazu. Research Inst., King Fahd Univ. Petroleum & Minerals, Dhahran, Saudi Arabia. Sekiyu Gakkaishi (1998), 41(2), 117-124. Publisher: Sekiyu Gakkai, CODEN: SKGSAE ISSN: 0582-4664. Journal written in English. CAN 128:169551 AN 1998:148119 CAPLUS

Abstract

The thermal transformations in petroleum derived asphaltene in a temp. range from 40 to 420°C was studied using proton magnetic resonance thermal anal. (PMRTA). Stacked plot of 1H-NMR signals and residual hydrogen suggest the gradual structural transition of asphaltene from largely rigid material to one having a high degree of mol. mobility at 300°C. From the results of solid echo curve fitting anal., an increasing Weibull time const. and decreasing power may be taken as gradual shifting of rigid structure to a more mobile one. No clear abrupt changes are obsd. relating to liq. phase transition and the formation of coke precursor from asphaltene in the temp. range up to 420°C. The second moment, M2T(VT), is sensitive to mol. dynamics and also to concn. and distribution of protons and unpaired electrons in the mol. lattice. The value of M2T16 provides an appropriate measure to study the extent to which mol. lattice of asphaltene was mobilized by thermal destabilization. The asphaltene has extremely high fluidity compared with those derived from coals at 400°C. From PMRTA of reheated samples, first heat treatment up to 450°C have resulted in irreversible thermal transformations.