APPLICABILITY OF RAMAN SPECTRA TO THE ANALYSIS OF HYDROCARBON MIXTURES

Frames 2431-2458

Abstract

The author describes no experimental work of his own, but makes conclusions from published Raman data about the suitability of Raman Spectra for hydrocarbon analysis.

I. General Characteristics of Raman Spectra of Hydrocarbon Groups.

Paraffins yield relatively weak spectra, but they are distinct and characteristic up to about C_{22}. Heavier molecules yield very complex spectra. The C-C bond frequency decreases with increasing chain length, and may be an index in determining degree of branching. Characteristic spectral regions for certain branched and straight chains are given sketchily.

Cyclic compounds have Raman lines which are characteristic of the number of members in the rings. Some of these characteristic frequencies are given. The spectra of aromatics are very distinctive and relatively strong. Condensed rings give spectra quite similar to those of aromatics.

II. Distinguishing Characteristics of Hydrocarbon Groups.

Cyclohexanes have spectra very similar to those of paraffins. Other cyclo-paraffins are fairly well distinguishable from paraffins. Aromatics can be distinguished as a class quite definitely. Condensed rings and substituted aromatics are very similar. Some details about particular frequencies to look for are given.

III. Analysis of Gasolines.

Some of Goubeau's analyses (published earlier) of gasolines are given in detail including the respective Raman frequencies used. From this and other work it is generalized that by use of careful fractionation and Raman Spectra analysis of gasolines boiling up to 120 C can be accomplished reasonably accurately. Higher boiling mixtures are too complex for analysis by this method with reasonable speed.

IV. Analysis of Lube Oils

Fluorescence makes analysis of lube oil by Raman effect difficult. Further, the great complexity makes accurate analysis impossible. It may be possible to tell roughly about cyclic components the kind of rings, the number per molecule, and the sizes of substituents in some cases.

POLYMERIZATION - AUGUST AND SEPTEMBER, 1945

Dr. H. A. van Westen and Dr. H. J. Tedema

Frames 2479-2489

Abstract

Experiments are described in which naphthalene is alkylated with olefin fractions having the boiling ranges 75-130 C (C_6-C_8), 200-250 C (C_{12}-C_{14}), and 270-300 C (C_{15}-C_{17}). At a temperature of 40 C (20 C also used) and a reaction time of 2 to 16 hours, the alkylation goes smoothly and requires 4 to 5 moles of $AlCl_3$ per 100 moles of olefin used. From 60 to 80 per cent of the synthetic lube oil produced had only one naphthalene nucleus per molecule. The oils have a practically constant molecular weight, and those having fewer but longer side chains are more paraffinic in nature with lower viscosity, higher viscosity index, lower Conradson Carbon Residue, lower density, and higher aniline point.