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**Committee D02 on Petroleum Products and Lubricants
Subcommittee D02.04 on Hydrocarbon Analysis**

Research Report D02-1544

Interlaboratory Study to Establish Precision Statements for ASTM D6839, Standard Test Method for Hydrocarbon Types, Oxygenated Compounds and Benzene in Spark Ignition Engine Fuels by Gas Chromatography

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The PIONA Plus Analyzer
AC/HP REFORMULYZER ™
FOR THE HP 6890 SERIES GAS CHROMATOGRAPH
BASED UPON THE HP CHEMSTATION

The **AC/HP Reformulyzer** performs all the tasks of the PNA and PIONA analyzers and more. The system analyzes all hydrocarbon types: paraffin's, isoparaffins, olefins, naphthenes and aromatics in finished gasoline's and gasoline-related streams. In addition this system is extended to quantitate oxygenates in reformulated gasoline.

The application meets the performance specifications of ASTM methods D 1319-93, D 3606-92, D 4420-89, D 4815-93, D 5443-93, D 5580-95, D 5599-95 and of other test methods such as UOP-870 and DIN 51.448 and the proposed ASTM PIONA method for reformulated gasoline's.

System Specifications:

1) Hardware

The **AC/HP Reformulyzer** is configured around the HP 6890 Series Gas Chromatograph, which is modified with columns, valves and other components. These modifications include:

    a. Polar OV-275 column to separate the sample in three fractions based upon the polarity;

    b. Mol. Sieves 5A trap for accurate separation of n-Paraffin's from Isoparaffins and Naphthenes;

    c. Mol. Sieves 13X column for separating Paraffin's from Naphthenes up to C_{12} by carbon number;

    d. Ether/Alcohol trap for separating oxygenates from the other components in the sample matrix;

    e. Automatic valves for column switching.

2) Software

The **AC/HP Reformulyzer** is controlled by dedicated AC Reformulyzer application software, fully integrated with HP ChemStation operational software in a Microsoft Windows environment. The complete software runs on HP Vectra Bundled Package for data acquisition.

The AC application software offers multiple modes as PNA, PONA plus Oxygenates and PIONA. The user selects a mode depending on the sample type and data required. For each mode, all settings are preprogrammed to enable automatic column switching and temperature control. The analysis time depends on the data required and the sample type being analyzed.

3) Performance specifications:

a. <u>Separation Range</u>:
- Paraffin's C_3-C_{10};
- Isoparaffins C_4-C_{10};
- Olefins C_4-C_{10};
- Naphthenes C_5-C_{10};
- Aromatics C_6-C_{10};
- Ethers C_5-C_6; Alcohol's C_2-C_4

b. <u>Sample Range</u>
- alkylates
- FCC gasoline's
- finished gasoline's
- hydrocrackates
- isomerates
- reformates
- naphtha's