



OXYGENATES IN GASOLINE ANALYZER (California LEV III; ASTM D4815 and D7754)

Tailpipe emissions from gasoline-powered vehicles possess major ingredients involved in the production of photo-chemical smog, including nitric oxides, carbon monoxide and unburned hydrocarbons. Addition of oxygenates to gasoline was found to reduce carbon monoxide and hydrocarbons concentrations due to changes in combustion chemistries. An early attempt was Arco Chemical's mass production of methyl-*t*-butyl ether (MTBE) in 1979.

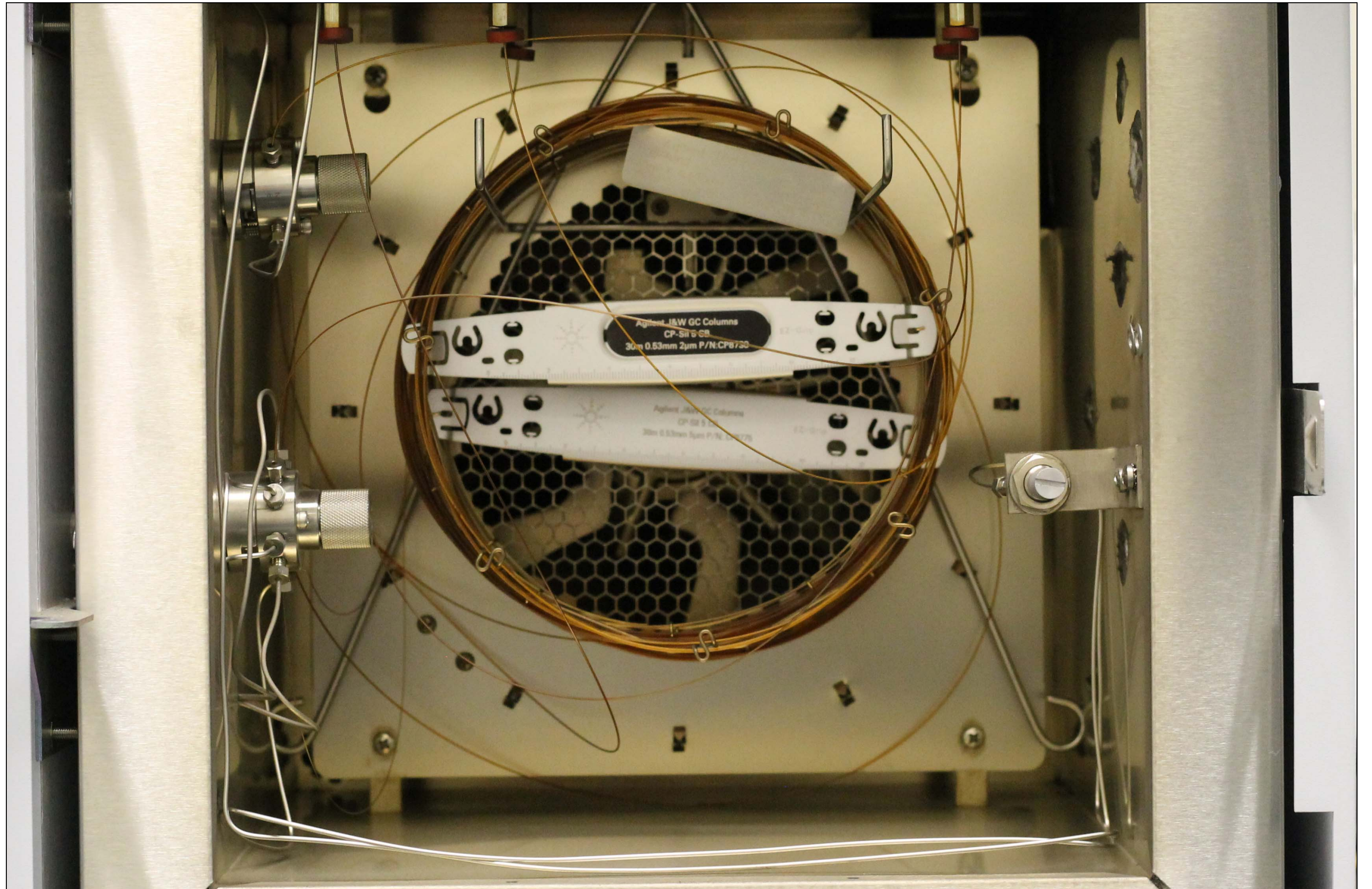
Then in 1995, Santa Monica Water Department (California) detected unexpected levels of MTBE in their underground aquifer, and attributed it to leaks in storage tanks at retail gasoline stations.

Following mandates in the Clean Air Act of 1990 to include oxygenates in gasoline, California transitioned to requiring addition of ethanol in 2001, as the required oxygenate, to avoid the toxic effects in the environment of other alternatives.

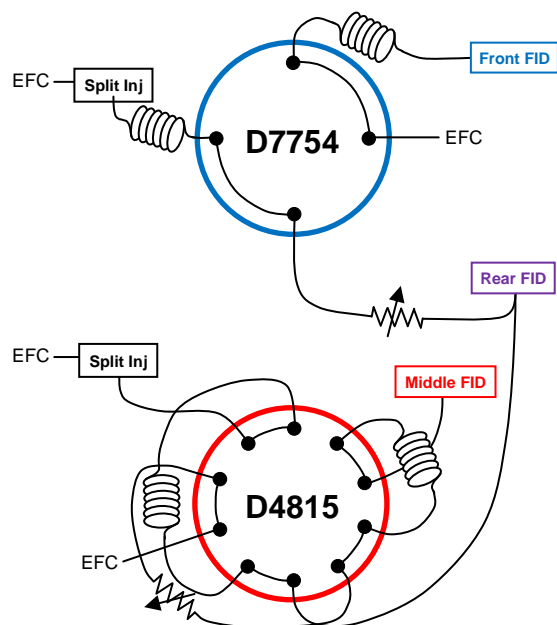
The California Air Resources Board (ARB) has been assigned the responsibility of monitoring commercial sales of gasoline within California for oxygenates. ARB actively screens refineries, distribution terminals and retail gasoline stations for these chemicals. ASTM D4815 [Standard Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary-Amyl Alcohol and C1 to C4 Alcohols by Gas Chromatography] is used to enforce the maximum level of 10.0 vol% for ethanol. Elevated levels of ethanol increase harmful nitric oxides emissions, and lower concentrations increase discharge of carbon monoxide and hydrocarbons.

ASTM D7754 [Standard Test Method for Determination of Trace Oxygenates in Automotive Spark-Ignition Engine Fuel by Multidimensional Gas Chromatography] is applied for detection of prohibited oxygenates, notably MTBE, with limits at < 0.05 vol%. No oxygenates are permitted in California gasoline unless examined with extremely thorough environmental review; currently only ethanol is approved in California.



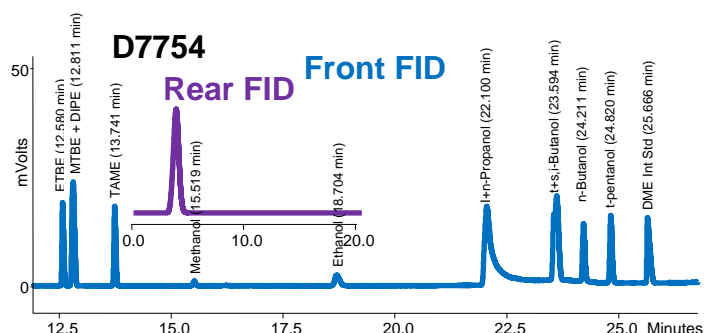
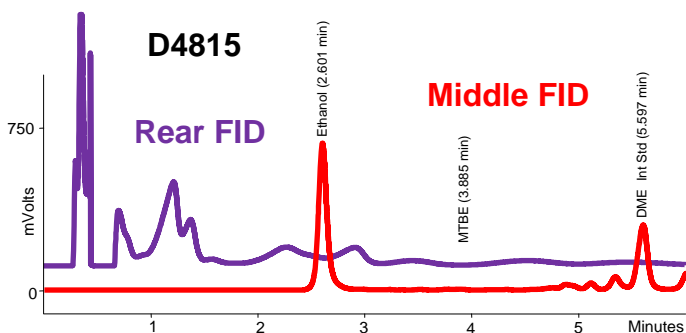
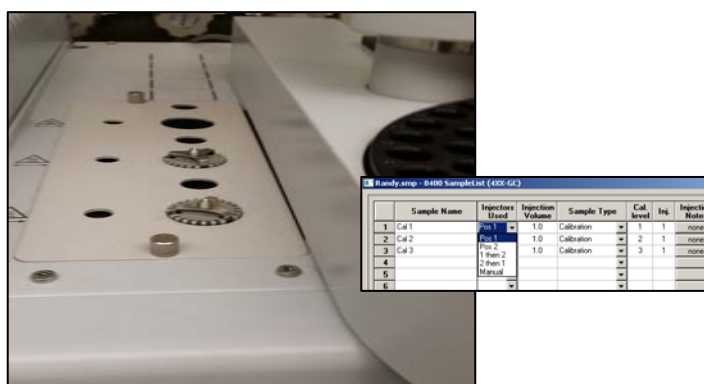


The Scion 456 Gas Chromatograph, equipped with an 8400 AutoSampler™, two split injectors, three flame ionization detectors, a micro-packed column, three capillary columns, and required valving is perfect for performing both ASTM standard methods in one instrument. Either protocol can be executed simply by activating the appropriate method and introducing the gasoline sample into the proper injector. Two independent pathways are included in the single Scion 456, with separate injector, valving and primary flame ionization detector for each channel. A third flame ionization detector is deployed as an assessment of appropriate valve actuation timing for both methods, as described in both ASTM protocols.



Unique Features of Scion 456 for Oxygenates in Gasoline

- User-selectable automated injection into either of two independent injectors.
- Three flame ionization detectors to handle full method detection requirements in ASTM standard methods.
- Workstation setup capable of switching combinations of pairs of flame ionization detectors with ease, by simple activation of the related method.
- Very large column oven for convenient attachment of multiple columns to injectors, valves and detectors.



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