CLAIMS:

1. A method to simulate distillation of a petroleum ~~stream~~ sample by comprehensive two-dimensional gas chromatography with sub-total yield of compounds in the sample by class as a function of boiling point, comprising:

a) separating said petroleum ~~stream~~ sample with a two-dimensional gas chromatograph in a first non-polar dimension of retention time to define component boiling point and a second dimension of polarity with detection of components by polarity class to determine ~~polarity~~ presence of components by relative mole as a function of temperature,

b) integrating the two-dimensional gas chromatograph at a given temperature to determine ~~signal intensity~~ the relative molar amount of separated components by class as a function of temperature, wherein said integrating step gives the mole percent of non-carbon elements containing compounds in the sample.

~~2. The method of claim 1 wherein said temperature is first dimension retention time and said polarity is second dimension retention time.~~

~~3. The method of claim 2 where first dimension retention time is boiling point.~~

~~4. The method of claim 1 wherein the signal intensity is weight percent.~~

~~5. The method of claim 1 wherein said signal intensity is mole percent.~~

~~6. The method of claim 4 wherein said integrating step gives the weight percent of saturates, one-ring aromatics, two-ring aromatics and three-ring aromatics in the petroleum feedstream.~~

~~7. The method of claim 5 wherein said integrating step gives the mole percent of non-carbon elements containing compounds.~~

~~8.~~2. The method of claim ~~7~~ 1 wherein the non-carbon elements containing compounds include sulfur containing compounds.

3. A method to simulate distillation of a petroleum sample by comprehensive two-dimensional gas chromatography with sub-total yield of compounds in the sample by class as a function of boiling point, comprising:

a) separating said petroleum sample with a two-dimensional gas chromatograph in a first non-polar dimension of retention time to define component boiling point and a second dimension of polarity with detection of components by polarity class, in which the detection of components by polarity class is carried out using a sulfur chemiluminescence detector, to determine presence of components by relative mole as a function of temperature,

b) integrating the two-dimensional gas chromatograph at a given temperature to determine the relative molar amount of separated components by class as a function of temperature.

4. A method to simulate distillation of a petroleum sample by comprehensive two-dimensional gas chromatography with sub-total yield of compounds in the sample by class as a function of boiling point, comprising:

a) separating said petroleum sample with a two-dimensional gas chromatograph in a first non-polar dimension of retention time to define component boiling point and a second dimension of polarity with detection of components by polarity class, in which the detection of components by polarity class is carried out using a nitrogen chemiluminescence detector, to determine presence of components by relative mole as a function of temperature,

b) integrating the two-dimensional gas chromatograph at a given temperature to determine the relative molar amount of separated components by class as a function of temperature.