

Answer on the question #66226, Chemistry / Other

Question:

The relative peak areas obtained from a gas chromatogram of a mixture of methyl acetate, methyl propionate, and methyl n-butyrate were 18.1, 43.6, and 29.9, respectively. Calculate the percentage of each compound if the respective relative detection responses were 0.60, 0.78, and 0.88. Use the area normalization technique.

Solution:

Relative response factor is the ratio of the response factor of analyte to those of standard:

$$RRF = RRF_A / RRF_S$$

Thus, to calculate the concentration ratio, we take the relative peak area and divide it by the RRF:

$$\frac{c_A}{c_S} = \frac{A_{relative}}{RRF}$$
$$\frac{c_{MeAc}}{c_S} = \frac{18.1}{0.6} = 30.2$$

So, for methyl acetate, methyl propionate, and methyl n-butyrate, concentration ratio is 30.2, 55.9 and 34.0, respectively.

To get the percentage, we should normalize the relative concentration to 100% sum:

$$\%(MeAc) = \frac{30.2}{30.2 + 55.9 + 34.0} \cdot 100\% = 25.1\%$$

$$\%(methyl\ propionate) = \frac{55.9}{30.2 + 55.9 + 34.0} \cdot 100\% = 46.6\%$$

$$\%(methyl\ n-butyrate) = \frac{34.0}{30.2 + 55.9 + 34.0} \cdot 100\% = 28.3\%$$

Answer: The percentages of methyl acetate, methyl propionate and methyl n-butyrate are 25.1%, 46.6%, 28.3%, respectively.