

Name: _____

Section: _____ Date: _____

GAS CHROMATOGRAPHY (GC) – FS07

A. Build a Gas Chromatograph:

In this lab you will build a gas chromatograph as instructed in the lab manual. You will use your GC to run three different samples: CH_2Cl_2 , CHCl_3 , and a mixture of the two. You will obtain voltage data from the computer for about 600 seconds after injecting each of the samples. You will need to analyze the data obtained as indicated below.

- 1) Construct three separate graphs (chromatograms) in Excel, one for each of the samples: CH_2Cl_2 , CHCl_3 , and the mixture. These graphs must include a title and axes labels with units.
- 2) Draw tangents and a baseline for each of the peaks using a metric ruler measurements should be taken to (0.1 mm) (Note: the lines should form a triangle so that you can estimate the area of each peak).
- 3) Label the w_B (base width), t_R (retention time), and h (height) of each peak. Also, in the graph for the mixture, label each peak with the corresponding compound.
- 4) Calculate the area (A) and the number of theoretical plates (N) for all four peaks (so you should have 8 values calculated, 4 areas and 4 theoretical plates).

B. Fill in the following blanks using the words included in the word bank: injector, detector, mobile phase, stationary phase.

1. In gas chromatography an inert gas is used to carry the sample through the column to the detector; this gas is known as the _____.
2. The _____ will sense the compounds as they exit the GC, this will pick up the color change in the flame due to the Beilstein reaction.
3. The packing used in a GC, known as the _____, aids in the separation of compounds due to the varying adsorption of molecules on the packing.
4. Compounds are introduced to the column by way of the _____, which is sometimes heated to aid in the vaporization of the sample before it enters the column.

C. Answer the following questions pertaining to GC.

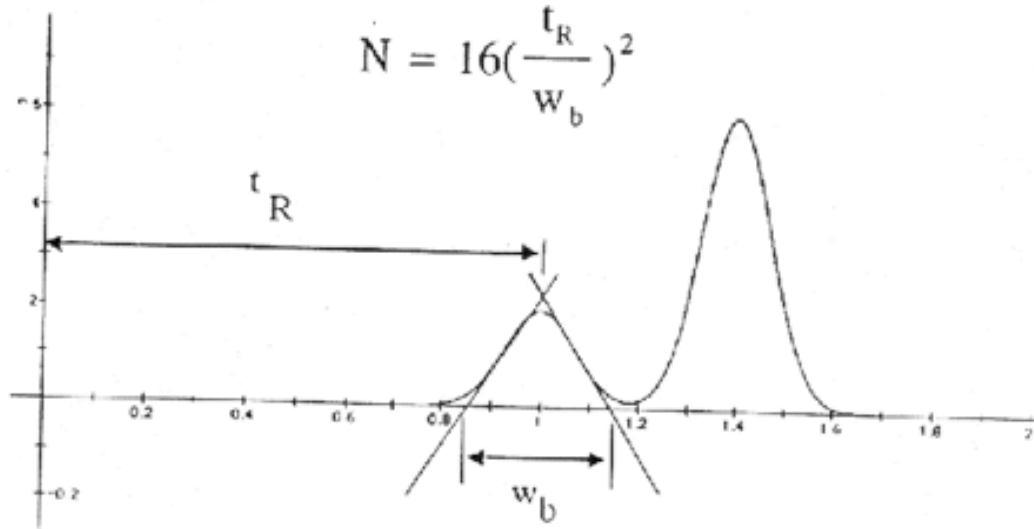
1. What is the significance of N (the number of theoretical plates) in a GC experiment? For example: If you have two chromatograms (one for each compound, C_1 & C_2), then what does it mean if N_1 is greater than N_2 ?
2. What does the retention time of a species tell you about the compound? For example: If you have a chromatogram with two peaks corresponding to C_1 & C_2 , then what does it mean for t_{R1} to be less than t_{R2} ?
3. If you have two chromatograms of the same mixture, but they are from two different GC instruments, then how do you determine which one gives you better separation? For example: If the first one gives short, broad peaks and the second one gives tall, sharp peaks, then which instrument gives you better separation? Explain your answer.
4. You injected a 2:3 ratio of methylene chloride to chloroform for your mixture. Based on the ratio of the Area of your peaks (triangles) did you get the expected 2:3 ratio? If not what is your percent error?

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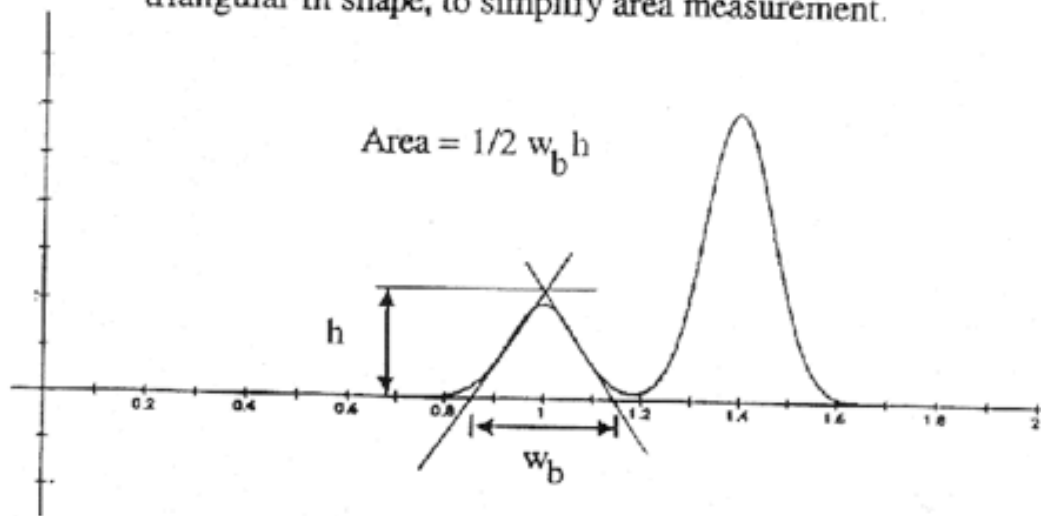
Example:

N = number of theoretical plates, (a measure of efficiency)



NOTE: w_b is measured at the intersection of the tangents with the baseline.

The gaussian curve can be approximated as triangular in shape, to simplify area measurement.



NOTE: the height is measured to the top of the tangents, which is above the actual curve peak