**Task 7 – Applications of Chromatography**

**Applications of Chromatography**

For this task, you will be responding to the articles, “Analysis of Flue Gases with GC and TCD Detection” and, “Amino acid determination by HPLC combined with multivariate approach for geographical classification of Malaysian Edible Bird’s Nest”.

**Part 1: Gas Chromatography**

Responding to the article on the analysis of flue gas, answer the following questions:

1. What are the chemical equations of combustion for the fuels described in the article? What would you expect the molar ratios of each product to be?
2. What are the main components of flue gas? Draw their Lewis structure, describe their shape, determine their polarity, and draw the overall direction of any dipole moments the molecule may have.
3. Using the chromatogram (figure 2), determine the order of the boiling points of each molecule. Compare this to the known boiling points and discuss any differences.
4. Explain why the molecule with the highest boiling point has such a high boiling point with reference to intermolecular forces.
5. Calculate the molar ratio of each chemical to carbon dioxide. Assuming that carbon dioxide is the only chemical they want to be producing, determine how favourable the combustion processes are.
6. Determine the chemicals eluted at the retention time 4.70. If another chromatogram was run under identical conditions and came out at 4.70 minutes, would it be the same chemical? Why/why not?

**Part 2: High Performance Liquid Chromatography**

Responding to the article on analysing amino acids, answer the following questions:

1. Explain why they would choose to use HPLC over GC for this experiment.
2. Sometimes, a TLC is done prior to HPLC as a test-run. Draw the TLC plate you would expect to see for the first 4 amino acids in figure 2 of the article, and calculate the retention factor for each.
3. Assume that the first 4 amino acids have Rf values of 0.1, 0.2, 0.3, and 0.4. Write down which amino acid would have which R­f value.
4. Find the structure of the first four amino acids by research online. Circle the sections where each amino acid is structurally different from the others, and determine which molecule is the most polar. Using this information, determine the relative polarities of the mobile and stationary phases.
5. Construct a graph for eluent percentage over time using table 2 for both eluent A and eluent B for the first 33 minutes. Determine the concentration of each eluent at 25 minutes.

Your mark will be based under a validation sat under test conditions in-class – the date for this validation will be set on SEQTA. The response task should be submitted by the 18th of July so that appropriate feedback can be given.

Note that the questions on your validation will be similar to those in the response task – however, questions asked under each part may be for either HPLC or GC, not just the type that corresponds to that section.