

Gas chromatography

[Science](#), [Chemistry](#)



GAS CHROMATOGRAPHY EXPERIMENT The purpose of this experiment is for the student: 1)to learn the general theoretical aspects of gas chromatography as a separation method, 2)to learn how to operate gas chromatographs specific to COD, 3)to become familiar with using the gas chromatograph (GC) to qualitatively identify components of mixtures, 4)to be introduced to and to interpret the quantitative data available via gas chromatography, 5)to gain insight into how the GC technique is used in the chemical industry both as a qualitative and quantitative tool.

As a means of accomplishing these objectives, we will attempt to identify the three major organic components of two different kinds of nail polish remover.

PRELAB ASSIGNMENT Read Technique 22 in Pavia, 4th ed. Be sure that you understand the components of a gas chromatograph and the factors affecting separation. Pay particular attention to the definitions of retention time and resolution and how the GC can be used for qualitative analysis. ·Fill out a gold sheet for all compounds present in the purple nail polish remover as listed below. Write a procedural flow chart for the experiment.

EXPERIMENTAL PROCEDURE Each student will be required to make at least one injection into the GC. Each student will also be a member of a group and will share information and chromatograms with other group members and between groups. All GC injections will be one micro-liter " sandwiched injections". The procedure for preparing the syringe is described below. ·Place your sample in a small test-tube. ·Rinse the syringe three times with your sample. ·Draw approximately 1 micro-liter of air into the syringe. Draw 2 or 3 micro-liters of your sample into the syringe with the air. ·Turn the syringe so that the tip of the needle is pointing up and expel liquid from the

syringe until only 1 micro-liter of liquid remains in the syringe. Pull the plunger back and draw in approximately 1 micro-liter of air. You now have a 1 micro-liter sample "sandwiched" between two air bubbles. Your group will be assigned either regular (purple) Revlon nail polish remover or acetone-free (blue) Revlon nail polish remover. The contents are listed below.

Your group must gather enough information to be able to identify the three major peaks in the gas chromatogram for your assigned nail polish remover. Acetone, ethyl acetate, and isopropyl alcohol in addition to the two nail polish removers will be available as samples for injection. You may use these chemicals to make mixtures that you will inject into the GC. You may not inject any of these neat liquids (pure chemical samples) because the column may become overloaded and the peaks will show a lot of trailing.

When analyzing the data and planning your mixtures, keep in mind that our GC's have flame ionization detectors that do not detect non-flammable substances such as water. Someone in the group will need to inject the assigned nail polish remover into a GC and wait for the instrument to record the chromatogram. While the GC is cooling down, label the chromatogram with your name, the name of your sample, and the number of the GC which was used. Have the instructor initial the original chromatogram.

When the "ready" indicator light turns green on the GC, another member of the group should make an injection into the same GC in order to have the same experimental conditions for comparisons of results. The chemical make up of this second and subsequent injections should be determined after consultation within the group. You must get the approval of the instructor before making any mixtures for injection into the GC. Each person must

submit at least one original initialed chromatogram attached to the cover sheet.

All other chromatograms will be obtained from your partners and by exchanging data within a group. The second type of nail polish will be analyzed using class data that will be provided by your instructor. The labels on the two nail polish removers list the contents of each in the following order: PURPLE Nail Polish| BLUE Nail Polish| acetone| ethyl acetate| water| isopropyl alcohol| ethyl acetate| water| isopropyl alcohol| jojoba oil| benzophenone-1| butyl alcohol| dyes| butyl acetate| | toluene| | dyes|