

Research Interests for Academic Year 2007-2008

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The following are some areas I have an interest in investigating in the coming year, hopefully in conjunction with some students. The primary requirement for a student to be involved is to have an interest in learning some content related to the specific areas and, more generally, learning about the process of research including literature searching and some of the techniques involved in exploring research problems. There is no absolute requirement about your year in college or courses you have completed or grades you have received. If you have interests that you would like to explore, I would certainly be willing to visit with you about those interests.

Typically a student working on undergraduate research will be enrolled in a Special Problems course for 1-4 hours of credit. A one hour enrollment would equate to about three hours a week in the laboratory.

Please feel free to visit with me if you have an interest in working on one of these projects in the coming year. They are listed in no particular order of importance.

Project 1:

Explore the appearance of ions in the GC/MS (starting with chlorobenzenes and perhaps progressing from there) as a function of ionizing potential in the MSⁿ mode. This instrument is heavily used in analytical methods, but this project looks more at how we can use it to determine information about the stability of ions. I have some preliminary data for these materials and am interested in determining whether or not we can use the instrument to understand stability issues in gas phase ions.

Project 2:

I have a series of rubber materials that have been cured and am interested in determining something we call the crosslink density. This is typically done by carrying out swelling experiments – the materials are put in a good solvent allowed to soak for a few days and weighed after coming to equilibrium. The more highly crosslinked a system is, the less solvent it will absorb. Thus the information can be used to determine the actual crosslink densities of these systems.

This work stems from my summer work at the Naval Research Laboratory.

Project 3:

One of the issues faced in working with various polymers (and rubber materials) is working with the miscibility (solubility) of different polymers. I have two sets of polymers for which I am interested in developing miscibility information over a range of compositions and temperatures. One way of doing this is through using viscosity measurements and I am interested in working with these specific materials to determine their overall miscibility over a range of conditions.

This work also stems from my summer work at the Naval Research Laboratory.

Project 4:

In looking at the miscibility of a couple of rubber materials (specifically EPDM and EPM), I have noticed an interesting behavior in the infrared spectrum. It would not be expected that a significant difference in infrared spectrum would occur on the scale of this polymer mixing, and I am interested in pursuing the origin of this difference.

This work also stems from my summer work at the Naval Research Laboratory.