

CHEM 311 Research Assignment

Topic Approval Deadline: Friday, November 3rd, 2017

The **term research assignment deliverables** for this course are a **10 page research paper** (double spaced, with figures, and references), a **one page abstract/summary of the paper** and a **short presentation** (5-7 mins) on a new or improved method in analytical chemistry. You may use the textbook and references cited therein or browse current issues of scientific literature journals such as *Analytical Chemistry*, *Environmental Science and Technology* or *Trends in Analytical Chemistry* etc. to identify an emerging analytical method. You should identify an analyte (or analytes) of interest and define the environmental matrix in which it will occur. For example, you might consider a new method of analysis of the herbicide *atrazine* in groundwater or the heavy metal *mercury* in canned tuna fish. Your summary and presentation should address the principles of operation of the new (or improved) method describing how the analyte/s is/are separated from the matrix and quantified.

PURPOSE

The purpose of this assignment is to provide students with the experience of applying the principles of Environmental Chemical Analysis to a 'real world' application not specifically covered in the course materials. Students will be introduced to the *Analytical Chemistry* literature and the exercise of conducting textbook and library research on a topic or problem tailored towards their interests and/or major field of study.

CONTENT

Define your topic in terms of: the analyte, the environmental matrix and the technique employed for the analysis. Present the basic principles behind the analysis technique. Be clear to establish how the analyte is being selectively quantified, potential interferences and sample preparation. Schematic figures and tables are useful ways to illustrate this information. Summarize the findings of the researchers. Where possible, identify the detection limits, interferences, precision and accuracy. You may use tables or graphs to summarize data or present results. A closing statement outlining the advantages or disadvantages of the technique over other methods is appropriate. You may want to mention cost and/or ease of use, and/or future directions.

Topics must be approved by the instructor, and in the case of overlaps, excessive subject duplication will be eliminated by accepting topics on a 'first-come-first-served' basis. There are plenty of examples in the book, but a scan of *Analytical Chemistry*, *Environmental Science and Technology*, *Rapid Communications in Mass spectrometry* or other journals should give you ideas...

Examples of Past Research Topics for CHEM 311 Research Assignment

Analysis of Cadmium in Marine Sediments by X-ray fluorescence

Measurement of *in-vivo* Dissolved Oxygen using ultra micro-sensors

Analysis of marine toxins in shellfish using HPLC-MS

Analysis of anti-bodies using enzyme linked immunosorbent assays

Mercury analysis in fish tissue using gold trap atomic fluorescence

Analysis of nerve agents using field portable GC-MS

Analysis of the mineral content of Martian rocks by alpha proton X-ray spectrometry

Analysis of trace elements in wine using ICP-MS

Analysis of *in-situ* atmospheric ozone concentrations using remote satellite techniques

Analysis of PCB's in killer whale blubber by high resolution GC-MS/MS

Analysis and chemical speciation of arsenic anions using complexation ion-chromatography

Nerve Agents by Acoustic Wave Purge and trap GC

Organomercury by bioluminescence of sensor bacteria

Microbes by Quantitative PCR - Capillary Electrophoresis

Biomolecules by Capillary Electrophoresis - Electrospray - MS

Metals in Fish Otoliths by ICP-MS

Cyanide in Wastewater by Amperometric Detection

CHEM 311 RESEARCH ASSIGNMENT

TOPIC SUBMISSION FORMAT (Email please)

STUDENT NAME:

ANALYTE:

ANALYTICAL METHOD:

SAMPLE MATRIX:

DESCRIPTIVE SUMMARY:

BRIEFLY DESCRIBE THE ANALYTICAL METHOD AND/OR THE COMBINATION OF METHODS USED TO IDENTIFY AND QUANTIFY THE ANALYTE (A FEW SENTENCES):

REFERENCE(s):