

**CHEM 322 – Spring 2015 Project**  
**DUE May 4, 12:00 Noon**  
**No Late Papers Accepted!**  
**5 point bonus for papers submitted by 5:00 PM April 27!**

Based on your remarkable proficiency in CHEM 322, you have been hired to help determine an appropriate method of analysis for an analytical scenario. Your task is to propose a method to deal with the analytical scenario in a precise and accurate fashion. You may choose between forms of liquid chromatography, gas chromatography, electrophoresis, molecular spectroscopy, atomic spectroscopy, mass spectrometry, or electrochemistry (or some combination thereof).

Working individually or with a partner, use your experience and an exploration of the literature to prepare and submit to Dr. Lamp a document that contains the following sections.

1. **Scenario Description:** a description of the analytical scenario including a discussion of the main challenges with the analysis.
2. **Proposed Method:** a proposed method of analysis including:
  - a. a thorough justification for the method chosen. What makes this method better than any alternatives?
  - b. a block diagram of the instrument and a description of the main components of the instrument including why each component is pertinent for the analysis and how each component contributes to the figures of merit (such as selectivity, sensitivity, LOD...) for the measurement.
3. **Cost Estimate:** an estimate of costs:
  - a. for purchasing an instrument for the analysis;
  - b. and for operating the instrument (per sample). This may include reagents, gases, consumables, etc.
4. **References:** references must be in the format of the journal *Analytical Chemistry*. See the "Author's Guide to Analytical Chemistry" available at [pubs.acs.org](http://pubs.acs.org) for examples.

### Format

The document must be typewritten with a minimum of four and maximum of ten double-spaced pages of text (1 inch margins and 12 pt font), including figures and references.

### Grading

Grades will be assigned on the basis of the quality and completeness of your responses to the items above as well as the overall quality of your writing (grammar, typos, etc.) It would be to your benefit to have someone proofread your document before turning it in.

<b>Grade Breakdown</b>	
Description of Scenario	20 points
Proposed method and justification	50 points
Cost estimate	15 points
Overall quality of writing	15 points
<b>Total</b>	<b>100 points</b>

## Possible Scenarios

Once you have chosen a partner (if you opt to work as a team), you will select a topic at random by drawing a number that corresponds to one of the topics below. Groups will not duplicate topics.

1. determination of sodium lauryl sulfate and sodium laureth sulfate in commercial body care products
2. ppb-level determination of sulfur content in automotive fuels.
3. ppm-level determination of methanol in grain alcohol
4. ppb-level identification and determination of pesticides on vegetables.
5. ppb-level determination of estradiol in biological fluids.
6. ppb-level determination of mycotoxins in cattle feed.
7. ppb-level determination and speciation of chromium (III) and chromium (VI) in drinking water.
8. ppb-level simultaneous analysis of VOCs and 1,4-dioxane in water
9. ppb-level determination of methadone and any metabolites in urine.
10. determining the mass and size distributions of amylose and amylopectins in starch
11. online monitoring of atmospheric aerosols near a coal-fired power plant.
12. determination of phenolic compounds in olive oil.
13. ppb-level determination of explosives in drinking water.
14. ppm-level determination of fusel alcohols in alcoholic beverages.
15. parts-per-trillion determination of mercury in drinking water.
16. determination of mercury in copper ore.
17. trace analysis of greenhouse gases in ambient air.
18. trace-level identification and quantitation of heavy metals in gourmet salts.
19. ppm-level determination and speciation of alkali metals in Portland cement.
20. determination of identity and thickness of a polymer film coated onto a piece of silicon.

## Tips

- Justification of your choices is a critical component of this project. *Be sure to thoroughly justify your choice in comparison to other options you may have.*
- Websites like [asdlb.org](http://asdlb.org) or websites from instrument vendors may provide useful justification. Don't forget your textbook and other resources you have available at the library and online.
- You ARE NOT allowed to consult with other faculty on this project! You may ask Dr. Lamp questions, which he may answer at his discretion. I have informed the faculty that they should not provide assistance on this project.
- If you contact an instrument vendor for pricing information, be sure to make it clear to them that you do not need an official quotation, since you will not actually be purchasing the instrument. Inform them that a ball-park estimate, to the nearest \$5000 or so is all that you need for this class project.