

Analytical Chemistry Cume on Elemental Analysis by Atomic Absorption (AA) & Inductively Coupled Plasma (ICP)

Prof. Luke Hanley, February 2004

Each question is worth equal credit (5%), unless otherwise noted.

Answer the following questions about atomic absorption (AA).

1. Why is a hollow cathode lamp used in AA?
2. Draw a typical spectral output of a hollow cathode lamp.
3. What is the purpose of a multielement lamp? Does it allow simultaneous measurement of multiple elements?
4. What is the purpose of the monochromator in AA?
5. What is the purpose of modulation in the light source?
6. What is the purpose of the premix burner system?
7. Describe two types of interferences in AA. (Note: This question is worth 10%).
8. What does changing the oxidant-fuel combination do to the flame and why is this relevant to the aforementioned interferences?
9. Why are non-linear calibration curves sometimes used for AA? Compare with linear calibration curves.

Answer the following questions about inductively coupled plasma (ICP).

10. What is the approximate temperature of the plasma torch in ICP and how does it compare to the approximate flame temperature in AA?
11. What is the result of this different plasma temperature in ICP?
12. What optical process can be used for detection in ICP and how does this differ from that used in AA?
13. Briefly describe a completely different, non-optical detector also used in ICP.
14. Describe the device most often used to introduce a liquid sample into the plasma torch.

Answer the following questions by comparing atomic absorption (AA) and inductively coupled plasma (ICP).

15. Which method is better for simultaneous analysis of multiple elements and why? (Note: This question is worth 10%).
16. Which method has fewer problems with interferences and why? (Note: This question is worth 10%).
17. Which type of instrument is less expensive and therefore more frequently used?