

Chapter 10

Textbook questions

Question 10-1

What is an internal standard and why is it used?

An internal standard is a substance that responds to **uncontrollable variables** in a similar way as the analyte. It is introduced into or is present in both standards and samples in a fixed amount. The ratio of the analyte signal to the internal standard signal then serves as the analytical reading.

Question 10-2

Why are atomic emission methods with an ICP source better suited for multielement analysis than are flame atomic absorption methods?

Flame atomic absorption requires a separate lamp for each element, which is not convenient when multiple elements are to be determined.

Question 10-6

Describe three ways of introducing a sample into an ICP torch.

Ways of sample introduction

Method	Type of Sample
Pneumatic nebulization	Solution or slurry
Ultrasonic nebulization	Solution
Electrothermal vaporization	Solid, liquid, or solution
Hydride generation	Solution of certain elements
Direct insertion	Solid, powder
Laser ablation	Solid, metal
Spark or arc ablation	Conducting solid
Glow-discharge sputtering	Conducting solid

Question 10-8

Why are ionization interferences less severe in ICP than in flame emission spectroscopy?

Ionization interferences are less severe in the ICP than in flame emission because argon plasmas have a high concentration of electrons (from ionization of the argon) which represses ionization of the analyte.

Question 10-9

What are some of the advantages of plasma sources compared with flame sources for emission spectrometry?

Advantages of plasma sources include:

1. Lower interferences
2. Emission spectra for many elements can be obtained with one set of excitation conditions.
3. Spectra can be obtained for elements that tend to form refractory compounds.
4. Plasma sources usually have a linearity range that covers several decades in concentration.

Question 10-10

Discuss the advantages and disadvantages of sequential versus simultaneous multichannel ICP spectrometers.

Sequential spectrometers are usually less expensive than true simultaneous systems.

They are easier to maintain and operate. The sequential instruments are not as rapid as true simultaneous instruments and usually consume more sample when multiple elements are determined.