CHEM-E4120 Quantitative Instrumental Analysis

Examination 21.12.2016

Reply only to 5 questions upon your own choice!

1. What are the most important components of traditional and the present time modern spectrofotometers designed for absorption measurements?

2. Photon detectors in the photon energy range of 1.5 eV – 6 eV (wavelength range of 200 nm – 800 nm)? Ion/electron detectors?

3. How X rays can be generated in your samples? How these X rays evoked by these methods can be detected? What are the benefits and strengths of each of the generation and detection methods?

4. You are supposed to carry out trace analysis of certain rather heavy metal ions from your samples taken from your closed water circulation system. Your own laboratory has only an old spectrofotometer and you suspect that you could not reach the required LODs and LOQs with complexation techniques combined with the absorption measurements. What kind of methods would be reasonable to use when these analyses would be bought from an external service laboratory? What are the strengths of each of these analytical techniques?

5. How chromatography and capillary electrophoresis can be combined with masspectrometry? What are the strengths and weaknesses of different types of mass analyzer systems used?

6. (a) What kind of tools and means you can use to speed up your analysis with different types of chromatography? (b) What kind of analytes are best suited to be separated and detected by GLC and on the other hand by HPLC? (c) What kind of detectors there are for GC and HPLC? (d) What are the strengths of CE in comparison to HPLC?