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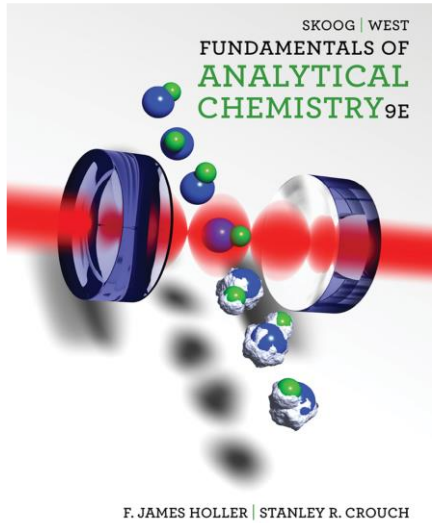
1.



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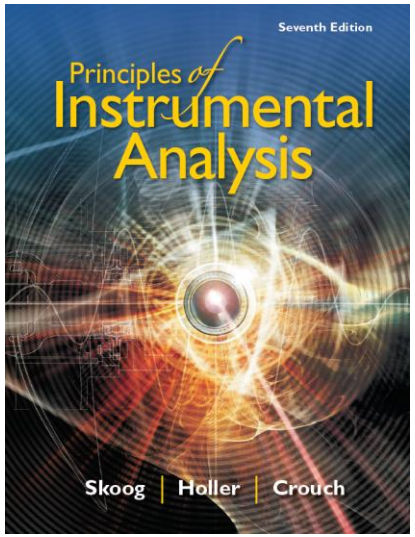

3. ATAKOL's lecture notes

1. Skoog, D.A., West, D.M., Holler, J.F., Crouch, S.R. 2013. Fundamentals of Analytical Chemistry (9E). Cengage Learning, Belmont, USA.
2. Skoog, D.A., Holler, J.F., Crouch, S.R. 2016. Principles of Instrumental Analysis (7E). Cengage Learning, Boston, USA.
3. Prof. Dr. Orhan ATAKOL's lecture notes.

ATOMIC MASS SPECTROMETRY

* Atomic and molecular masses are generally expressed on the *atomic mass scale*, which is based on a specific isotope of carbon. One *unified atomic mass unit* on this scale is equal to 1/12 the mass of a neutral $^{12}_{6}\mathrm{C}$ atom.

* The unified atomic mass unit is given the symbol u.
One unified atomic mass unit is commonly termed one *dalton* (Da), which has become the accepted term even though it is not an official SI unit.
The older term, atomic mass unit (amu) is discouraged since it was based on the most abundant stable isotope of oxygen $^{16}\mathrm{O}$.

* The relative atomic mass of an isotope such as $^{35}_{17}\mathrm{Cl}$ is then measured with respect to the mass of the reference $^{12}_{6}\mathrm{C}$ atom. Chlorine-35 has a mass that is 2.914071 times greater than the mass of the carbon isotope.

- In mass spectrometry, in contrast to most types of chemistry, we are often interested in the exact mass *m* of particular isotopes of an element or the exact mass of compounds containing a particular set of isotopes.

Mass-to-Charge Ratio

The mass-to-charge ratio of an ion is the unitless ratio of its mass number to the number of fundamental charges *z* on the ion. Because most ions in mass spectrometry are singly charged, the term mass-to-charge ratio is sometimes shortened to the more convenient term *mass*.

Types of Atomic Mass Spectrometry

Historically, thermal ionization mass spectrometry and spark source mass spectrometry (SSMS) were the first mass spectrometric methods developed for qualitative and quantitative elemental analysis, and these types of procedures still find applications, particularly inductively coupled plasma mass spectrometry (ICPMS).

Mass Spectrometers

A mass spectrometer is an instrument that produces ions and separates them according to their mass-to-charge ratios, *m/z*. Most of the ions are singly charged so that the ratio is simply equal to the mass number of the ion.

Several types of mass spectrometers are currently available from instrument manufacturers. We focus the three types that are used in atomic mass spectrometry:

* The *quadrupole mass spectrometer*
* The *time-of-flight mass spectrometer*
* The *double- focusing mass spectrometer*