University Hamma Lakhdar of El Oued,

Faculty of Exact Sciences

Lecture 3 in Technical English/ First Year Master Physics

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If we heat a sample of a compound to a sufficiently **high temperature** (for example, by putting it in an electric arc), the spectra of all the elements in the compound will be observed. Under such conditions, the resulting **spectrum** is no longer simple. It will most likely contain complicated patterns of many closely spaced lines. Yet each element gives out its own spectrum, which is different from that of any other. It takes accurate measurements of the positions of **spectral lines** to identify an element. Once this has been done, however, the presence of that element has been definitely established.

With a good instrument, it is observed that the yellow of **the sodium flame** is not just any yellow. It is a very specific color indeed, which has its own special place in the spectrum. It is a yellow made by no other element. The presence of this particular pair of lines always means that sodium is present in the **light source**. Even if the yellow color is hidden from the unaided eye by many colors, the spectroscope will show the presence of sodium. Although calcium, lithium, and strontium give flame tests of nearly the same color, each gives its own set of characteristic spectral lines when viewed through a **spectroscope.**

The spectroscope thus enables us to distinguish one element from another. Spectral analysis, or spectroscopy, can be done on tiny quantities of matter, such as very small sample of **a rare mineral** or of a **biological material**. Spectroscopy can even be used to determine the presence of different elements in distant objects like our sun and other stars. Analysis of sunlight was one of the very early uses of spectroscope in the study of unknown matter. During the first few years of spectroscopy, five new elements were discovered that are present on earth in such a small concentrations that they were **previously unknown**. For example, in analyzing the spectrum of **minerals** found in the water of a certain spring in Germany, two lines of unknown origin were found in the blue region of the spectrum. This bit of evidence was enough to challenge Robert Bunsen, the German chemist, to search for a new element in the water. In order to isolate some of the pure element, which he named "cesium"; it was necessary **to evaporate** 40,000kg of spring water! In more recent times, spectral analysis has been one of the tools found helpful in identifying some of the new elements produced by nuclear reactions. Time after time, this interplay between **chemical analysis** and spectral

analysis has caused complex substances to yield the secret of their composition. Invariably, the results given by these two different methods agree completely.

READING COMPREHENSION

Exercise 1: Answer the following questions by referring to the reading passage

1. What is the major function of spectroscopy?
2. In the very present, in which way spectroscopy is more helpful?
3. Translate the underline words in the text to Arabic.

Exercise 2: Decide whether each of the following statements is true (T) or false (F) or without any information to identify (N).

1. ……. It is impossible to see the spectra of oxygen and chlorine by using alcohol burner.
2. …….The positions of spectral lines of an element help identify the element.
3. …….Some elements may have some similar spectral lines.
4. …….Applying spectral analysis helps to detect new elements.

Exercise 3: Matching each of the words/phrases from column I with its definition from column II

Column I	**Column II**
1. To observe	a. precise
2. Flame	b. to tell the difference
3. Sample	c. a large amount of something in a small area
4. Pattern	d. a long and pointed stream of burning gas
5. Accurate	e. to recognize
6. To identify	f. to discover
7. Specific	g. a small amount of a substance scientifically examined and analyzed
8. To determine	h. a particular way for something to be done or to occur
9. To distinguish	i. to watch carefully
10. Concentration	k. particular