ATOMIC ABSORPTION SPECTROSCOPY

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Atomic absorption spectroscopy is a quantitative method of analysis that is applicable to many metals and a few nonmetals.
An atomic absorption spectrophotometer consists of a light source, a sample compartment and a detector.
In this method, light from a source is directed through the sample to a detector. The greater the amount of sample present, the greater the absorbance produced by the sample.
The source of light is a lamp whose cathode is composed of the element being measured.

Each element requires a different lamp.
A hollow cathode lamp for Aluminum (Al)
The lamp is housed inside the lamp compartment of the instrument.
The sample compartment is really the flame since it is in the flame that the atoms absorb radiation from the source.
The signal from the detector is transferred to the computer, and the output registers on the monitor in a manner specified by the user.
Hardcopy of the data is usually then sent to the printer.
One of the most common means of introducing the sample into the flame is by preparing a solution of the sample in a suitable solvent, frequently water.
The flame gases flowing into the burner create a suction that pulls the liquid into the small tube from the sample container. This liquid is transferred to the flame where the ions are atomized. These atoms absorb light from the source.
Sample is vaporized in the flame.

Aspirator tube sucks the sample into the flame in the sample compartment.
The readings specified by the user are displayed on the screen for each sample measured.
Quantitative analysis can be achieved by measuring the absorbance of a series of solutions of known concentration.

A calibration curve and the equation for the line can be used to determine an unknown concentration based on its absorbance.
Calibration Curve for the Determination of Aluminum by Atomic Absorption Spectroscopy

<table>
<thead>
<tr>
<th>Row Num</th>
<th>Conc Al (ppm)</th>
<th>Absorbance ()</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.00</td>
<td>0.001</td>
</tr>
<tr>
<td>2</td>
<td>110.50</td>
<td>0.068</td>
</tr>
<tr>
<td>3</td>
<td>221.00</td>
<td>0.140</td>
</tr>
<tr>
<td>4</td>
<td>331.50</td>
<td>0.215</td>
</tr>
<tr>
<td>5</td>
<td>552.50</td>
<td>0.350</td>
</tr>
</tbody>
</table>

Number: 5
Mean: 243.10, 0.155
Min: 0.00, 0.001
Max: 552.50, 0.350
Std Dev: 212.55, 0.135

$y = Mx + B$
$M = 0.00063605, B = 0.00017568$
Mean Sqr Err = 5.12E-06