The analysis of Metals using the
Varian Vista MPX CCD Simultaneous axial ICP-OES

1. General information
   Inductively coupled plasma optical emission spectroscopy (ICP-OES) is an analytical technique used for the detection of metals and non-metals such as phosphorus and silicon. It uses the plasma (above) to produce excited atoms and ions that emit electromagnetic radiation at wavelengths characteristic of a particular element. The intensity of this emission is indicative of the concentration of the element within the sample.

2. Sample Preparation
   In order to analyse samples by ICP-OES, they must be put into solution. The most commonly used sample preparation methods are detailed in our Standard Analytical Method No. 14. They are known as wet oxidations or digestions. These include: HNO₃/H₂O₂ used for organometallics, inorganic compounds and trace analysis, H₂SO₄/HClO₄ used for phosphorus, organometallic and trace analysis in organic compounds, HNO₃/HCl/H₂O₂ used for inorganic metal and trace analysis. Samples are made to volume in A grade volumetrics (eg 100ml, 50ml, 20ml, etc depending upon expected levels and sample concentration) using 18.2MΩ water. Blank solutions are prepared in the same manner for trace level determinations.

   Multiple standards, prepared using the same digestion method as the sample, are used in order to generate a calibration curve for each element to be determined. Eg. 5, 10 and 20ppm standards prepared in 100ml A grade volumetrics from 1000ppm stock standard solution.

4. Instrumental operation.
   Standard Analytical Method No. 21 sets out in detail how to use the ICP-OES. A calibration curve is prepared using the standard solutions. A minimum of two emission lines are chosen for examination in order to discount possible sources of interference. The concentration of metal in the sample solution is calculated by running the sample solution against the calibration curve.