

## Chapter 3

We saw in Chapter 3 that there is a need to prepare or process our “representative” sample in order to ‘measure’ our analyte(s) or property of interest. This should be performed in such a way, so as to maintain the integrity of the sample, its analyte(s) or property.

We also saw that while there are a number of stages involved in the sample preparation process, it helps first to identify from our Analytical Choices flowchart (Figure 3.1) what we are dealing with (sample and analyte or property types) and what we are measuring in terms of particular categories. This process will influence our decision making process and as we have seen in chapter 3, there is a close link between the analyte(s) or property to be measured, the sample preparation process and the final measurement technique.

### Problem 1

- a) Identify the possible categories for each of the scenarios in the below list of analytes and samples, using Figure 3.1 and the relevant section in Chapter 3. You can use various search techniques, if needed to help identify both the sample type and the type of analyte within the categories. The first scenario in the list (i) is completed for you, to act as a guide. See Example Feedback on i) below.
- i) The presence of (the ‘NSAID’) Phenylbutazone in meats sold for human consumption
  - ii) (Methyl) and other alkyl Parabenzoic Acid (PBA) additives in face cream
  - iii) Manuka Factor in honey to check adulteration or Faked quality goods
  - iv) Levels of Bisphenol A in printed Till and Card Receipts
  - v) Levels of Radionuclides in Plants and Soils from old uranium mining activities. (U, Ra, Pb, etc.)
  - vi) Concentration of titanium dioxide in sunscreen
  - vii) The composition of scrap metal salvaged from a waste facility, for sorting and selling
  - viii) The determination of elemental composition of mineral tablets sold on the Food Supplement market
  - ix) The determination of the (range of) fatty acid content of Soya beans.

- x) The determination of ammonium ions in a processed waste-water discharged to a river.

### Problem 2

- b) Using the list of scenarios from section (a), above, identify the processes you would undertake to bring each of the analyte(s) of interest from their various sample types into a form ready for measurement by a suitable (instrumental) technique. Remember that there is often more than one way to process your samples, to allow the analyte (or property) to be in a form ready for a suitable measurement technique. Therefore at this stage you are just looking for viable route(s). As a guide, the first in the list is again given as a feedback example, but with a little more detail than you need to give, in order to demonstrate the process.

### Problem 3

We saw in the on-line problems for Chapter 1 that 'Problem 7' asked you to consider recycled plastics and secondary plastics products destined for use by the general consumer as a potential problem because of certain metal and metalloid elements being present as well as certain non-metallic elements (other than the more common backbone elements of carbon, hydrogen, oxygen, nitrogen and sulphur). With this in mind, consider the scenario where you are a county public analyst and have been sent a yellow-coloured plastic drinking mug from Trading Standards. The mug is imported from a non-EU country and the only details you have are the country of origin, the importer, the 'plastic' material itself is possibly constituted from recycled sources but stated to be HDPP and "suitable as a drinking vessel".

- a) How might you identify the type (and possible range) of plastic material it is made from?
- b) How might you identify the suitability of the yellow plastic mug for its stated use as a "drinking vessel"?

Hint: See the feedback to Problem 7 in chapter 1 on-line, for guidance. Then categorise the sample and analyte, and then consider whether you can directly undertake part a) using a suitable technique (with limited sample preparation required?). This question is raised again in the on-line chapter 4 section, later on, as Question 5, which considers measurement

techniques. You might also consider any direct solids measurement techniques that could be used to address part b).

Remember that this is chapter 3 on-line and addresses how the sample can be prepared ready for measurement. As part b) will also include migration or leachable elements from the plastic, an interrogation of suitable European and government web sites (EU JRC, FSA, DEFRA and peer-reviewed scientific sources / papers etc.) would be a good start.