Service offerings from Pharmaceutical Chemistry – Wet Chemistry

Quantitative analysis

Contact for more details on techniques : dluk24-WetChemTechnical@mdlz.com

Assays by titration. Determining the concentration/purity and average molecular weight of an analyte

- Manual titrations. Highly skilled analysts ensure accurate and consistent results.
- Potentiometric titrations. Accuracy increases by measuring the end-point automatically. Titrant aliquots can also be 10 times more precise than manual aliquots.

Assays by spectrophotometric techniques

- Ultraviolet-visible Spectroscopy: Colorimetric assays allow calculation of the content of an active pharmaceutical ingredient based on the absorbance measurement obtained using UV-Vis.
- Fourier Transform Infrared Spectroscopy. Determination of simethicone content in emulsions by comparing an FTIR spectrum of a sample to that of a simethicone standard of known concentration.

Assays involving redox columns

- Redox multi-step reactions coupled with manual titrations. These assays make use of a reducing column, while the titrants work to oxidise intermediate reagents.

Hydrofluoric acid based assays

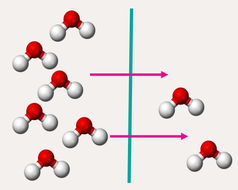
- Determination of silicon dioxide and talc purity %, requiring the use of hydrofluoric acid and high temperatures, due to the insolubility of silica in any other solvents.

Gravimetric analyses

- Testing for impurity residues in high temperature conditions – sulphated ash, total ash, residue on evaporation, solvent-insoluble impurities for a given sample aliquot.
- Testing for loss of sample weight upon drying.

Osmometry. Defines the total number of solute particles in a solution

- Osmolarity measures particle count per litre of solvent. Osmolality measures particle count per kg solvent.
- Freezing point depression osmometer
- Osmolality of medicinal injections/formulations (vaccines, injectable water, vitamins, insulin) heavily influences the water diffusion (osmosis) through cell membranes.



Melting/freezing/boiling point
Density Refractive Index

- Monitoring physical properties through high-precision, instrumental analysis.
- Data can validate if the sample conforms to pharmacopoeial requirements.

Value tests

- Saponification: expresses the quantity of potassium hydroxide required to neutralise the free acids and to saponify the esters present in 1 g sample
- Unsaponification: applied to the substances non-volatile at 100-105 °C obtained by extraction with an organic solvent from the sample after it had been saponified.
- Iodine : expresses in grams the quantity of iodine, that can be fixed by 100 g substance
- Acid : the quantity of potassium hydroxide required to neutralise the free acids present in 1 g of the substance
- Esters of oleic acid : conforms if any esters are present in a fatty acid sample
- Hydroxyl : expresses the quantity of potassium hydroxide required to neutralise the acid combined by acylation in 1 g sample
- Peroxide : expresses the quantity of peroxide contained in 1 kg sample in milliequivalents of active oxygen

pH

- Measure the acidity or the alkalinity of samples in aqueous solutions.
- pH is a critical factor for all medicine, because it has an impact on molecular solubility, medication stability, biological tolerability of the formulation, and the efficiency of the active ingredient.

Specific Optical Rotation

- Measures the change in orientation of monochromatic plane-polarized light as the light passes through a sample in solution.
- It is a useful tool for studying optical isomerism of compounds. A highly sensitive technique, which can identify impurities in the sample, which alter the optical rotation from pharmacopoeial values.

Conductivity

- Conductivity measures how easily an electric current passes through a material and it is directly proportional to the concentration of salts in a given sample.
- Accurate measurement of conductivity in API manufacturing plays an important role in many steps, including crystallization control, cleaning and rinsing, and water production. At each of these steps, inaccurate measurements can lead to productivity loss, contamination, or expensive batch failure.

Method validation for quantitative analyses.

- We offer the methodology to have client methods validated to Good Manufacturing Practice requirements. Our standards of work ensure all pharmacopoeial criteria for validation are met. Below are a few examples: Peroxide content assays. Autotitrations, manual titrations. Container closure integrity – a limit test for ingress of dye within containers.

Reading Scientific Services Ltd
The Reading Science Centre, Whiteknights Campus, Pepper Lane, Reading, Berkshire RG6 6LA • Tel: **+44 (0)118 918 4000** • Email: **enquiries@rssl.com** • **www.rssl.com**

Service offerings from Pharmaceutical Chemistry – Wet Chemistry

Qualitative analysis

Contact for more details on techniques: dluk24-WetChemTechnical@mdlz.com

Characters

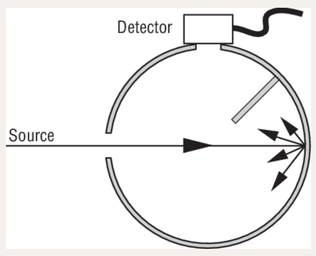
Visual or instrumental depiction of the qualities of the chemical being tested.
The environment's influence on the chemical is being monitored.

Sample identification methods

Manual testing: identifying the functional group/ion specific to the sample by formation of new functional groups in the presence of certain reagents

Instrumental testing: via spectroscopic methods – Ultraviolet visible Spectroscopy and Fourier Transform Infrared Spectroscopy

- **FTIR methods-** ATR accessory, sample embedded in discs with potassium bromide, analysis between salt plates, nujol mull
- **UV-Vis methods**
  - two-dimensional detector of absorbance/transmittance in solution
  - **integrating sphere accessory:** the complete sample beam is collected even if the light path deviates.
    For transmittance/absorbance analysis of solid materials such as powders, large irregular samples (paper, glass, plastic), but it can be used for liquids, too. The 150 mm sphere is ideal for colour analysis.



Stability qualification

Simulating shelf life of medicines, raw materials.

Tracking compliance to pharmacopoeial requirements periodically.

Semi-quantitative analysis

Differentiating between glass types

Assesses the hydrolytic resistance of glass containers, grains, or glass part of a container.

Testing is carried out by titration of the extraction solutions obtained from the glass, under the conditions described for the specific test.

Coloured glass containers can also be tested for spectral transmission.

Thin layer chromatography

Separates mixtures of substances into their components, allowing for their identification when compared to reference standards.

Uses a thin, uniform layer of silica gel or alumina coated onto glass. The mobile phase reagents allow all components to travel onto the polar silica layer and be separated based on their different polarities (affinities) to the silica.

Testing limits of hazardous materials in food & pharmaceutical ingredients

Limit of total organic carbon

Testing surface coupons for validating internal cleaning methods of reactors/pipelines used in medicine fabrication

Identifying any trace organic and inorganic carbon sources from cleaning water/injectable water.

Method validation for qualitative analyses

We offer the methodology to have client methods validated to Good Manufacturing Practice requirements.

Validation of method for non-compendial materials, which are tested using compendial tests (effectively validating each method for the suitability of use with each raw material)

Validation of client methods or researched methods to the International Committee of Harmonization guidelines

Verification of compendial methods (Can RSSL perform the test as stated in the pharmacopoeia)

Reading Scientific Services Ltd
The Reading Science Centre, Whiteknights Campus, Pepper Lane, Reading, Berkshire RG6 6LA • Tel: **+44 (0)118 918 4000** • Email: **enquiries@rssl.com** • **www.rssl.com**