

Essential practical skills list

General Scientific Skills and Safety

- Apply a working knowledge of scientific regulation, health & safety and laboratory safe practice. This should include: emergency procedures; principles of safe storage, use, disposal and containment of chemicals (e.g. use of fume-hoods) and other hazards (e.g. electrical, magnetic fields, radiochemical, lasers, glass and sharps) including spillages/breakages; correct use of PPE; identification and labelling of materials; principles of safe use of equipment and risk assessments
- Prepare and use supporting documentation in compliance with local safety procedures and regulations (e.g. COSHH forms, risk assessments)
- Plan, design and correctly rationalise experiments to test a scientific hypothesis in a timely manner which considers important measurement criteria such as accuracy and precision
- Competently and accurately observe and keep records of practical work and effectively report the data in an appropriate scientific manner
- Behave in a proper, ethical and professional manner within the laboratory environment

General laboratory techniques

- Use and care for balances and laboratory equipment (e.g. pH meters, glass/auto pipettes and burettes)
- Safely assemble and clean glassware (considering appropriateness for use and required precision where relevant)
- Correctly and safely use, prepare and handle solids, liquids, gases and solutions (including toxic and corrosive materials)
- Understand and use chemical terminology
- Calculate quantities and concentrations of reagents

Experimental methods

- Set up a wide range of reactions using a range of heating/cooling methods and appropriate atmospheres
- Safely quench and work up reactions including aqueous work-up and using appropriate drying agents
- Use common laboratory processes such as evaporation, measurements of melting points, measurement of pH and determination of equivalence points
- Use a wide range of separation and purification techniques for solids, liquids and gases. These could include distillation, recrystallisation, sublimation, solvent extraction, filtration, thin layer chromatography and column chromatography (including gas chromatography, high performance liquid chromatography and flash chromatography)
- Design, construct and execute an experiment to determine quantitative, qualitative, kinetic or thermodynamic parameters and assess/evaluate the results
- Prepare samples for and interpret spectra from a wide range of commonly used spectroscopic and spectrometric techniques. These could include infra-red, UV-visible, nuclear magnetic resonance, mass spectrometry, polarimetry, fluorescence, Raman, atomic absorption spectroscopy, X-ray diffraction and microscopy

Data analysis

- Develop a wide range of numerical, data analysis and presentation skills such as calculating and accurately reporting measurement uncertainties by utilising appropriate statistical packages and databases.