Practical Endorsement

The key areas of study in this topic are:

- Independent thinking
- Use and application of scientific methods and practices
- Research and referencing
- Instruments and equipment
- Use of apparatus and techniques

By the end of the course I should be able to:	Start	End
Apply investigative approaches and methods to practical work, including how to solve problems in a practical context		
Safely and correctly use a range of practical equipment and materials		
Identify potential hazards and minimise risks		
Follow written instructions		
Make and record observations/measurements		
Keep appropriate records of experimental activities		
Present information and data in a scientific way		
Use appropriate software and tools to process data, carry out research and report findings		
Use online and offline research skills including websites, textbooks and other printed scientific sources of information		
Correctly cite sources of information		
Use a wide range of experimental and practical instruments, equipment and techniques		

Demonstrate the practical skills listed above through use of the apparatus and techniques listed below.
• use of appropriate apparatus to record a range of measurements (to include mass, time, volume of liquids and gases, temperature)
• use of a water bath or electric heater or sand bath for heating
• measurement of pH using pH charts, or pH meter, or pH probe on a data logger
• use of laboratory apparatus for a variety of experimental techniques including:
  ○ titration, using burette and pipette
  ○ distillation and heating under reflux, including setting up glassware using retort stand and clamps		

○ qualitative tests for ions and organic functional groups ○ filtration, including use of fluted filter paper, or filtration under reduced pressure • use of a volumetric flask, including accurate technique for making up a standard solution • use of acid–base indicators in titrations of weak/ strong acids with weak/strong alkalis • purification of: ○ a solid product by recrystallization ○ a liquid product, including use of a separating funnel • use of melting point apparatus • use of thin layer or paper chromatography • setting up of electrochemical cells and measuring voltages • safely and carefully handling solids and liquids, including corrosive, irritant, flammable and toxic substances • measurement of rates of reaction by at least two different methods, for example: ○ an initial rate method such as a clock reaction ○ a continuous monitoring method