

## A policy position on the Royal Society of Chemistry's vision for practical chemistry in 5-19 education



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## Summary

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Practical chemistry is an essential part of the chemistry discipline because it supports the understanding of the subject as an empirical science and is core to understanding the question 'How do we do chemistry?'.<sup>1</sup> The skills developed through practical work can be used by youngpeople in their future studies and careers in the sciences and beyond. Practical chemistry can also introduce students to the real-life application of the sciences and develop an understanding of hazards and risks.

We believe it is crucial that all learners should have access to relevant and regular practical chemistry activities throughout their chemistry education, which are sustainable, inclusive, accessible and have a clear purpose. However, we are concerned that there are barriers to practical chemistry across all UK nations due to the lack of science technicians; lack of funding; insufficient time within the science curriculum to teach practical chemistry and inadequate subject specific professional development available for science teachers.

## Introduction

We believe that the purposes of practical chemistry activities are:<sup>2</sup>

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Practical skills should be developed over the course of a young person's 5-19 education. They can be divided into four areas:<sup>4</sup>

1 Manipulative skills: setting up and using laboratory equipment; taking measurements; using computational simulations.

2 Procedural skills: being safe in the laboratory; following a scientific method; choosing suitable equipment.

3 Scientific Enquiry skills: making observations; making predictions; identifying variables; asking questions; analysing data; collecting data; interpreting data; drawing conclusions; pattern seeking; identifying, classifying and grouping; using secondary sources; writing lab reports; presentations.

4 Wider skills: time-management; teamwork; organisation; communication; confidence; numeracy; using software such as Microsoft Excel to plot graphs and present data; researching; referencing.

Some skills are possible to develop by completing a variety of desk-based activities, such as analysing data from a textbook. However, these should complement but not replace hands-on practical chemistry activities.

## Key Messages

We believe that students should take part (s)-18 (e)-3 T5 Tf33.8 50 (r)-27 (t)26-3 T5 Tf33.8 50 (r)-27 (t)denvel Soal So

4 Practical chemistry activities must have a clear purpose and be related to the learning aims of the lesson.

5 Practical chemistry activities must promote an equitable chemistry education and be designed with consideration to inclusivity and accessibility.

6 The sustainability of practical activities should be considered at all stages, to aid with budget constraints and reduce the environmental footprint of practical chemistry in classrooms. Sustainability of practical chemistry can be improved through the consideration of the amount and type of chemicals used in the classroom and the type of experiments conducted.<sup>17</sup>