

## The hunt for vitamin C

This resource accompanies the article **Vital vitamins** in *Education in Chemistry* which can be viewed at [rsc.li/46meZdM](https://rsc.li/46meZdM).

The resource has been adapted from the book series **In search of more solutions**. You can find more practical problem-solving activities from this series at: [rsc.li/3Q5bsKR](https://rsc.li/3Q5bsKR).

### Introduction


Read our standard health and safety guidance ([rsc.li/3IAmFA0](https://rsc.li/3IAmFA0)) and carry out a risk assessment before running any live practical. See the **teacher notes** for further instructions and the **student sheets** for partial instructions to carry out the problem-solving experiment.

### Available equipment

- Filter funnel
- Muslin or glass wool
- 25 cm<sup>3</sup> pipette and safety filler
- 50 cm<sup>3</sup> burette
- 250 cm<sup>3</sup> conical flask
- 25 cm<sup>3</sup> measuring cylinder
- 100 cm<sup>3</sup> measuring cylinder
- 500 cm<sup>3</sup> measuring cylinder
- 250 cm<sup>3</sup> beaker
- Bunsen burner, tripod and gauze
- Safety glasses
- Liquidiser
- Safety equipment: safety glasses

### Preparation and safety

- 100 g of green cabbage  
(With a large class provide students with pre-shredded cabbage and allow them to weigh out 100 g).
- Deionised water to ensure no dissolved oxygen interferes with the vitamin C content.

Chemicals supplied for the practical	Preparation
<p>Phosphoric acid solution, 5% solution, equivalent to about <math>0.9 \text{ mol dm}^{-3}</math>.  <math>\text{H}_3\text{PO}_4(\text{aq})</math>            Currently not classified as hazardous.            CLEAPSS hazcard HC072.</p>	<p>Phosphoric acid concentrated solution.  <math>\text{H}_3\text{PO}_4(\text{l})</math>            The usual concentrated commercial solution is about 85% (w/w) which is equivalent to <math>14.7 \text{ mol dm}^{-3}</math>. Check information from supplier.            MW = <math>97.99 \text{ g mol}^{-1}</math></p> <p></p> <p>DANGER            Causes severe burns and eye damage.            Wear splash-proof goggles and chemical-resistant gloves.            CLEAPSS recipe book RB065.</p>
<p>2, 6-Dichlorophenolindophenol (DCPIP) solution, <math>0.4 \text{ g dm}^{-3}</math>.  <math>\text{C}_{12}\text{H}_7\text{NCl}_2\text{O}_2(\text{aq})</math>            Not usually considered as hazardous. Check the supplier's SDS.            CLEAPSS hazcard HC032.</p>	<p>2, 6-Dichlorophenolindophenol (DCPIP), solid.  <math>\text{C}_{12}\text{H}_7\text{NCl}_2\text{O}_2(\text{s})</math>            MW = <math>268.1 \text{ g mol}^{-1}</math>            Not usually considered as hazardous. Check the supplier's SDS.            CLEAPSS recipe sheet RB000 recipe 13.</p>
<p>Ascorbic acid (vitamin C) solution, <math>0.2 \text{ g dm}^{-3}</math> in 5% phosphoric acid.  <math>\text{C}_6\text{H}_8\text{O}_6(\text{l})</math>            Currently not classified as hazardous.            CLEAPSS hazcard HC038d.</p>	<p>Ascorbic acid solid.  <math>\text{C}_6\text{H}_8\text{O}_6(\text{s})</math>            MW = <math>176.12 \text{ g mol}^{-1}</math>            Currently not classified as hazardous.</p> <p>Phosphoric acid solution, 5% solution, equivalent to about <math>0.9 \text{ mol dm}^{-3}</math>.  <math>\text{H}_3\text{PO}_4(\text{aq})</math>            Currently not classified as hazardous.            See information above.</p>

### Tips and safety advice

- The concentration of the DCPIP solution will not be accurate hence it is important to carry out Task 3, stage 1 (standardisation) of the experiment.

### Disposal

- Dilute the cabbage solution and the 5% phosphoric acid solution to a concentration of  $0.1 \text{ mol dm}^{-3}$  phosphoric acid and the DCPIP solution to 0.1% before pouring down a foul-water drain.