

Vitamin C

Introduction

The determination of the vitamin C content of different drinks, fruits and vegetables is an easy practical and gives good quantitative results. Using known concentrations of ascorbic acid to produce standard curves allows accurate determination of concentration and opportunities for students to practice techniques such as the preparation of dilution series, accuracy and precision. The practical generates results that students find interesting and relevant.

Background

Vitamin C, (ascorbic acid), was the first vitamin to be artificially synthesised in 1935, though its history goes back to ancient folk knowledge of the need for fresh plant material and raw animal flesh to prevent disease.

The most important role of vitamin C is in the formation of collagen, the ubiquitous structural protein component found in connective tissues, skin, bones, cartilage, ligaments and elsewhere. Lack of the vitamin eventually leads to the symptoms associated with scurvy resulting from collagen failure. Early symptoms include spongy bleeding gums, liver spots on the skin and lethargy followed in the later stages by loss of teeth, failure of wounds to heal, immobilisation and eventual death.

The RDA (Recommended Dietary Allowance) for vitamin C is 40mg/day (UK), 45mg/day (WHO), and 60-95mg/day in USA depending on age and sex. The Tolerable Upper Intake level in USA is 2000mg/day for a 25 year old male, though independent sources have recommended daily intakes higher than this.

Method

The methods for detecting vitamin C generally make use of its anti-oxidant property. A method often used in schools is the reduction of DCPIP from blue to colourless. The method recommended here is the decolourisation of the blue/black starch-iodine complex which we have found as accurate, cheaper and easier than the alternative.

.To prepare a stock solution of starch-iodine dissolve 0.2g of soluble starch in about 50cm³ of boiling water.

Add 2cm³ of stock iodine solution and make the final volume up to 100cm³ with water.

.For colorimetry this should be diluted 1:4 with water to give an absorbance between 1 and 1.5 using red light.

Add 0.5cm³ of test solution to 3cm³ of the starch-iodine solution. For a standard curve a range of concentrations between 0 and 0.1g/l are suitable.

More details, suggestions for investigations and sample results can be viewed on the Mystrica website, www.mystrica.com