

# Colorimetric determination of phosphate in toothpaste – sample data



*Education in Chemistry*

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[rsc.li/EiC417-medical-plastics](http://rsc.li/EiC417-medical-plastics)

This experiment accompanies the above article 'Body, heal thyself'

## Background

This article discusses the use of bioglass as a source of calcium and phosphate ions for remineralising bones. It also states that remineralising toothpastes work in a similar way. The amount of phosphate ion in toothpaste can be determined using a phosphate assay technique combined with colorimetry or visual comparison. This provides a novel and engaging context for colorimetry work, especially if pupils are allowed to bring in toothpaste samples from home and compare their results with the manufacturers' published values.

Phosphate ions react with ammonium molybdate to form a vivid blue complex, which gives good results in a school colorimeter at 650 nm. The reaction is carried out in the presence of excess acid to prevent oxidation. Download the student worksheet ([rsc.li/2sKtDLK](http://rsc.li/2sKtDLK)) and technician notes ([rsc.li/2rPX7E0](http://rsc.li/2rPX7E0)).

## Sample data

Calibration solutions were prepared using potassium dihydrogenphosphate(V) and complexed with ammonium molybdate in acidic solution.

3.5 g of toothpaste was made up to 100 cm<sup>3</sup> of stock solution in a volumetric flask. 10 cm<sup>3</sup> of this was pipetted into another 100 cm<sup>3</sup> volumetric flask and the ingredients for complex formation added before making up to the mark. This gave a result that fell within the calibration range.

mg/dm <sup>3</sup> phosphate	Absorbance
0	0.02
2	0.22
5	0.49
10	0.86
Toothpaste	0.75