'Let's get Practical'
– How Science Works

OCR
RECOGNISING ACHIEVEMENT

Column Chromatography

Apparatus:

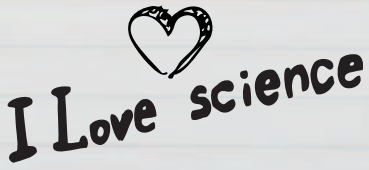
Colourless plastic drinking straws [of the type without the bending concertina folds]
Talcum powder
Test tubes [dimensions 25mm x 150mm] and bungs with single holes to hold the glass rod
Glass rods
Adhesive tape
Scissors
Scalpels
Pin
A suitable mixture to separate [food colours or inks as demonstration mixtures]
Butan-1-ol or ethanol

Reference: Additional Applied Science A4.4

Can also be used with Gateway Science Suite Chemistry Module C3g *'Batch or continuous?'* or Twenty First Century Science Suite Chemistry Module C7.5 *'Chromatography'*

Chromatography may be carried out using a number of support systems for the stationary phase. It is not uncommon to use paper or sheets of plastic or glass which carry a thin layer of silica, but the latter are expensive and fragile and the former does not always give a good separation. Moreover, the flat surfaces must not be touched and sometimes large vessels are needed to cope with the width of the strips. The sides of the strips must be kept away from the sides in order to preserve a horizontal rising solvent front. Care must also be taken not to spot the plate in a position below the eluent level, and this can sometimes be difficult to judge. Also, these methods do not easily allow for investigation on the effects of different stationary phases on the efficiency of the procedure, nor are they readily adaptable to running multiple chromatograms at the same time.

This simple exercise circumvents these problems and utilises a readily available stationary phase: talc. It is useful as a means of simple qualitative analysis.



Procedure

1 A test tube, bung and glass rod are assembled as shown in figure 1. The bung must be a tight fit in the tube without the bottom of the glass rod bearing on the bottom of the tube.

2 A plastic drinking straw is cut to length as shown also in figure 1. This will ultimately be stuck to the rod.

3 The tube is charged with eluent to a depth of 6cm.

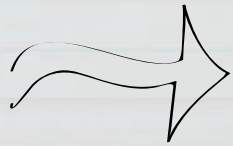
4 The straw is the thrust carefully into a beaker containing talcum powder. This will push powder up into the straw. Several cycles should enable talcum powder to a depth of 5 cm to be pushed up into the straw.

5 Using a pin, the first 2-3 mm of packing is picked out from the filled end of the straw, and this end dipped into the mixture to be separated, so that some of the mixture is just absorbed onto the talc.

6 This end is then sealed by once again pushing the straw into some talc which has been placed on a tile.

7 The straw is then attached with tape to the glass rod as shown in figure 1, and the bung/rod/straw assembly pushed into the test tube. It is important that the end of the straw is a little higher than the end of the glass rod so that eluent is able to soak up into the column of stationary phase.

8 The combination of capillary action and inequality of liquid levels inside and out side the straw will cause the eluent to rise up through the talc, and in so doing effect the separation of the mixtures



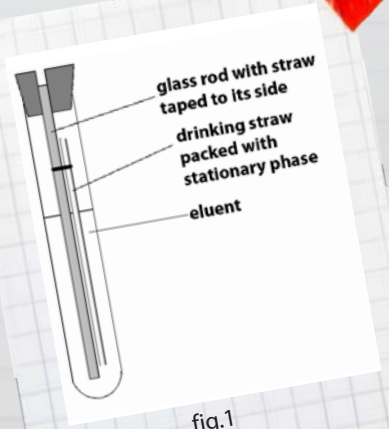


fig.1

Questions and extensions

1 Investigate effects of using different inorganic powders as stationary phases, e.g. calcium carbonate, magnesium oxide

2 TLC plates could be made on microscope slides by applying slurries of magnesium oxide or silica using a glass rod and allowing the slides to dry before spotting in the conventional way.

3 Investigate the possibility of running more than one straw in each test tube, perhaps switching to boiling tubes if this is more appropriate. When making comparisons would this be of any advantage?

Reference

http://khimiya.org/pdfs/EKHIMIYA_18_3_ERGUL_c.pdf