PAPER CHROMATOGRAPHY

1. a) Pen 2.

   b) Dissolve some of the ink from the message in a suitable solvent, and then put a spot of the solution on a previously drawn pencil line on the chromatography paper, labelling it M (also in pencil). Place spots of ink from the various pens on the same line and label them as well.

   Suspend the paper in a chromatography tank so that the pencil line is above the level of the solvent used, and then wait.

   c) To stop the solvent from evaporating as it rises up the paper.

   d) Ninhydrin

   e) It contains amino acids 1,4 and 5, plus another amino acid which doesn't match any of the comparison ones. (If you included 2 as well, you didn't look at the diagram carefully enough. The R_f value is the same, but the colour of the spot is different.)

2. a) You would put a spot of the mixture on the pencil line, and label it M. You then place the paper in solvent as described above until you have a good separation. Remove the paper from the solvent, mark the position of the solvent front, and dry the paper.

   Then rotate it through 90° so that the row of spots is near the bottom of the paper, and suspend it in a second solvent.

   b) These are the marked positions of the solvent fronts in solvents 1 and 2.

   c) You measure the distance travelled by the spot and divide it by the distance travelled by the solvent front.

   d) (i) spot 4

   (ii) spot 1

   (iii) spot 1

   (iv) spot 4

   In each case, you are looking for the spot which has travelled the greatest or the least distance relative to the distance travelled by the solvent front.

3. a) Paper is made of fibres of cellulose which is a polymer of glucose. The important thing about glucose is the large number of OH groups sticking out from the molecules. These attract water molecules either from the air or those present when the paper was made. Paper therefore has fibres

which are surrounded by water molecules.
b) The more polar a molecule is, the more time it will spend in solution in the water attached to the fibres, and the less time it will spend in the non-polar solvent. It won't therefore travel very far up the paper. That means that the more polar the molecule, the smaller the R_f value. On the other hand, a non-polar molecule will spend more of its time dissolved in the non-polar solvent, and so travel much further up the paper. Its R_f value will be greater.

c) partition