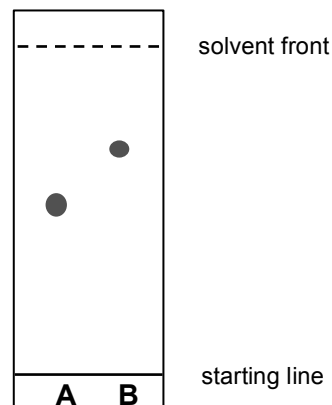




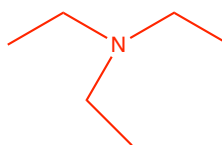
Propylamine and triethylamine were analysed by thin layer chromatography. A silica plate was used with hexane as solvent. The resulting chromatogram is shown.



a Draw the skeletal structure of each amine.



propylamine



triethylamine

b Give two ways in which the spots of these colourless substances could be identified.

- 1 **under a uv lamp**
- 2 **using ninhydrin**

c Calculate the  $R_f$  value of spots **A** and **B**.

$$\text{Spot A: } R_f = \frac{22.5}{43.5} = 0.52$$

$$\text{Spot B: } R_f = \frac{29.5}{43.5} = 0.68$$

d State which substance is spot **A**. Explain your answer.

**A = propylamine B = triethylamine**

**propylamine is more polar than triethylamine and therefore propylamine has a greater relative affinity for the silica than the hexane and so moves slower**

e A second experiment was carried out. Before putting samples on the plate, some hydrochloric acid was added to each amine. Predict how the  $R_f$  values for the acidified amine samples will change from the original experiment.

**amines react with acid to form ionic salts**

**these have a greater relative affinity for the silica than the hexane compared to the amines**

**therefore the spots move a shorter distance (if at all) and have lower  $R_f$  values**