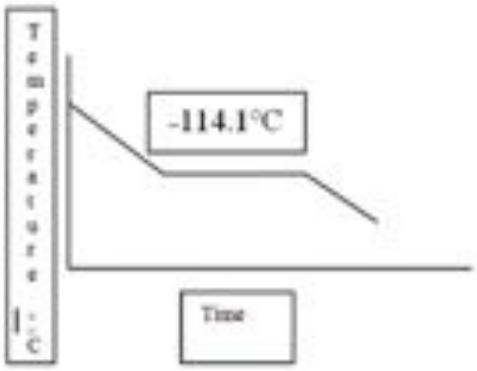
Macroscopic Properties of Matter

Problem solving and quantities in chemistry

Set 1: Mixtures Exercises and Answers

1. Describe using examples the differences between a homogeneous and a heterogeneous mixture.
Homogeneous: (includes solutions) you cannot see the mixed components e.g. air, sea water, sugar solution, brass
Heterogeneous: can easily see the mixed components e.g. muddy water, orange juice with pulp, sugar and concrete

2. The following graph shows the cooling cure of ethanol. Place the following labels on the graph: time, temperature and freezing point (actual value). Is ethanol a pure substance? Explain.



Yes A pure substance contains only one kind of particle throughout, which is C_2H_5OH in this case.

3. The paper chromatogram below shows the separation of a black ink.
(a) What is a paper chromatogram?
(b) How is it produced?
(c) Use the chromatogram to describe the ink mixture.
(d) Explain the different positions of the colours.
(e) What is an R value?
(f) How would you determine the R values for each colour component.

The black ink paper chromatogram:
(a) A paper chromatogram is the paper after chromatography has separated the dyes.
(b) Produced as solvent rises through paper meeting the mixture and carrying it up the paper with the solvent. Different compounds in the sample mixture travel different distances.
(c) The black ink is a mixture of yellow, red and blue dye.
(d) Yellow adheres the most strongly with the paper followed by the red then the blue so the blue travels further up the paper.

4. Describe how you could separate and collect the first substance (in bold) from each mixture:
(a) **Sugar** and sand;
(b) **Sand** and salt;
(c) **Water** and sugar;
(d) **Blue dye** and yellow dye;

(e) **Octane** from crude oil;
(f) **Ilmenite** from other mineral sands;

(a) Add water to dissolve the sugar, filter off the sand, evaporate the water and recover the sugar.
(b) Add water to dissolve the salt, filter off the sand and dry.
(c) Distillation
(d) Paper chromatography
(e) Fractional distillation
(f) Use a magnet, ilmenite is slightly magnetic