

## Separating and Purifying substances

Total Marks : 18

Q1.

Inks contain coloured dyes.

Samples of four inks, **W**, **X**, **Y** and **Z**, were separated using paper chromatography.

Figure 5 shows the chromatogram obtained.

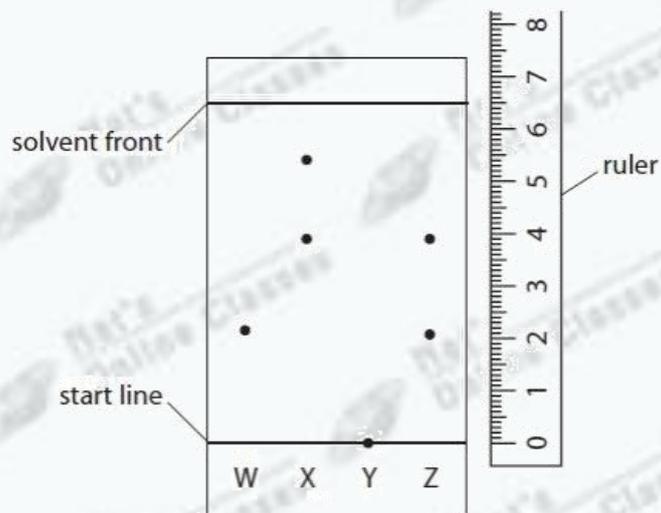


Figure 5

(i) In the experiment, the solvent front moved 6.5 cm.

Calculate the  $R_f$  value of the dye that is present in both inks **X** and **Z**.

(1)

.....  
.....

$R_f =$  .....

(ii) State what could be changed in the experiment to make the  $R_f$  value more accurate.

(1)

.....

.....

(iii) In this experiment, ink sample Y did not move from the start line.

Explain a change to the experiment that would be needed to separate the dyes in ink sample Y.

(2)

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**(Total for question = 4 marks)**

**Q2.**

A sample of rock salt contains a mixture of sodium chloride and some insoluble substances.

The rock salt is added to water and the mixture stirred.

The mixture is then filtered to obtain a filtrate of sodium chloride solution.

(i) Draw a labelled diagram of the apparatus used to filter the mixture and collect the sodium chloride solution.

(2)

(ii) Describe how a sample of pure, dry sodium chloride crystals can be obtained from the filtrate.

(3)

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**(Total for question = 5 marks)**

Q3.

A student set up the apparatus shown in Figure 4 to obtain pure water from sea water by distillation.

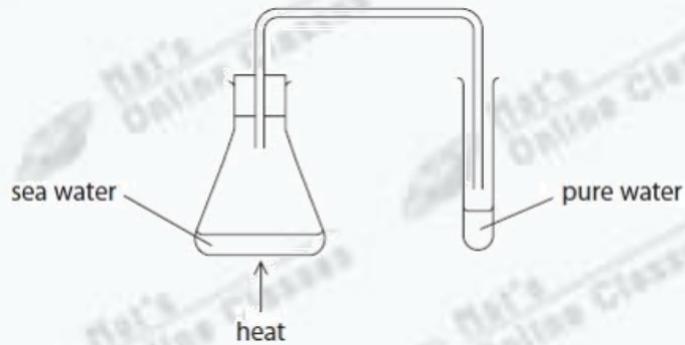


Figure 4

(i) Explain how the water in sea water separates to produce the pure water in this apparatus.

(2)

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(ii) Explain how the apparatus could be improved to increase the amount of pure water collected from the same volume of sea water.

(2)

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(Total for question = 4 marks)

Q4.

Figure 2 shows a label from a bottle of drinking water.

Pure drinking water	
Mass of dissolved solids in mg per 1000cm <sup>3</sup>	
calcium ions	60
sodium ions	2
hydrogencarbonate ions	200
pH of water	
pH	7

Figure 2

(i) Explain why this drinking water should not be described as pure water.

(2)

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.....

(ii) State the information from Figure 2 that shows that the drinking water is neutral.

(1)

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(iii) Calculate the mass of calcium ions in 250 cm<sup>3</sup> of this drinking water.

(2)

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.....

mass = ..... mg

(Total for question = 5 marks)