

# Experimental Techniques

## Question Paper 1

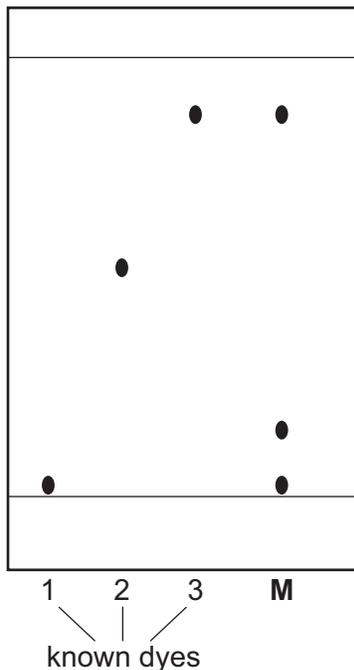
<b>Level</b>	IGCSE
<b>Subject</b>	Chemistry
<b>Exam Board</b>	CIE
<b>Topic</b>	Experimental Techniques
<b>Sub-Topic</b>	
<b>Paper Type</b>	Alternative to Practical
<b>Booklet</b>	Question Paper 1

**Time Allowed:** 54 minutes

**Score:** /45

**Percentage:** /100

- 1 A mixture of coloured dyes, **M**, was separated by chromatography. The dyes were insoluble in water. The chromatogram below shows the result of separating the mixture and the chromatography of three known dyes 1, 2 and 3.



(a) On the diagram, label the base line (origin). [1]

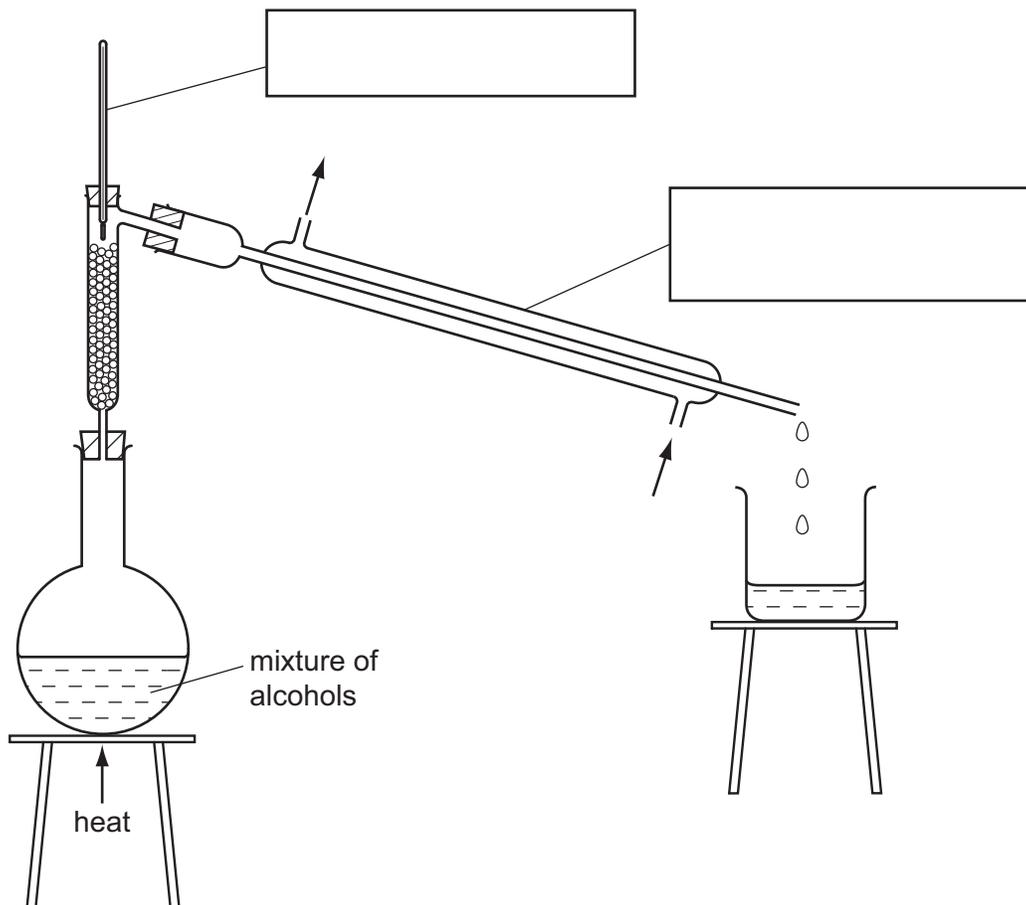
(b) Name a solvent that could be used in this separation. [1]  
 .....

(c) How many dyes were there in the mixture, **M**? [1]  
 .....

(d) What are your conclusions about the identity of the dyes in the mixture, **M**? [3]  
 .....  
 .....

(e) How could the reliability of the results be checked? [1]  
 .....

- 2 A student separated a mixture of two alcohols, ethanol (boiling point  $78^{\circ}\text{C}$ ) and butanol (boiling point  $118^{\circ}\text{C}$ ).  
The apparatus used is shown below.



(a) Complete the boxes to identify the pieces of apparatus labelled. [2]

(b) Label the arrows. [1]

(c) State the name of this separation process.  
..... [2]

(d) Which liquid is first to collect in the beaker?  
..... [1]

(ii) How would the student know when all of this liquid had collected?  
.....  
..... [1]

(e) Identify and explain a possible hazard in this experiment.

.....

..... [2]

[Total: 9]

3 The following paragraph was taken from a student's notebook.

*Preparation of lead chloride*

*10 cm<sup>3</sup> of aqueous lead nitrate was placed in a beaker and 10 cm<sup>3</sup> of aqueous potassium chloride added. Lead chloride, a white solid, was formed. The solid was separated from the mixture.*

*Water was then added to the solid and the mixture boiled. A clear liquid was formed. On cooling, white crystals were deposited.*

(a) What type of chemical reaction resulted in the formation of the lead chloride?

..... [1]

(b) What is the solubility of lead chloride in

(i) cold water, .....

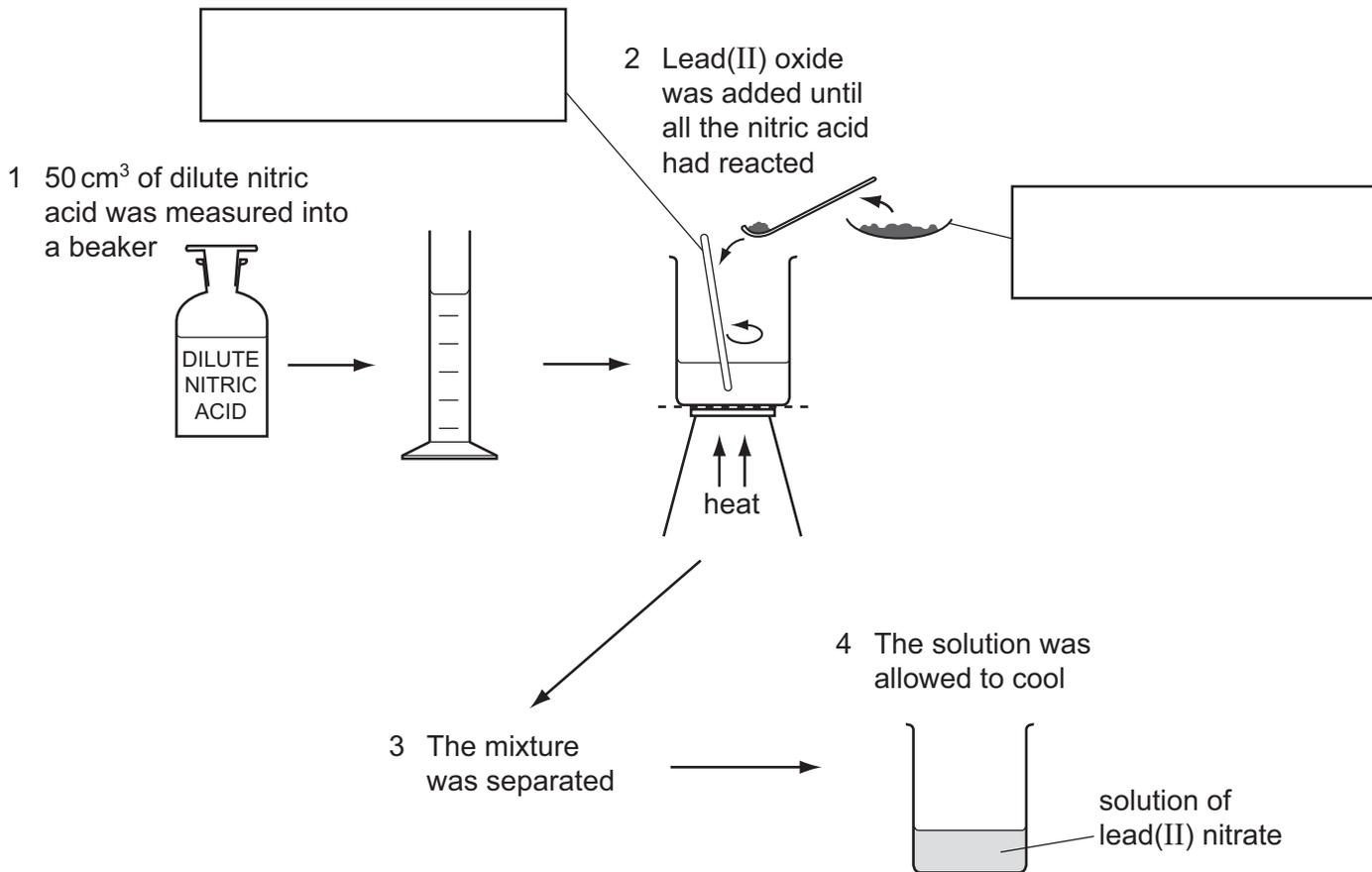
(ii) hot water? ..... [2]

(c) What method should be used to separate the crystals from the mixture?

..... [1]

[Total: 4]

- 4 A student reacted dilute nitric acid with lead(II) oxide to prepare lead(II) nitrate. The diagram shows the stages in the method used.

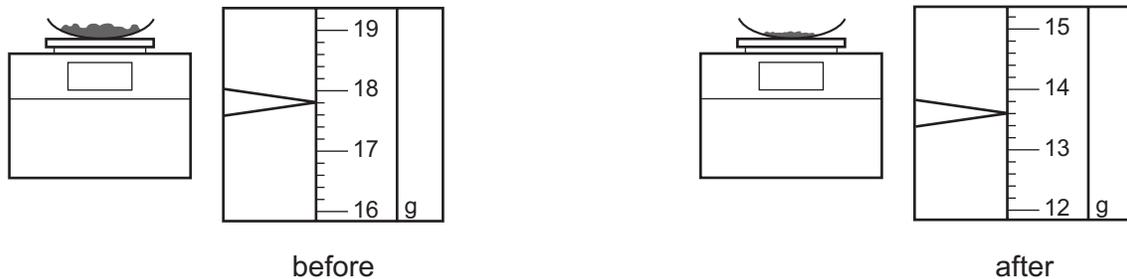


(a) Complete the boxes to identify the pieces of apparatus. [2]

(b) Why is the dilute nitric acid heated?

..... [1]

(c) The lead(II) oxide was weighed before and after the additions.



Use the balance diagrams to work out the mass of lead(II) oxide added to the dilute nitric acid.

..... [2]

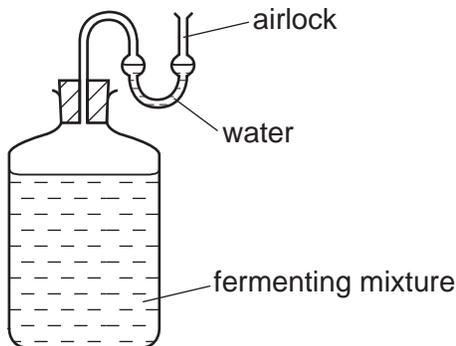
- (d) (i) How would the student know when all of the dilute nitric acid had reacted in stage 2?  
..... [1]
- (ii) What method is used to separate the mixture in stage 3?  
..... [1]
- (iii) What term is used to describe the unreacted lead(II) oxide?  
..... [1]
- (e) Describe the effect of heating the solution of lead(II) nitrate until it boils and then heating for a further ten minutes.  
.....  
.....  
..... [2]

[Total: 10]

5 A student found a recipe for making elderberry wine by fermentation.

- 1 kg elderberries
- 0.5 kg sugar
- 10 g yeast granules
- 3 dm<sup>3</sup> water

The student decided to make some elderberry wine using the apparatus below.



The student carried out the following method.

Step 1 The elderberries were crushed.

Step 2 The crushed elderberries and sugar were added to the water and the mixture was boiled for ten minutes. The crushed elderberries were then separated from the mixture.

Step 3 Yeast was added to the liquid when it had cooled to room temperature.

(a) Suggest the purpose of the airlock in the apparatus.

..... [1]

(b) What apparatus could be used in Step 1?

..... [1]

(c) Draw a labelled diagram of the apparatus used to separate the crushed elderberries from the mixture in Step 2.

[2]

(d) Why was the yeast in Step 3 not added until the liquid was at room temperature?

..... [1]

**(e) (i)** State **one** observation during the fermentation.

..... [1]

**(ii)** Suggest how the rate of the fermentation reaction could be measured.

.....  
..... [2]

**(f)** Name the method that could be used to separate ethanol from the fermented mixture.

..... [1]

[Total: 9]

6

**Old documents**

Some documents are stored in containers with packets of silica gel crystals. These crystals absorb water from air that enters the container. Water could damage the documents.

Anhydrous cobalt(II) chloride is added to the silica gel. As the crystals absorb water they change colour from blue to pink. Heating the silica gel in an oven removes the water from the crystals so that the crystals can be reused.

Plan an experiment to find the mass of water absorbed by a packet of silica gel crystals.

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.....

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..... [6]

[Total: 6]