



Thursday 12 June 2014 – Morning

**LEVEL 1 CAMBRIDGE NATIONAL IN SCIENCE IN THE
WORKPLACE**

R075/01 How scientific data is used

Candidates answer on the Question Paper.
A calculator may be used for this paper.

OCR supplied materials:
None

Other materials required:
Pencil
Ruler (cm/mm)

Duration: 1 hour



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **50**.
- The quality of written communication is assessed in questions marked with a pencil (✎).
- This document consists of **16** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Charles is a farmer.

He tests the pH value of his soil.

This helps him decide which crop will grow best.

Crop	Best soil pH
Wheat	6
Barley	7
Chick peas	8

He tests his soil with universal indicator.

Here is the colour chart he uses.

4	5	6	7	8	9	10
red	orange	yellow	green	green-blue	blue	blue-black

(a) Charles tests his soil.

The universal indicator goes green-blue.

(i) What is the pH of his soil?

.....

[1]

(ii) Which is the best crop for his soil?

.....

[1]

(b) Charles does the pH test three times.

He gets the same result each time.

Which word best describes the results?

Put a **ring** around the correct answer.

accurate

precise

repeatable

reproducible

[1]

(c) (i) Elsie works at an agricultural college.

She tests the soil using the same method as Charles.

She gets the same results.

Which word best describes the results of Charles and Elsie?

Put a **ring** around the correct answer.

accurate precise repeatable reproducible [1]

(ii) Elsie also uses a pH meter to test the soil.

Suggest why she does this.

..... [1]

(d) Charles needs to know more before he decides which is the best crop to grow.

(i) Suggest another piece of information he needs.

.....
..... [1]

(ii) State how he could get this information.

.....
..... [1]

[Total: 7]

2 Sunita is a science technician.

She finds two unlabelled bags of white powder.

The white powder could be:

either **barium carbonate**, or **sodium carbonate**, or **sodium chloride**.

(a) Sunita does a flame test on each powder.

(i) Explain how the flame test will show her whether the cation in each powder is barium or sodium.

.....

.....

.....

..... [2]

(ii) Which of the following words best describes the results obtained from the flame test?

Put a **ring** around the correct answer.

qualitative **quantitative** **relative** [1]

(b) Sunita tests each powder and finds that the anion is a **carbonate**.

(i) What is the test for a carbonate?

Put a tick (✓) in the box next to the correct answer.

Anion Test	
add dilute acid to the powder	<input type="checkbox"/>
add dilute barium chloride to a solution of the powder	<input type="checkbox"/>
add dilute silver nitrate to a solution of the powder	<input type="checkbox"/>

[1]

(ii) In the test, the carbonate fizzes and gives off a gas.

Describe the test to show that this gas is carbon dioxide.

.....

.....

.....

..... [2]

(c) For each flame test Sunita uses the following apparatus:

- platinum wire loop
- concentrated hydrochloric acid
- bunsen burner
- clean beakers.

Describe how Sunita carries out the flame test and explain how she avoids contamination of the powder samples.



The quality of written communication will be assessed in your answer.

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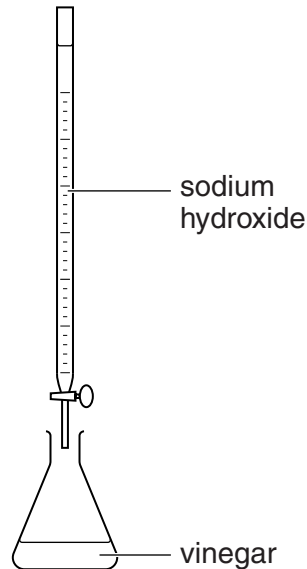
..... [6]

[Total: 12]

- 3 The Food Standards Agency suspects that some fast food outlets add more water to their vinegar than they should.

George tests some samples of vinegar in a laboratory.

He titrates vinegar with sodium hydroxide.



- (a) Vinegar is a weak acid. Sodium hydroxide is a strong base.

Which indicator should George use for his titration?

Put a tick (✓) in the box next to the correct answer.

bromothymol blue	<input type="checkbox"/>
methyl orange	<input type="checkbox"/>
phenolphthalein	<input type="checkbox"/>

[1]

- (b) Vinegar is a solution of ethanoic acid in water.

George performs his titrations by:

- dissolving 2.0g of ethanoic acid in 100ml of water to produce an acid solution
- taking 25 ml of this acid solution and putting it in a beaker
- titrating the sodium hydroxide into the acid solution
- repeating the procedure using three 25 ml samples from the same acid solution
- repeating the whole procedure for 4.0g, 6.0g and 8.0g of ethanoic acid.

- (i) Use words from this list to complete the sentences.

controlled dependent fair independent qualitative

In these titrations the mass of ethanoic acid dissolved in 100ml of water is the variable.

The volume of sodium hydroxide titrated is the variable.

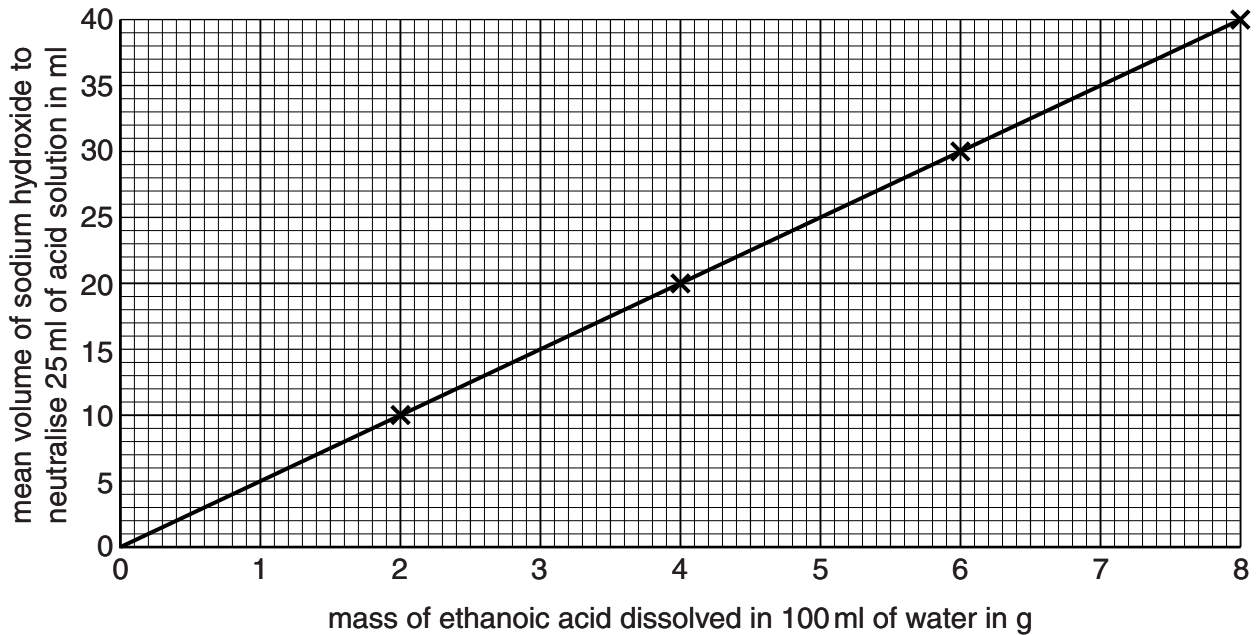
25ml of acid solution is put into the beaker for each titration. This is an example of a variable. [3]

- (ii) Why did George repeat the procedure using three 25ml samples from the same acid solution?

..... [1]

Question 3(c) begins on page 8

- (c) This is the calibration graph George gets from his results of titrating ethanoic acid with sodium hydroxide.



Here are the results of tests from three food outlets:

	Food outlet		
	Allgoods	McNairs	Scrumpi's
mean volume of sodium hydroxide to neutralise 25 ml of vinegar	30 ml	15 ml	22 ml
mass of ethanoic acid dissolved in 100 ml of water	6.0 g

- (i) Use the calibration graph to complete the table above. [2]

- (ii) Vinegar with less than 4.0g of ethanoic acid in 100 ml has too much water added.

Which outlet has added too much water?

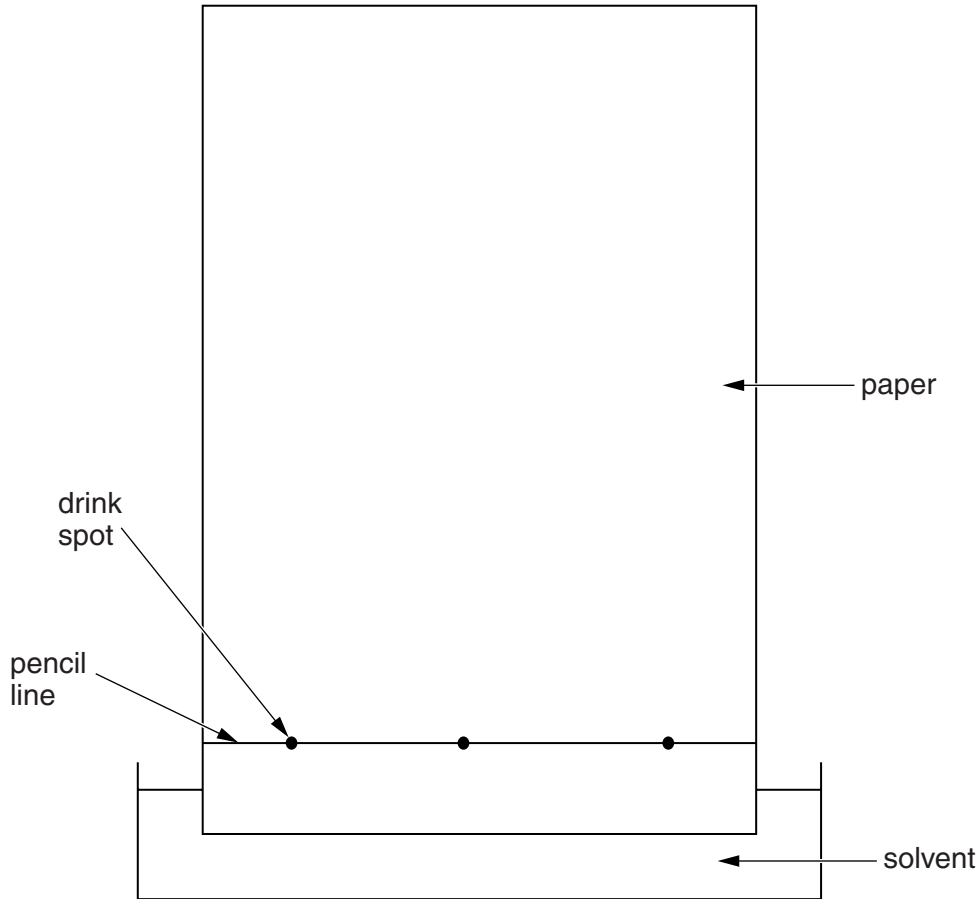
Which outlet has the strongest vinegar?

[2]

10
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- 4 Philip works in the laboratory of a company making fruit and vegetable drinks. He investigates the types of sugar in the drinks. He uses chromatography to do this, as shown in the diagram.



- (a) Look at the diagram and identify the stationary and mobile phases.

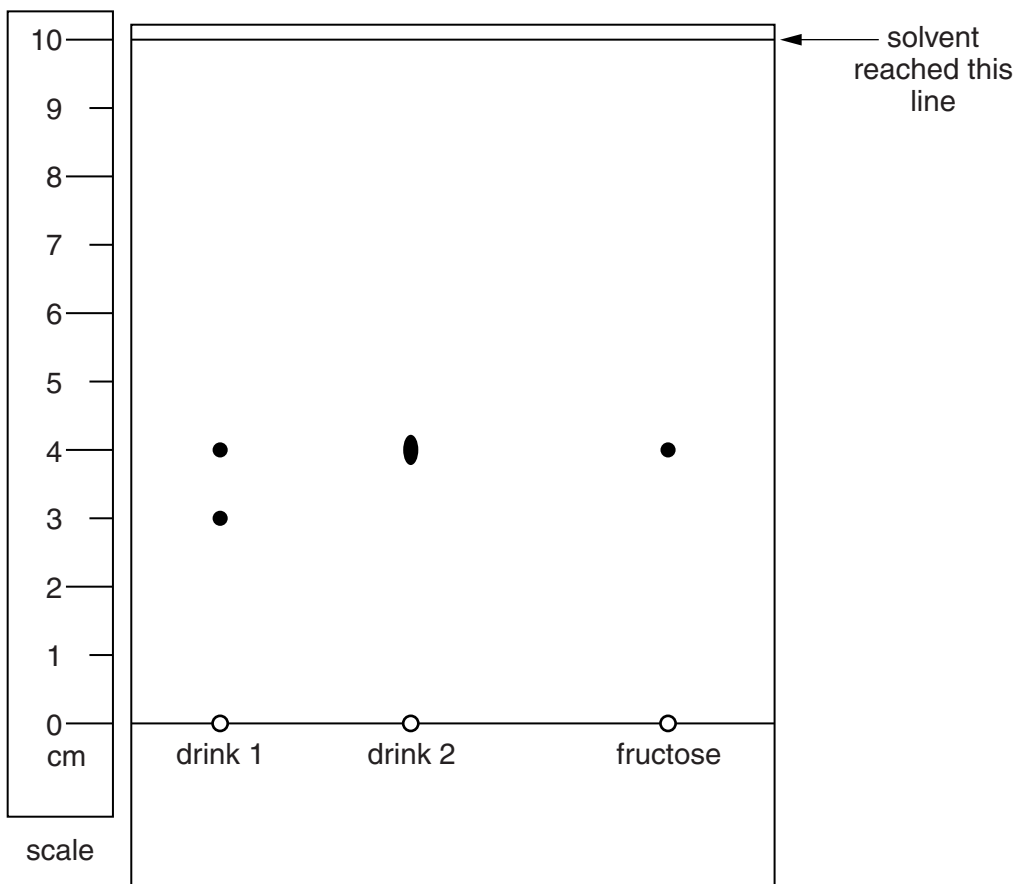
Draw a straight line from each **phase** to its **component**.

Phase	Component
Stationary	drink spot
Mobile	paper
	pencil line
	solvent

[2]

He tests drink 1, drink 2 and fructose. He puts a drop of each on the pencil line.

Here is the chromatogram he produces.



(b) (i) Decide whether these statements are **true** or **false**.

Put a tick (✓) in **one** box in **each** row.

	True	False
Drink 1 contains more than one substance.		
Drink 1 contains fructose.		

[2]

(ii) Philip uses fructose as a **standard reference**.

Explain what is meant by standard reference.

.....

.....

..... [2]

- (iii) The R_f value for each spot can be calculated by using the formula

$$R_f = \frac{\text{distance moved by drink spot}}{\text{distance moved by solvent}}$$

Use the scale on the chromatogram diagram to calculate the R_f value for the **lower** spot of **drink 1**.

Show your working.

R_f value = [2]

- (iv) Philip looks in a data book for R_f values of other types of sugar.

Type of sugar	R_f value
sucrose	0.36
galactose	0.30
maltose	0.25

Use your calculated value of R_f for the lower spot of drink 1 to identify which type of sugar it is likely to be.

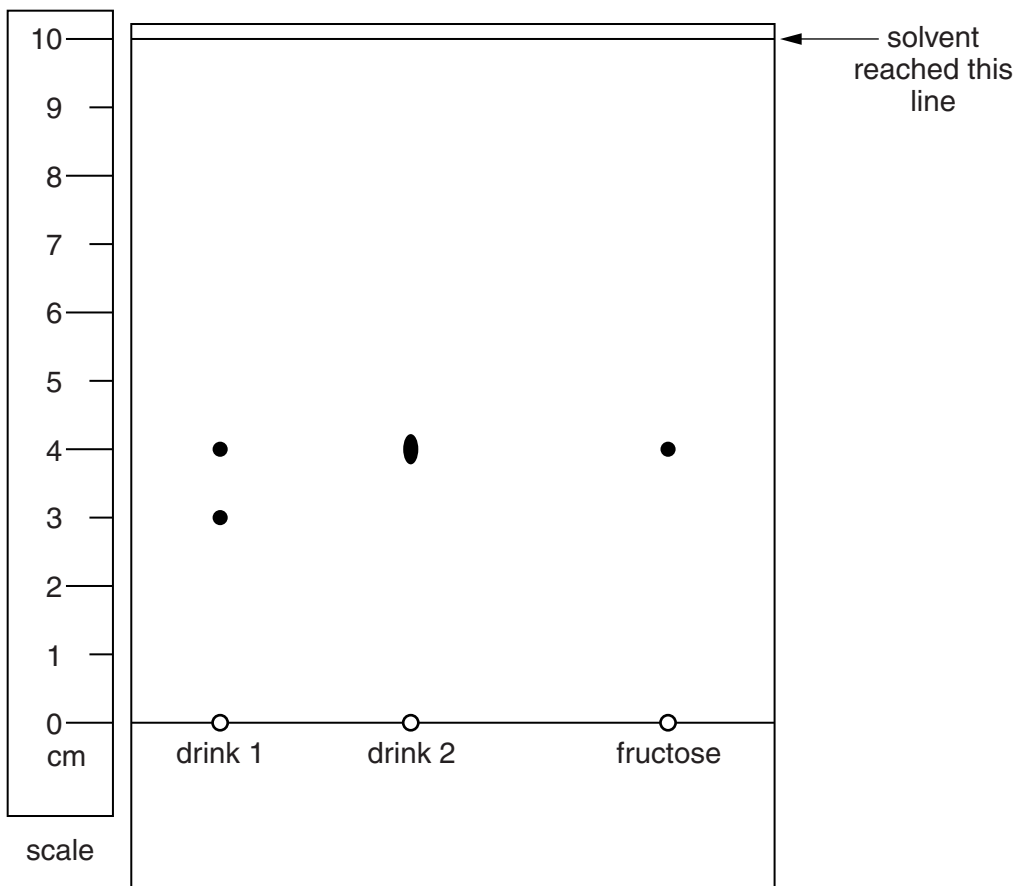
Explain your answer.

Name of sugar


Explanation

..... [2]

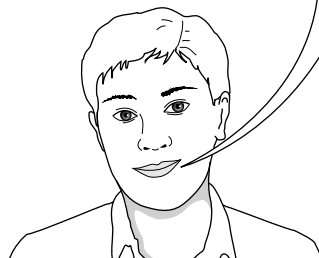
(c) (i) Philip, Edward and Ann, discuss the results for drink 2.




They say why they think there is a bigger spot for drink 2.



Philip
This shows that drink 2 contains more fructose than drink 1.



Edward
There may be another type of sugar in drink 2 as well as fructose.



Ann
You must have used a bigger drop of drink 2 on the pencil line than drink 1.

Who do you agree with? Put a ring around your choice.

Philip

Edward

Ann

Give a reason for your choice.

.....

.....

.....

[2]

- (ii) Philip decides to test drink 2 using a **different** solvent.

Here are some reasons why he decides to use a different solvent.

Put a tick (✓) against the **two** best reasons which explain why.

Different solvents move at different speeds up the paper.	
The R_f value for a sugar depends on the solvent.	
It gives more data about the sugars present.	
It makes it a fair test.	

[2]

- (iii) Name another piece of apparatus Philip could use to identify the sugars in the drinks.

.....

How would this apparatus improve the conclusion?

.....

..... [2]

[Total: 16]

END OF QUESTION PAPER

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