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Wednesday 30 May 2012 – Afternoon

GCSE TWENTY FIRST CENTURY SCIENCE ADDITIONAL APPLIED SCIENCE A

A335/01 Unit 4: Harnessing Chemicals (Foundation Tier)

A314380612

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: 45 minutes

A33501

Candidate forename		Candidate surname	

Centre number						Candidate number				

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 **36**.
- This document consists of **8** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Nick knows that there are symbols for each chemical element.

(a) (i) Put a (ring) around the correct chemical symbol for the element **calcium**.

C **Ca** **C*l*** **Co** **Cu** **[1]**

(ii) Nick has been told that **sodium sulfate** consists of two sodium atoms, one sulfur atom and four oxygen atoms.
The symbol for sodium is Na, for sulfur is S and for oxygen is O.
Write down the formula of sodium sulfate.

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

(iii) He reads that methane has the formula CH_4.
Five of his friends tell him different things that he can tell from this formula.
Put ticks (✓) in the boxes next to the **two** correct statements.

Methane is an element.	☐
Methane contains two atoms in each molecule.	☐
Methane is made of five elements.	☐
Methane is a compound.	☐
Methane is a hydrocarbon.	☐

[2]

(b) Nick knows that most products are complex mixtures of chemicals.

(i) Draw straight lines to join each **type of mixture** with its correct **description**.

type of mixture	description
solid mixture	a solid dispersed in a liquid
emulsion	a liquid finely dispersed in another liquid
suspension	a solid finely dispersed in another solid

[2]

(ii) Give two examples of consumer products which are emulsions.

.....

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

(c) (i) Use **two** of these words to complete the sentence below.

filtrate **residue** **solute** **solution** **suspension**

The **concentration** of a solution is the mass of the .....

dissolved in a given volume of ..... . **[2]**

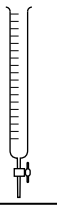
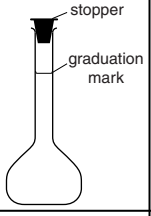
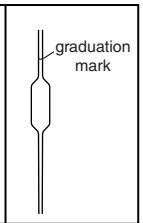
(ii) Nick weighs out 5.00 g of copper sulfate.
He dissolves it to make 250 ml of solution.
What is the concentration of his solution in g/litre?
Show your working.

answer = ... g/litre **[2]**

[Total: 12]

2 Florika wants to make some salts. There are several pieces of chemical apparatus she could use to measure out the chemicals.

(a) Put a tick (✓) underneath the **best** piece of apparatus for each **purpose**.

purpose					
making up a solution to exactly 250 cm^3					
measuring exactly 25 cm^3 of alkali for a titration					
finding out how much acid neutralises the alkali in a titration					

[3]

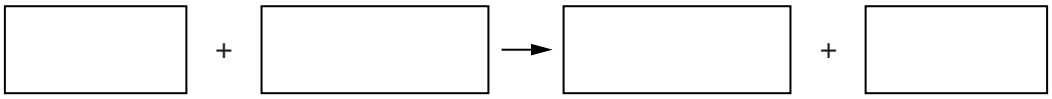
Florika makes common salt by neutralising sodium hydroxide with hydrochloric acid.

(b) Suggest a suitable indicator that Florika could use and describe the colour change for this indicator when the alkali has been neutralised.

indicator .....

colour changes from ..... to ..... **[2]**

(c) **(i)** Write the **word equation** for the reaction between sodium hydroxide and hydrochloric acid.



[2]

(ii) Florika needs to make sure that the acid and alkali mix together continuously.
Describe the **extra** apparatus that she could use to keep the solutions well mixed throughout the experiment.

.....

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

(iii) Explain how Florika could keep the solutions mixed without needing the extra apparatus.

.....

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

(d) This reaction produces a solution of salt.
Describe how crystals of pure salt can be obtained from this solution.

.....

.....

.....

.....

.....

..... **[3]**

(e) The table below gives the names of some common acids and alkalis.

hydrochloric acid	calcium hydroxide
nitric acid	ammonium hydroxide
phosphoric acid	potassium hydroxide
sulfuric acid	sodium carbonate

Choose from this table the names of the substances which could be used to make each of these salts.

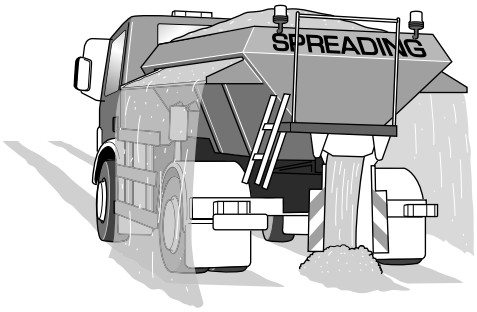
Sodium sulfate could be made by mixing .....

with ..... .

Calcium phosphate could be made by mixing .....

with ..... . **[2]**

(f) During very cold weather, common salt is spread on many roads to make ice melt.



Look at this data for the cost of common salt.

type of common salt	price in pence / kg
brown road salt	2.5
white road salt	4.0
dishwasher salt	40
table salt	100

(i) Suggest why road salt is not usually used in a dishwasher.

.....

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

(ii) Suggest why table salt is not usually used to clear ice from roads.

.....

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

(iii) Explain why each different type of salt has a different price.

.....

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

[Total: 18]

3 Stefan is going to take an exam about the chemical industry.
He needs to know the difference between fine and bulk chemicals.

(a) (i) Describe what **fine** and **bulk** mean, making clear the difference.

fine chemical .....

.....

bulk chemical .....

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

(ii) Put ticks (✓) in the boxes next to the **three** bulk chemicals in this list.

ammonia	☐
aspirin	☐
sodium hydroxide	☐
sulfuric acid	☐
vitamin C	☐

[2]

(b) Stefan studies the manufacture of ammonia from nitrogen and hydrogen.
He works out that 28 kg of nitrogen should react to make 34 kg of ammonia.
He finds out that 28 kg of nitrogen actually makes only 5.1 kg of ammonia in the reaction vessel.

What is the percentage yield of this process?
Show your working.

answer ..... **[2]**

[Total: 6]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE