Acid and Alkali

Total mark – 16

Question: 1

1 Which of these pH values shows the pH of a strong acid?

A 1

B 5

C 7

D 10

Your answer ☐ [1]

1			A ✓	1	1.2	ALLOW 1

Question: 2

12 What is the name of the gas made when zinc carbonate reacts with hydrochloric acid?

A Carbon dioxide

B Chlorine

C Hydrogen

D Oxygen

Your answer ☐ [1]

12			A ✓	1	1.2

Question: 3

17 Acids are substances that turn universal indicator paper red.

(a) (i) What makes a substance acidic?

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

(ii) Sodium hydroxide, NaOH, is an alkali.

Sodium hydroxide neutralises sulfuric acid, H_2SO_4. The reaction makes a salt called sodium sulfate, Na_2SO_4. Water is also made.

Complete the **balanced symbol equation** for this reaction.

..... $NaOH$ + H_2SO_4 $\rightarrow$ Na_2SO_4 + ... H_2O

[2]

(b) A student investigates the reaction of an aqueous solution of sodium hydroxide and sulfuric acid. During the experiment, the student tests the pH of the solution with universal indicator.

(i) Suggest a piece of equipment that the student could use instead of universal indicator paper to test the pH of the solution.

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

(ii) Describe how to use the equipment suggested in **(b)(i)**.

.....

.....

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

17	**(a)**	**(i)**	Hydrogen ion/ H^+	**1**	**1.1**	
		(ii)	$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$ Reactant✓ Product ✓	**2**	**2.2 x2**	
	(b)	**(i)**	pH meter ✓	**1**	**2.2**	**ALLOW** pH probe
		(ii)	Wash the probe with water ✓ Put the probe into the solution ✓	**2**	**1.2**	**ALLLOW** calibrate the meter/probe

Question: 4

26 A student has a solution of hydrochloric acid, HC*l*, and a solution of sodium hydroxide, NaOH.

He wants to make a pure, dry sample of sodium chloride.

(a) Describe how he can do this.

Include the apparatus he should use and his method.

.....

.....

.....

.....

.....

.....

.....

..... **[4]**

(b) Write a **balanced symbol** equation for the reaction.

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

(c) The student also investigates other reactions.

The table shows the salts he can make from different starting materials.

Complete the table.

Acid used	Other starting material	Salt made
Sulfuric acid	Copper oxide	.....
.....	Zinc carbonate	Zinc nitrate
Hydrochloric acid	.....	Magnesium chloride

[3]

(d) What **type** of reaction happens when sulfuric acid reacts with copper oxide?

.....

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

<table>
<tr><td>26</td><td>(a)</td><td></td><td>Any four from:
Titration ✓

Put acid in burette ✓
Pipette (a known volume of) sodium hydroxide into flask ✓

Use a (named) indicator / use of a pH meter ✓
Add acid to sodium hydroxide until colour of indicator changes ✓
Repeat (to get an accurate value) ✓
Repeat again with no indicator ✓
Evaporate (off the water) / crystallise ✓</td><td>4</td><td>4 x 3.3a</td><td>ALLOW other methods involving adding acid to sodium hydroxide solution using the principles outlined on the LHS
eg ALLOW mix or react acid with alkali

ALLOW alkali in burette
ALLOW acid in flask

DO NOT ALLOW marks in incorrect context</td></tr>
<tr><td></td><td>(b)</td><td></td><td>$NaOH + HCl \rightarrow NaCl + H_2O$ ✓</td><td>1</td><td>2.2</td><td>ALLOW = or ⇌ instead of →
DO NOT ALLOW and or & instead of +

ALLOW any correct multiples including fractions

IGNORE any state symbols</td></tr>
<tr><td></td><td>(c)</td><td></td><td><table><tr><th>Acid used</th><th>Other starting material</th><th>Salt made</th></tr><tr><td>sulfuric acid</td><td>copper oxide</td><td>copper sulfate ✓</td></tr><tr><td>nitric acid ✓</td><td>zinc carbonate</td><td>zinc nitrate</td></tr><tr><td>hydrochloric acid</td><td>magnesium oxide/ magnesium hydroxide / magnesium carbonate / magnesium ✓</td><td>magnesium chloride</td></tr></table></td><td>3</td><td>3 x 2.2</td><td>ALLOW correct formulae</td></tr>
<tr><td></td><td>(d)</td><td></td><td>Neutralisation ✓</td><td>1</td><td>2.2</td><td></td></tr>
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