1 Which statements are properties of an acid?

1 reacts with ammonium sulfate to form ammonia

2 turns red litmus blue

	1	2
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

2 Which property is **not** characteristic of a base?

A It reacts with a carbonate to form carbon dioxide.

B It reacts with an acid to form a salt.

C It reacts with an ammonium salt to form ammonia.

D It turns universal indicator paper blue.

3 A sting from insect X has a pH of 6 and a sting from insect Y has a pH of 8.

The table shows the pH of four substances.

substance	pH
hydrochloric acid	1
sodium hydrogen carbonate	8
sodium hydroxide	14
vinegar	5

Which substances are used to treat the two stings?

	X	Y
A	hydrochloric acid	sodium hydroxide
B	sodium hydrogen carbonate	vinegar
C	sodium hydroxide	hydrochloric acid
D	vinegar	sodium hydrogen carbonate

4 Three liquids, P, Q and R, are added to a mixture of hydrochloric acid and Universal Indicator solution.

The following observations are made.

P the colour of the indicator turns purple.

Q the colour of the indicator does not change.

R there is effervescence and the indicator turns blue.

What are P, Q and R?

	P	Q	R
A	sodium carbonate solution	water	sodium hydroxide solution
B	sodium hydroxide solution	water	sodium carbonate solution
C	water	sodium carbonate solution	sodium hydroxide solution
D	water	sodium hydroxide solution	sodium carbonate solution

5 Which property is **not** characteristic of a base?

A It reacts with a carbonate to form carbon dioxide.

B It reacts with an acid to form a salt.

C It reacts with an ammonium salt to form ammonia.

D It turns universal indicator paper blue.

6 The table shows the pH of four aqueous solutions, W, X, Y and Z.

substance	pH
W	7
X	9
Y	2
Z	5

Universal Indicator is added to each solution.

Which row shows the colour of each solution after the indicator is added?

	W	X	Y	Z
A	blue	green	orange	red
B	green	blue	red	orange
C	orange	red	blue	green
D	red	orange	green	blue

7 Hydrochloric acid is used to clean metals.

The acid reacts with the oxide layer on the surface of the metal, forming a salt and water.

Which word describes the metal oxide?

A alloy

B base

C element

D indicator

8 Which statement is **not** correct?

A When a base reacts with an ammonium salt, ammonia is given off.

B When an acid reacts with a base, neutralisation takes place.

C When an acid reacts with a carbonate, carbon dioxide is given off.

D When the acidity of a solution increases, the pH increases.

9 Which reaction is **not** characteristic of an acid?

A It dissolves magnesium oxide.

B It produces ammonia from ammonium compounds.

C It produces carbon dioxide from a carbonate.

D It produces hydrogen from zinc metal.

10 Which equation for the reaction between sodium carbonate and dilute hydrochloric acid is correct?

A $Na_2CO_3(s) + HCl(aq) \rightarrow NaCl(aq) + CO_2(g) + H_2O(l)$

B $Na_2CO_3(s) + HCl(aq) \rightarrow Na_2Cl(aq) + CO_2(g) + H_2O(l)$

C $Na_2CO_3(s) + 2HCl(aq) \rightarrow NaCl(aq) + CO_2(g) + H_2O(l)$

D $Na_2CO_3(s) + 2HCl(aq) \rightarrow 2NaCl(aq) + CO_2(g) + H_2O(l)$

11 Three chemicals, P, Q and R, were each dissolved in water. The table shows some of the reactions of these solutions.

solution	reaction when solid sodium carbonate is added	reaction when heated with solid ammonium chloride
P	gas evolved	no reaction
Q	no reaction	gas evolved
R	no reaction	no reaction

The pH of the three solutions was also measured.

What are the correct pH values of these solutions?

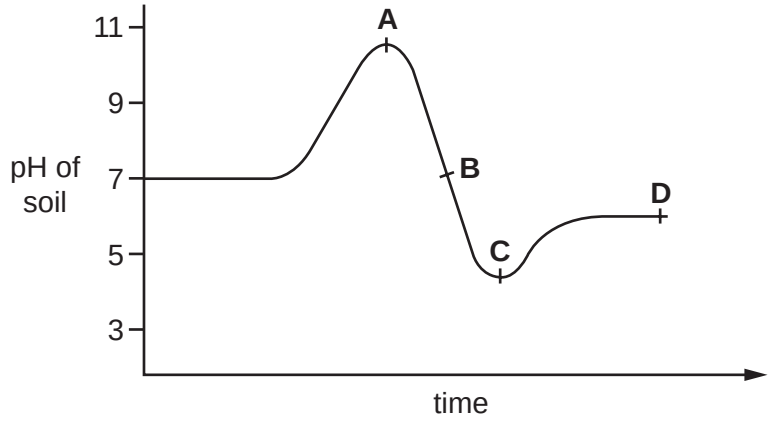
	P	Q	R
A	2	7	13
B	2	1	7
C	7	2	13
D	13	7	2

12 Which substance is the most acidic?

	substance	pH
A	calcium hydroxide	12
B	lemon juice	4
C	milk	6
D	washing up liquid	8

13 The graph shows how the pH of soil in a field changes over time.

At which point was the soil neutral?



14 A colourless solution is tested by the following reactions.

Which reaction is **not** characteristic of an acid?

A A piece of magnesium ribbon is added. Bubbles are seen and the magnesium disappears.

B A pungent smelling gas is produced when ammonium carbonate is added.

C Copper oxide powder is added and the mixed is warmed. The solution turns blue.

D The solution turns blue litmus red.

15 Which statements about alkalis are correct?

1 When reacted with an acid, the pH of the alkali increases.

2 When tested with litmus, the litmus turns blue.

3 When warmed with an ammonium salt, ammonia gas is given off.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

16 Different plants grow best under different pH conditions.

Which plant grows best in alkaline soil?

	plant	grows best in soil at pH
A	cabbage	6-
B	potato	4-
C	strawberry	5-
D	wheat	6-

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	1	2
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B	✓	✗
C	✗	✓
D	✗	✗

19 Carbon dioxide is produced when

X reacts with ethanol.

Y reacts with sodium carbonate.

What are X and Y?

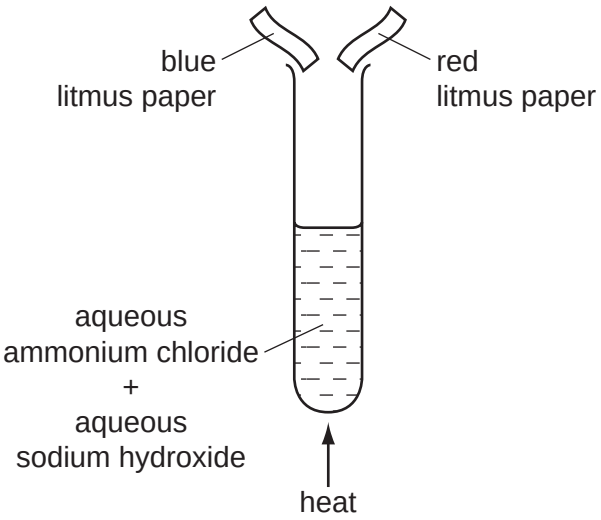
	X	Y
A	H_2	HC*l*
B	H_2	NaOH
C	O_2	HC*l*
D	O_2	NaOH

20 Ant stings hurt because of the methanoic acid produced by the ant.

Which substance could, **most safely**, be used to neutralise the acid?

	substance	pH
A	baking soda	8
B	car battery acid	1
C	lemon juice	3
D	oven cleaner	14

21 The diagram shows an experiment.



What happens to the pieces of litmus paper?

	blue litmus paper	red litmus paper
A	changes colour	changes colour
B	changes colour	no colour change
C	no colour change	changes colour
D	no colour change	no colour change

22 Two indicators, bromophenol blue and Congo red, show the following colours in acidic solutions and in alkaline solutions.

indicator	acid	alkali
bromophenol blue	yellow	blue
Congo red	violet	red

A few drops of each indicator are added to separate samples of a solution of pH 2.

What are the colours of the indicators in this solution?

	in a solution of pH 2	
	bromophenol blue is	Congo red is
A	blue	red
B	blue	violet
C	yellow	red
D	yellow	violet

23 Which statement about the reaction of acids is correct?

A They react with ammonium salts to form a salt and ammonia only.

B They react with metal carbonates to give a salt and carbon dioxide only.

C They react with metal hydroxides to give a salt and water only.

D They react with metals to give a salt, hydrogen and water only.

24 Which of these pairs of aqueous ions **both** react with dilute sulfuric acid to give a visible result?

A Ba^{2+} and Cl

B Ba^{2+} and CO_3^{2}

C NH_4^{+} and Cl

D NH_4^{+} and CO_3^{2}

25 Barium hydroxide is an alkali. It reacts with hydrochloric acid.

How does the pH of the hydrochloric acid change as an excess of aqueous barium hydroxide is added?

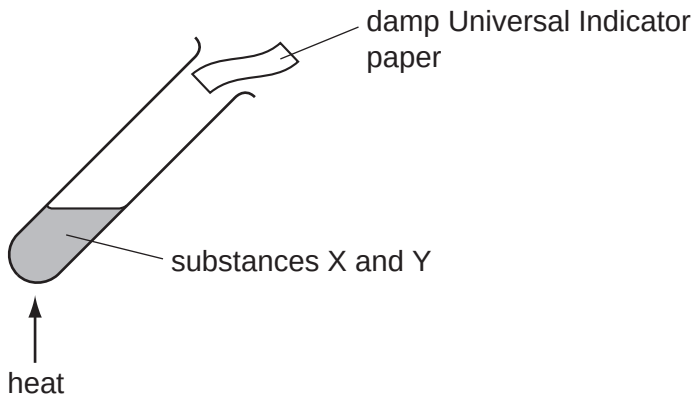
A The pH decreases from 14 and becomes constant at 7.

B The pH decreases from 14 to about 1.

C The pH increases from 1 and becomes constant at 7.

D The pH increases from 1 to about 14.

26 The diagram shows two substances, X and Y, being heated together.



The Universal Indicator paper turns blue during the experiment.

What are substances X and Y?

A ammonium nitrate and hydrochloric acid

B ammonium nitrate and sodium hydroxide

C sodium carbonate and hydrochloric acid

D sodium carbonate and sodium hydroxide

27 A gas is escaping from a pipe in a chemical plant.

A chemist tests this gas and finds that it is alkaline.

What is this gas?

A ammonia

B chlorine

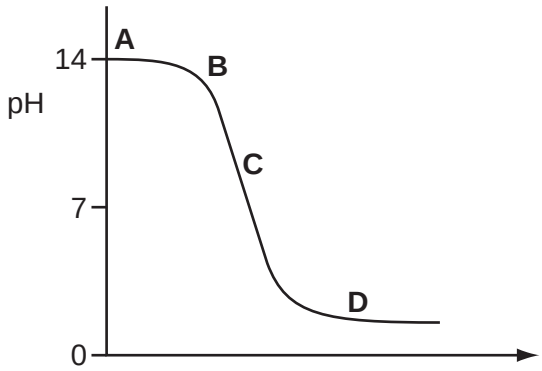
C hydrogen

D sulfur dioxide

28 The graph shows how the pH changes as an acid is added to an alkali.

$$\text{acid} + \text{alkali} \rightarrow \text{salt} + \text{water}$$

Which letter represents the area of the graph where both acid and salt are present?



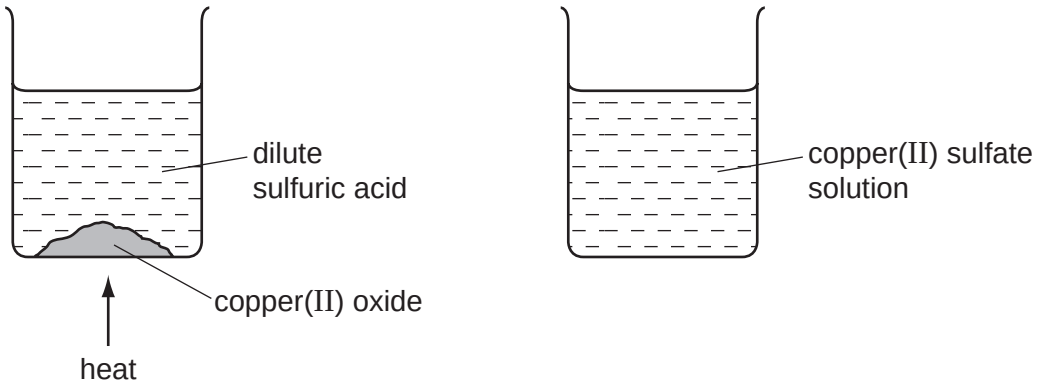
29 Dilute hydrochloric acid is added to a solid, S.

A flammable gas, G, is formed. Gas G is less dense than air.

What are S and G?

	solid S	gas G
A	copper	hydrogen
B	copper carbonate	carbon dioxide
C	zinc	hydrogen
D	zinc carbonate	carbon dioxide

30 An aqueous solution of copper(II) sulfate was made by adding excess copper(II) oxide to dilute sulfuric acid. The mixture was heated, stirred and then filtered.



What was the pH of the acid before adding the copper(II) oxide and of the solution after filtration?

	pH of acid before adding copper(II) oxide	pH of solution after filtration
A	greater than 7	7
B	greater than 7	less than 7
C	less than 7	7
D	less than 7	greater than 7

31 Which type of reaction always forms a salt and water?

A exothermic

B neutralisation

C oxidation

D polymerisation

32 An alloy contains copper and zinc.

Some of the zinc has become oxidised to zinc oxide.

What is the result of adding an excess of dilute sulfuric acid to the alloy?

A A blue solution and a white solid remains.

B A colourless solution and a pink / brown solid remains.

C The alloy dissolves completely to give a blue solution.

D The alloy dissolves completely to give a colourless solution.

33 Which is **not** a typical property of an acid?

A They react with alkalis producing water.

B They react with all metals producing hydrogen.

C They react with carbonates producing carbon dioxide.

D They turn litmus paper red.

34 Which reaction will result in a decrease in pH?

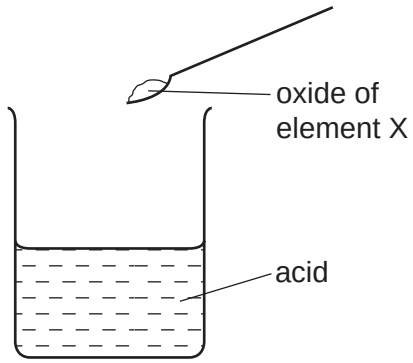
A adding calcium hydroxide to acid soil

B adding citric acid to sodium hydrogen carbonate solution

C adding sodium chloride to silver nitrate solution

D adding sodium hydroxide to hydrochloric acid

35 The oxide of element X was added to an acid. It reacted to form a salt and water.



What is the pH of the acid before the reaction and what type of element is X?

	pH	type of element X
A	greater than 7	metal
B	greater than 7	non-metal
C	less than 7	metal
D	less than 7	non-metal

36 An aqueous solution of the organic compound methylamine has a pH greater than 7.

Which statement about methylamine is correct?

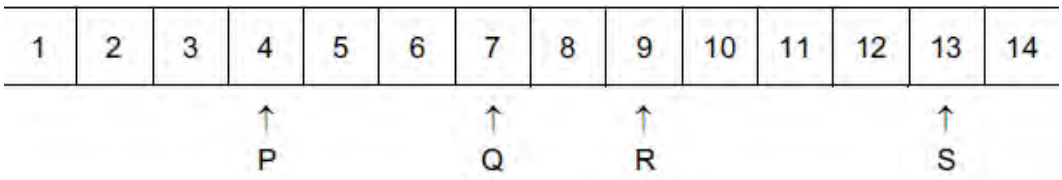
A It neutralises an aqueous solution of sodium hydroxide.

B It reacts with copper(II) carbonate to give carbon dioxide.

C It reacts with hydrochloric acid to form a salt.

D It turns blue litmus red.

37 The diagram shows the pH values of four solutions.



Which of these solutions are alkaline?

A P only

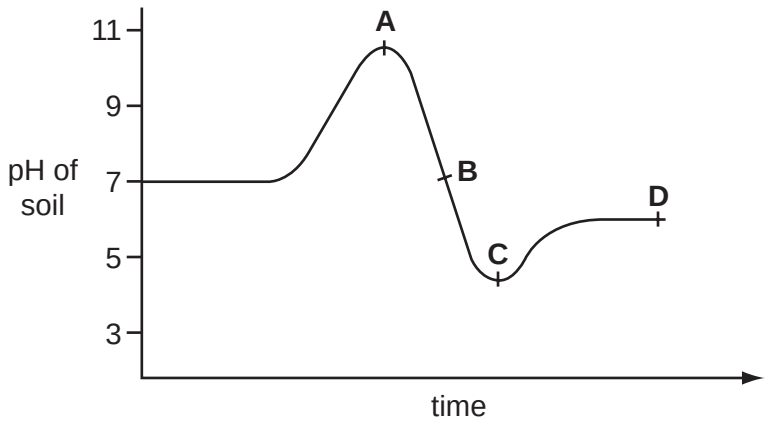
B P and Q only

C Q, R and S only

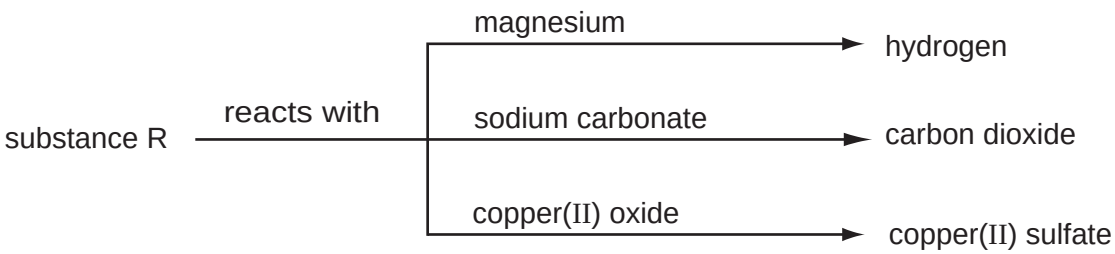
D R and S only

38 The graph shows how the pH of soil in a field changed over time.

At which point was the soil neutral?



39 Some reactions of a substance, R, are shown in the diagram.



What type of substance is R**?**

A an acid

B a base

C an element

D a salt

40 Substance K reacts with sodium carbonate to form a gas.

The gas turns limewater cloudy.

What is substance K and which process takes place in the reaction?

	K	process
A	ethanol	combustion
B	ethanol	neutralisation
C	hydrochloric acid	combustion
D	hydrochloric acid	neutralisation