Chapter 8

Acids, bases and salts

8.1 The characteristic properties of acidsand bases

01. 0620_m21_qp_22 Q: 21

Which statements about strong acids are correct?

1 They have a high concentration of OH^- ions.

2 They have a pH value of 1.

3 They completely ionise in water.

4 They turn red litmus blue.

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

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02. 0620_s21_qp_21 Q: 21

In which equation is the underlined reactant acting as a base?

A $CH_3COO^- + \underline{H_3O^+} \rightarrow CH_3COOH + H_2O$

B $\underline{NH_4^+} + OH^- \rightarrow NH_3 + H_2O$

C $CO_2 + 2\underline{H_2O} \rightarrow H_3O^+ + HCO_3^-$

D $\underline{H^+} + OH^- \rightarrow H_2O$

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03. 0620_s21_qp_22 Q: 21

Burning fossil fuels releases sulfur dioxide which leads to acid rain.

Which ion in the rain water causes it to be acidic?

A H^+ **B** OH^- **C** O^{2-} **D** SO_4^{2-}

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04. 0620_w21_qp_21 Q: 17

Which row describes the properties of an acid?

	property 1	property 2
A	proton acceptor	pH less than 7
B	proton acceptor	pH more than 7
C	proton donor	pH less than 7
D	proton donor	pH more than 7

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05. 0620_w21_qp_22 Q: 17

Which statements about acids and bases are correct?

1 An acid reacts with a metal to give off hydrogen.

2 A base reacts with an ammonium salt to give off ammonia.

3 An acid reacts with a carbonate to give off carbon dioxide.

4 Alkaline solutions are orange in methyl orange.

A 1, 2 and 3 **B** 1, 2 and 4 **C** 1, 3 and 4 **D** 2, 3 and 4

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06. 0620_w21_qp_23 Q: 20

A period of the Periodic Table is shown.

group	I	II	III	IV	V	VI	VII	VIII
element	R	S	T	V	W	X	Y	Z

The letters are not their chemical symbols.

Which statement is correct?

A Element R does not conduct electricity.

B Elements R and Y react together to form an ionic compound.

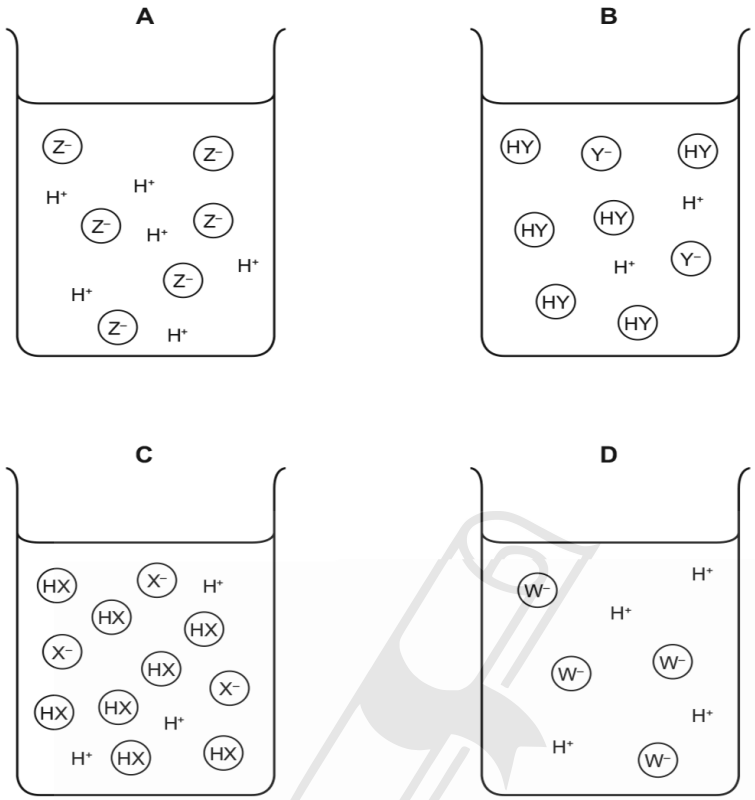
C Element Z exists as a diatomic molecule.

D Element Z reacts with element T.

07. 0620_m20_qp_22 Q: 19

Four different acids are dissolved in water.

Which beaker contains the most concentrated strong acid solution?



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08. 0620_p20_qp_20 Q: 22

Acids are compounds which donate protons (hydrogen ions).

$$NH_3(aq) + H_2O(l) \rightarrow NH_4^+(aq) + OH^-(aq)$$

Which compound in this equation is behaving as an acid?

A ammonia

B ammonium hydroxide

C none of them

D water

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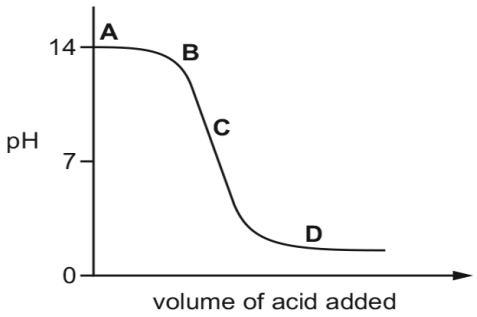
09. 0620_s20_qp_21 Q: 18

The graph shows how the pH of a solution 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?



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10. 0620_s20_qp_21 Q: 19

Which statement describes a weak acid?

A It is a proton acceptor and is fully ionised in aqueous solution.

B It is a proton acceptor and is partially ionised in aqueous solution.

C It is a proton donor and is fully ionised in aqueous solution.

D It is a proton donor and is partially ionised in aqueous solution.

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11. 0620_s20_qp_23 Q: 19

Which statement describes a weak acid?

A It is a proton acceptor and is fully ionised in aqueous solution.

B It is a proton acceptor and is partially ionised in aqueous solution.

C It is a proton donor and is fully ionised in aqueous solution.

D It is a proton donor and is partially ionised in aqueous solution.

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12. 0620_w20_qp_21 Q: 22

What is a characteristic of acids?

A Acids turn methyl orange indicator yellow.

B Acids have a high pH value.

C Acids react with ammonium salts to give ammonia gas.

D Acids react with carbonates to produce salts.

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13. 0620_w20_qp_22 Q: 21

The equation shows a reaction between aqueous hydrogen bromide and aqueous ammonia.

$$HBr(aq) + NH_3(aq) \rightarrow NH_4^+(aq) + Br^-(aq)$$

Which statement describes the role of aqueous hydrogen bromide?

A It is a catalyst.

B It is a reducing agent.

C It is a proton acceptor.

D It is a proton donor.

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14. 0620_w20_qp_23 Q: 22

An aqueous cation reacts with aqueous sodium hydroxide to form a white precipitate.

The precipitate is insoluble in excess sodium hydroxide.

What is the aqueous cation?

A aluminium ion

B calcium ion

C chromium ion

D zinc ion

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15. 0620_m19_qp_22 Q: 20

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 pH 14 and becomes constant at pH 7.

B The pH decreases from pH 14 to about pH 1.

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

D The pH increases from pH 1 to about pH 14.

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16. 0620_s19_qp_21 Q: 19

Ethanoic acid is a weak acid.

Hydrochloric acid is a strong acid.

Which statements are correct?

1 Ethanoic acid molecules are partially dissociated into ions.

2 1.0 mol / dm^3 ethanoic acid has a higher pH than 1.0 mol / dm^3 hydrochloric acid.

3 Ethanoic acid is always more dilute than hydrochloric acid.

4 Ethanoic acid is a proton acceptor.

A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

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17. 0620_s19_qp_22 Q: 19

Which row shows the difference between a weak acid and a strong acid?

	weak acid	strong acid
A	fully ionised	partially ionised
B	concentrated	dilute
C	dilute	concentrated
D	partially ionised	fully ionised

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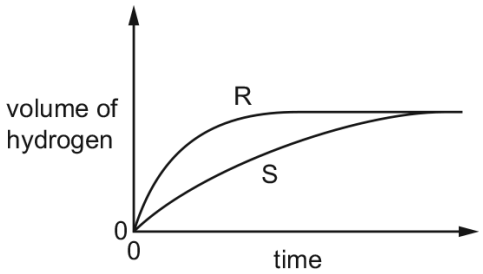
18. 0620_s19_qp_23 Q: 19

Solutions of acid R and acid S have the same concentration.

The same volume of each acid at the same temperature is reacted with the same mass of magnesium ribbon.

The volume of hydrogen produced is measured.

The results are shown.



Which statement about the reactions is correct?

A Acid S reacts faster than acid R.

B The final volume of hydrogen produced in each reaction is different.

C Acid R is a stronger acid than acid S.

D Acid S is a stronger acid than acid R.

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19. 0620_w19_qp_21 Q: 20

Carbonic acid is a weak acid formed when carbon dioxide dissolves in water.

What is the pH of the solution?

A 1 **B** 5 **C** 7 **D** 9

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20. 0620_w19_qp_22 Q: 20

Which statement describes the properties of hydrochloric acid?

A Carbon dioxide is produced when limestone reacts with hydrochloric acid.

B Hydrogen is produced when sodium hydroxide reacts with hydrochloric acid.

C Methyl orange turns yellow in strong hydrochloric acid.

D Red litmus paper turns blue when dipped into hydrochloric acid.

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21. 0620_w19_qp_23 Q: 20

Which statements about dilute sulfuric acid are correct?

1 It turns red litmus paper blue.

2 It reacts with magnesium(II) oxide to form magnesium(II) sulfate and water.

3 It reacts with magnesium to form magnesium(II) sulfate and carbon dioxide.

4 Its pH is below pH 7.

A 1 and 2 only **B** 1 and 3 only **C** 2 and 4 only **D** 3 and 4 only

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22. 0620_m18_qp_22 Q: 17

Ethanoic acid reacts with water to produce an acidic solution.

Which row describes the roles of ethanoic acid and water in this reaction?

	ethanoic acid	water
A	accepts a proton	donates a proton
B	accepts an electron	donates an electron
C	donates a proton	accepts a proton
D	donates an electron	accepts an electron

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23. 0620_s18_qp_21 Q: 18

Which solution has the lowest pH?

A 0.1 mol / dm^3 ammonia solution

B 0.1 mol / dm^3 ethanoic acid

C 0.1 mol / dm^3 lithium hydroxide

D 0.1 mol / dm^3 nitric acid

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24. 0620_s18_qp_22 Q: 18

Which statement about acids and bases is correct?

A A base is a donor of hydrogen ions.

B An acid is an acceptor of protons.

C A strong acid is fully ionised in aqueous solution.

D A weak acid cannot be used to neutralise a strong base.

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25. 0620_s18_qp_23 Q: 18

The equation represents an equilibrium in aqueous ammonia.

$$NH_3(aq) + H_2O(l) \rightleftharpoons NH_4^+(aq) + OH^-(aq)$$

How does aqueous ammonia behave in this reaction?

A as a strong acid

B as a strong base

C as a weak acid

D as a weak base

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26. 0620_w18_qp_21 Q: 18

Aqueous sodium hydroxide is added to solid Q in a test-tube.

A gas is produced which turns damp red litmus blue.

What is Q?

A aluminium

B ammonia

C ammonium chloride

D sodium nitrate

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27. 0620_w18_qp_21 Q: 19

Potassium hydroxide is a base.

Which statement describes a reaction of potassium hydroxide?

A Chlorine is formed when it is heated with ammonium chloride.

B It turns Universal Indicator green.

C It reacts with an acid to produce a salt and water.

D It turns methyl orange red.

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28. 0620_w18_qp_22 Q: 18

When dilute sulfuric acid is added to solid X, a colourless solution is formed and a gas is produced.

What is X?

A copper(II) oxide

B sodium oxide

C copper(II) carbonate

D sodium carbonate

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29. 0620_w18_qp_22 Q: 19

A few drops of methyl orange are added to a reaction mixture.

During the reaction, a gas is produced and the methyl orange turns from red to orange.

What are the reactants?

A aqueous sodium hydroxide and ammonium chloride

B aqueous sodium hydroxide and calcium carbonate

C dilute hydrochloric acid and magnesium

D dilute hydrochloric acid and aqueous sodium hydroxide

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30. 0620_w18_qp_23 Q: 19

Solution Q is warmed with ammonium chloride.

In a separate experiment, solution Q is added to methyl orange.

Which observations show that solution Q is basic?

	warmed with ammonium chloride	added to methyl orange
A	gas is produced	turns red
B	gas is produced	turns yellow
C	no reaction	turns red
D	no reaction	turns yellow

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31. 0620_m17_qp_22 Q: 19

A student investigates two acids W and X.

The same volumes of W and X are reacted separately with excess magnesium.

The student makes the following observations.

1 Hydrogen gas is produced at a faster rate with W than with X.

2 The total volume of hydrogen gas produced is the same for both acids.

Which statement explains these observations?

A The pH of W is higher than the pH of X.

B W is an organic acid.

C W is a stronger acid than X.

D W is more concentrated than X.

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32. 0620_s17_qp_21 Q: 19

Which row shows how the hydrogen ion concentration and pH of ethanoic acid compare to those of hydrochloric acid of the same concentration?

	ethanoic acid compared to hydrochloric acid	
	hydrogen ion concentration	pH
A	higher	higher
B	higher	lower
C	lower	higher
D	lower	lower

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33. 0620_s17_qp_22 Q: 19

Which statements about a weak acid, such as ethanoic acid, are correct?

1 It reacts with a carbonate.

2 It does not neutralise aqueous sodium hydroxide solution.

3 It turns red litmus blue.

4 It is only partially ionised in aqueous solution.

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

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34. 0620_s17_qp_23 Q: 19

Chloric(I) acid, HC*l*O, is formed when chlorine dissolves in water. It is a weak acid.

What is meant by the term *weak acid*?

A It contains fewer hydrogen atoms than a strong acid.

B It is easily neutralised by a strong alkali.

C It is less concentrated than a strong acid.

D It is only partially ionised in solution.

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35. 0620_w17_qp_21 Q: 18

What is **not** a typical characteristic of acids?

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 blue litmus paper red.

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36. 0620_m16_qp_22 Q: 18

Concentrated hydrochloric acid is a *strong acid*.

What is meant by the terms 'strong' and 'acid'?

	strong	acid
A	contains a low proportion of water	accepts protons
B	contains a low proportion of water	donates protons
C	fully ionised	accepts protons
D	fully ionised	donates protons

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37. 0620_p16_qp_20 Q: 22

Acids are compounds which donate protons (hydrogen ions).

$$NH_3(aq) + H_2O(l) \rightarrow NH_4^+(aq) + OH^-(aq)$$

Which compound in this equation is behaving as an acid?

A ammonia

B ammonium hydroxide

C none of them

D water

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38. 0620_s16_qp_21 Q: 18

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	✗	✗

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39. 0620_w16_qp_21 Q: 19

Hydrogen chloride gas reacts with water to produce an acidic solution. The equation for the reaction is shown.

$$HCl + H_2O \rightarrow Cl^- + H_3O^+$$

Which statement describes what happens during the reaction?

A The chloride ion is formed by accepting an electron from the water.

B The hydrogen chloride loses an electron to form the chloride ion.

C The water accepts a proton from the hydrogen chloride.

D The water donates a proton to the hydrogen chloride.

SN	Paper	Q. No.	Answer
01	0620_m21_qp_22	21	C
02	0620_s21_qp_21	21	C
03	0620_s21_qp_22	21	A
04	0620_w21_qp_21	17	C
05	0620_w21_qp_22	17	A
06	0620_w21_qp_23	20	C
07	0620_m20_qp_22	19	A
08	0620_p20_qp_20	22	D
09	0620_s20_qp_21	18	D
10	0620_s20_qp_21	19	D
11	0620_s20_qp_23	19	D
12	0620_w20_qp_21	22	D
13	0620_w20_qp_22	21	D
14	0620_w20_qp_23	22	B
15	0620_m19_qp_22	20	D
16	0620_s19_qp_21	19	A
17	0620_s19_qp_22	19	D
18	0620_s19_qp_23	19	C
19	0620_w19_qp_21	20	B
20	0620_w19_qp_22	20	A
21	0620_w19_qp_23	20	C
22	0620_m18_qp_22	17	C
23	0620_s18_qp_21	18	D
24	0620_s18_qp_22	18	C
25	0620_s18_qp_23	18	D
26	0620_w18_qp_21	18	C
27	0620_w18_qp_21	19	C
28	0620_w18_qp_22	18	D
29	0620_w18_qp_22	19	C
30	0620_w18_qp_23	19	B
31	0620_m17_qp_22	19	C
32	0620_s17_qp_21	19	C
33	0620_s17_qp_22	19	B
34	0620_s17_qp_23	19	D
35	0620_w17_qp_21	18	B
36	0620_m16_qp_22	18	D
37	0620_p16_qp_20	22	D
38	0620_s16_qp_21	18	D
39	0620_w16_qp_21	19	C