

1. 5070/21/M/J/18 Q8

- (b) Methanesulfonic acid is a stronger acid than ethanoic acid.

Explain the meaning of this statement.

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

- (c) What is the difference between an aqueous acid and an aqueous alkali in terms of the ions present?

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

2. 5070/22/M/J/18 Q9

- (b) Sulfamic acid is a weak acid.

- (i) What is meant by the term *acid*?

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

- (ii) What is the difference between a weak acid and a strong acid?

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

3. 5070/21/C/N/18 Q5

- (c) Succinic acid is a weak acid.

What is the meaning of the term *weak acid*?

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

4. 5070/21/M/J/19 Q2g

(g) Magnesium chloride is a soluble salt.

Describe how a pure sample of magnesium chloride crystals can be made from magnesium.

STP

[4]

5. 5070/21/M/J/19 Q6

6 Propanoic acid is a weak acid.

Calcium hydroxide and calcium oxide are bases.

(a) What is the meaning of the term *acid* in weak acid?

..... [1]

(b) What is the meaning of the term *weak* in weak acid?

..... [1]

(c) Describe how universal indicator can be used to find the pH of dilute propanoic acid.

..... [1]

(d) Give a large scale use of calcium hydroxide that depends on its basic character.

..... [1]

6. 5070/22/M/J/19 Q2f

(f) Aluminium chloride is a soluble salt.

Describe how a pure sample of aluminium chloride crystals can be made from aluminium.

..... [4]

7. 5070/22/M/J/19 Q8

- (f) Nitric acid is a strong acid and nitrous acid is a weak acid.

Describe the difference between a strong acid and a weak acid.

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..... [2]

8. 5070/21/O/N/19 Q6

Ethanoic acid, CH_3COOH , is a weak acid.

- (a) What is the meaning of the term *weak* when applied to acids?

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..... [1]

9. 5070/22/O/N/19 Q6

- (f) One method of determining the pH of aqueous butanoic acid is by using a pH meter.

Describe a different method of determining the pH of aqueous butanoic acid.

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..... [2]

10. 5070/21/M/J/20 Q8

- (ii) Describe the initial practical details for the preparation of pure magnesium chloride crystals.

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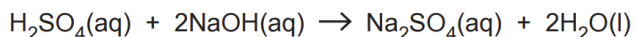
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..... [3]

11. 5070/22/M/J/20 Q5

Sulfuric acid, H_2SO_4 , reacts with sodium hydroxide, NaOH , as shown.

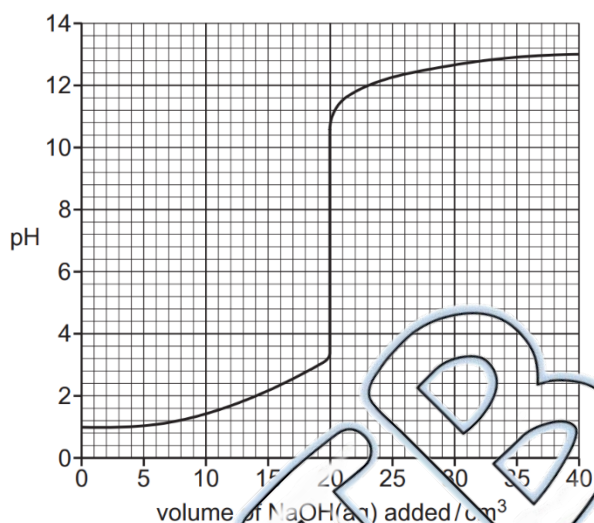


A sample of 25.0 cm^3 of 0.0500 mol/dm^3 H_2SO_4 is placed in a beaker.

$\text{NaOH}(\text{aq})$ is added slowly, from a burette, to the H_2SO_4 in the beaker.

A pH probe is used to measure the pH of the solution in the beaker until a total of 40.0 cm^3 of $\text{NaOH}(\text{aq})$ is added.

The graph shows how the pH of the solution in the beaker changes.



- (a) Explain, in terms of the ions present, why the pH of the solution in the beaker changes from 1.0 to 13.0.

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

- (b) Use the graph to state the volume of $\text{NaOH}(\text{aq})$ that just neutralises all of the H_2SO_4 .

volume of $\text{NaOH}(\text{aq})$ cm^3 [1]

12. 5070/22/M/J/20 Q7

- (b) Magnesium oxide is an insoluble base that can be used to prepare pure magnesium sulfate crystals.

Describe the essential practical details for the preparation of pure magnesium sulfate crystals from magnesium oxide.

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[4]

13. 5070/21/O/N/20 Q8a

- (ii) Describe how to prepare pure dry crystals of barium nitrate from aqueous barium nitrate.

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[3]

14. 5070/22/O/N/20 Q

Methanoic acid and ethanoic acid are weak acids.

- (a) What does the term weak mean, when applied to acids?

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.....

.....

.....

[1]

15. 5070/22/O/N/20 Q8a

- (ii) Describe how to prepare pure dry crystals of sodium sulfate from aqueous sodium sulfate.

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..... [2]

16. 5070/21/M/J/21 Q6e

- (e) Carbonic acid, $\text{H}_2\text{CO}_3(\text{aq})$, is a weak acid.

- (i) What is the meaning of the term *weak* in weak acid?

.....

..... [1]

- (ii) Carbonic acid contains a small concentration of carbonate ions, $\text{CO}_3^{2-}(\text{aq})$.

If carbonic acid is pumped deep underground, the $\text{CO}_3^{2-}(\text{aq})$ will react with metal ions to form insoluble carbonates.

Write the ionic equation for the reaction of magnesium ions with $\text{CO}_3^{2-}(\text{aq})$.

..... [1]

17. 5070/21/M/J/21 Q8a

- (d) Silver nitrate is a white crystalline soluble salt.

Name a suitable combination of an acid and an insoluble base which is used to prepare silver nitrate.

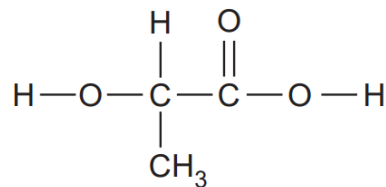
acid

base [1]

18. 5070/22/M/J/21 Q3b

Lactic acid is used to make poly(lactic acid), a biodegradable polymer.

The structure of lactic acid is shown.



- (iv) Aqueous lactic acid reacts with acidified potassium manganate(VII).

There is a colour change from purple to colourless.

Suggest what happens to the lactic acid in this reaction.

..... [1]

- (v) Aqueous lactic acid is neutralised by aqueous sodium hydroxide.

Write the ionic equation for this neutralisation.

..... [1]

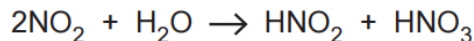
- (vi) Aqueous lactic acid reacts with magnesium.

Name the gas made in this reaction.

..... [1]

19. 5070/22/M/J/21 Q6d

Nitrogen dioxide, NO_2 , reacts with water to form a mixture of dilute nitric acid, HNO_3 , and dilute nitrous acid, HNO_2 .



- (i) Nitrogen dioxide reacts with aqueous sodium hydroxide to form two different salts and water.

Construct the equation for this reaction.

..... [2]

- (ii) Nitric acid is a strong acid.

Nitrous acid is a weak acid.

Describe the difference between a weak acid and a strong acid.

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

20. 5070/21/O/N/21 Q8c

- (i) Define the term *acid*.

..... [1]

- (ii) Explain the meaning of the term *weak* as applied to acids.

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

21. 5070/22/C/N/21 Q9d

- (i) Aqueous sodium hydroxide is warmed with ammonium sulfate.
State the names of the three products formed in this reaction.

1
2
3
[2]

22. 5070/21/M/J/22 Q9b

(b) Ammonia is used to make the soluble salt ammonium nitrate, NH_4NO_3 .

(i) Name the acid that reacts with ammonia to make ammonium nitrate.

..... [1]

23. 5070/22/M/J/22 Q2e

(e) Selenium, Se, is a non-metal.

(i) Deduce the formula of selenium(IV) oxide.

..... [1]

(ii) A small sample of selenium(IV) oxide is dissolved in water.

Two drops of universal indicator are added to this aqueous solution.

Predict the colour of the universal indicator in this solution.

Explain your answer.

colour

explanation

..... [1]

24. 5070/22/M/J/22 Q3c

(c) Butanoic acid is a weak acid.

State what is meant by the term *weak* in weak acid.

..... [1]

25. 5070/22/M/J/22 Q10b

(b) Nitric acid is used to make the soluble salt potassium nitrate, KNO_3 .

(i) Name the alkali that reacts with dilute nitric acid to make potassium nitrate.

..... [1]

(ii) Describe the experimental procedure used to make colourless aqueous potassium nitrate from the alkali and dilute nitric acid.

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

26. 5070/21/O/N/22 Q6c

(c) Nitric acid, HNO_3 , is a strong acid.

(i) State the meaning of the term *strong* in strong acid.

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

(ii) Suggest a pH value for a concentrated solution of a strong acid.

..... [1]

(iii) Complete the ionic equation for the reaction of an acid with an alkali.

$\text{H}^+ + \dots \rightarrow \text{H}_2\text{O}$ [1]

27. 5070/22/O/N/22 Q4

This question is about ammonium sulfate, $(\text{NH}_4)_2\text{SO}_4$.

- (a) Ammonium sulfate is a fertiliser.

Explain why farmers put fertilisers on soil where crops are grown.

..... [1]

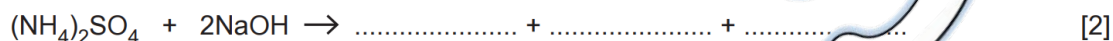
- (b) Explain why farmers do **not** add calcium hydroxide to the soil immediately after adding ammonium sulfate.

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..... [2]

28. 5070/22/O/N/22 Q4d

- (d) Complete the equation for the reaction of ammonium sulfate with aqueous sodium hydroxide.



1. 5070/21/M/J/18 Q8

REZAUL KARIM RAKIB, Senior Chemistry Teacher, Mastermind.

8(b)	methanesulfonic acid is more dissociated (1)	1
8(c)	acids contain H^+ (1) alkalis contain OH^- (1)	2

2. 5070/22/M/J/18 Q9

9(b)(i)	(a substance that) donates hydrogen ions / (a substance that) produces hydrogen ions (in solution) (1)	1
9(b)(ii)	weak acids partially ionise / weak acids do not completely dissociate / weak acids do not fully ionise (1) strong acids completely ionise / strong acids completely dissociate (1)	2

3. 5070/21/O/N/18 Q3

3(c)	acid which is only partially ionised (in water) to form H^+ ions / acid which is partially dissociated (in water) to form H^+ ions	1
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4. 5070/21/M/J/19 Q2g

2(g)	use hydrochloric acid (1) use excess magnesium (1) filter (off magnesium) (1) leave filtrate in warm place / evaporate solution to point of crystallisation then leave (1)	4
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5. 5070/21/M/J/19 Q6

6(a)	in aqueous solution contains hydrogen ions	1
6(b)	acid that does not dissociate completely / partial ionisation in water / little dissociation (1)	1
6(c)	match the colour obtained with a colour chart (1)	1
6(d)	reducing acidity of soil / removing acidic gases from power station chimneys / flue gas desulfurisation (1)	1

6. 5070/22/M/J/19 Q2f

2(f)	use hydrochloric acid (1) use excess aluminium (1) filter (off aluminium) (1) leave filtrate in the sun / evaporate solution to point of crystallisation then leave / leave in the sun (1)	4
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7. 5070/22/M/J/19 Q8

8(f)	strong acid completely dissociates / strong acid completely ionises (1) weak acid partially dissociates / weak acid partially ionises / little dissociation (1)	2
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8. 5070/21/O/N/19 Q6

6(a)	acid does not ionise completely / acid only partially dissociated / acid not fully dissociated	1
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9. 5070/22/O/N/19 Q6

6(f)	use universal indicator / full range indicator (1) match the colour observed with a colour chart (1)	2
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8(b)(ii)	excess base (added to warm acid) (1) mixture filtered (and the filtrate collected) (1) filtrate partially evaporated and then left to crystallise / filtrate left to crystallise / filtrate heated until saturated then left to form crystals (1)	3
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11. 5070/22/M/J/20 Q5

5(a)	Any two from: initially beaker has hydrogen ions so has a low pH (1) alkali contains hydroxide ions which react with hydrogen ions (1) at the end beaker contains hydroxide ions so pH is high (1)	2
5(b)	20 (cm ³) (1)	1

12. 5070/22/M/J/20 Q7

7(b)	use sulfuric acid (1) excess base (added to warm acid) (1) mixture filtered (and the filtrate collected) (1) filtrate partially evaporated and then left to crystallise / filtrate left to crystallise / filtrate heated until saturated and then left to form crystals (1)	4
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13. 5070/21/O/N/20 Q8a

8(a)(ii)	evaporate solution until crystallisation point / evaporate until solution is saturated (1) filter off crystals AND wash with organic solvent / wash with cold water (1) dry crystals with filter paper (1)	3
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14. 5070/22/O/N/20 Q6

6(a)	(acid which is) partially / slightly ionised (in water) / (acid which is) partially / slightly dissociated (in water)	1
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15. 5070/22/O/N/20 Q8c

8(a)(ii)	evaporate solution until crystallisation point / evaporate until solution is saturated (1) filter off crystals AND wash with organic solvent / wash with cold water (1) dry crystals with filter paper (1)	3
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16. 5070/21/M/J/21 Q6e

6(e)(i)	little dissociation (to form ions)	1
6(e)(ii)	$Mg^{2+} + CO_3^{2-} \rightarrow MgCO_3$	1

17. 5070/21/M/J/21 Q8d

8(d)	silver oxide / silver hydroxide AND nitric acid	1
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18. 5070/22/M/J/21 Q3b

3(b)(iv)	oxidised	1
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6(d)(i)	$2\text{NO}_2 + 2\text{NaOH} \rightarrow \text{NaNO}_2 + \text{NaNO}_3 + \text{H}_2\text{O}$ formula for NaNO_2 (1) balancing (1)	2
6(d)(ii)	strong acid completely dissociates / completely ionises (1) weak acid incompletely dissociates / incompletely ionises / partially dissociates / partially ionises (1)	2

20. 5070/21/O/N/21 Q8c

8(c)(i)	(solution which) contains hydrogen ions / hydrogen ion donor	
8(c)(ii)	(acid which) is incompletely ionised / (acid which) is not completely dissociated	1

21. 5070/22/O/N/21 Q9d

ammonia AND sodium sulfate AND water (2)	
if 2 marks not scored 1 mark for any two of ammonia, sodium sulfate or water	

22. 5070/21/M/J/22 Q9b

9(b)(i)	nitric acid	1
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23. 5070/22/M/J/22 Q2e

2(e)(i)	SeO_2 / O_2Se	1
2(e)(ii)	red / orange / yellow / yellow-green because non-metal oxides (are acidic)	1

24. 5070/22/M/J/22 Q3c

3(c)	does not completely dissociate / partially dissociates	1
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25. 5070/22/M/J/22 Q10b

10(b)(i)	potassium hydroxide	1
10(b)(ii)	idea of titrating acid (n ^o alkali) together using an indicator and the end-point (1) repeat the procedure using a different indicator (1)	2

26. 5070/21/O/N/22 Q6c

6(c)(i)	dissociates completely (in solution) / ionises completely (in solution)	1
6(c)(ii)	any value (to be exclusive of these values)	1
6(c)(iii)	OH^-	1

27. 5070/22/O/N/22 Q4

4(a)	to improve crop yield / to improve plant growth / to add minerals lost when plants are harvested	1
4(b)	ammonia is produced (1) (ammonia) escapes (from the soil) / ammonia is a gas (1)	2

28. 5070/22/O/N/22 Q4d

4(d)	$2\text{NH}_3 + \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$ correct formulae (1) correct balance (1)	2
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