

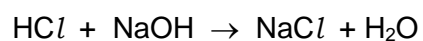


Oxford Cambridge and RSA

GCSE Chemistry A (Gateway Science)
J248/03 C1-C3 and C7 Higher (Higher Tier)

Question Set 8

- 1 A teacher investigates neutralisation. She uses hydrochloric acid, HCl , and sodium hydroxide, NaOH .



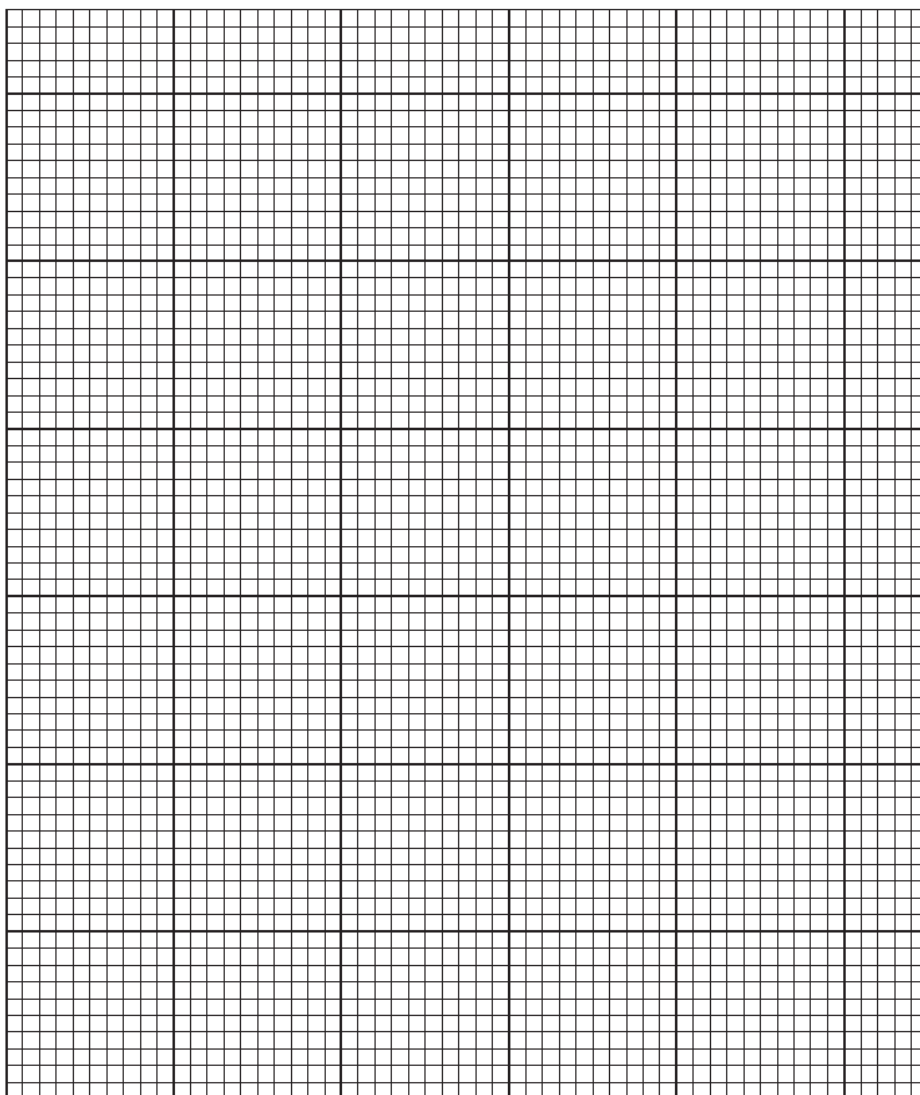
She slowly adds 1.0cm^3 portions of the hydrochloric acid to 20.0cm^3 of 1.0mol/dm^3 sodium hydroxide.

She records the pH until she has added an excess of acid.

Look at her results.

Volume of hydrochloric acid added (cm^3)	pH
0	12.0
1	11.8
2	11.6
3	11.4
4	11.2
5	7.0
6	3.0
7	2.8
8	2.5
9	2.3
10	2.3

- (a) (i) Plot a graph of the pH value against the amount of hydrochloric acid added and draw a line of best fit.



[3]

- (ii) Use your graph to estimate the **volume of hydrochloric acid** when the pH is 10.

Volume of hydrochloric acid = cm³ [1]

- (iii) What happens to the **concentration of hydroxide ions**, OH⁻, as the hydrochloric acid is added to the sodium hydroxide? [1]

- (iv) Acidic solutions contain hydrogen ions, H⁺. Alkaline solutions contain hydroxide ions, OH⁻.

Write the **balanced ionic** equation for neutralisation. [1]

(b) Hydrochloric acid, HCl (aq), is a strong acid. Ethanoic acid, CH_3COOH (aq), is a weak acid.

Explain the difference between a strong and a weak acid.

[2]

(c) (i) Nitric acid, HNO_3 , is another strong acid.

Nitric acid has a pH of 2.

The teacher adds enough water to reduce the concentration of the nitric acid by a factor of 100.

Calculate the new pH of the nitric acid.

pH = [2]

(ii) Nitric acid, HNO_3 , can also neutralise sodium hydroxide, NaOH .

Sodium nitrate, NaNO_3 , and water are made.

Write a **balanced symbol** equation for this reaction.

[1]

(iii) Describe how dry sodium nitrate crystals can be made using this reaction.

[2]

Total Marks for Question Set 8: 13

The Periodic Table of the Elements

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(0)	
1 H hydrogen 1.0	2 He helium 4.0						17 F fluorine 19.0	18 Ar argon 39.9
3 Li lithium 6.9	4 Be beryllium 9.0						8 O oxygen 16.0	9 Ne neon 20.2
11 Na sodium 23.0	12 Mg magnesium 24.3						16 S sulfur 32.1	17 Cl chlorine 35.5
19 K potassium 39.1	20 Ca calcium 40.1						14 Si silicon 28.1	15 P phosphorus 31.0
37 Rb rubidium 85.5	38 Sr strontium 87.6						13 Al aluminum 27.0	14 Si silicon 28.1
55 Cs caesium 132.9	56 Ba barium 137.3						5 B boron 10.8	6 C carbon 12.0
87 Fr francium	88 Ra radium						31 Ga gallium 69.7	32 Ge germanium 72.6
							49 In indium 114.8	50 Sn tin 118.7
							81 Tl thallium 204.4	82 Pb lead 207.2
							101 Ag silver 107.9	102 Cd cadmium 112.4
							79 Au gold 197.0	80 Hg mercury 200.6
							29 Cu copper 63.5	30 Zn zinc 65.4
							47 Ag silver 107.9	48 Cd cadmium 112.4
							28 Ni nickel 58.7	29 Cu copper 63.5
							46 Pd palladium 106.4	47 Ag silver 107.9
							78 Pt platinum 195.1	79 Au gold 197.0
							110 Ds darmstadtium	111 Rg roentgenium
							109 Mt meitnerium	110 Ds darmstadtium
							108 Hs hassium	109 Mt meitnerium
							106 Sg seaborgium	107 Bh bohrium
							105 Db dubnium	106 Sg seaborgium
							104 Rf rutherfordium	105 Db dubnium
							76 Os osmium 190.2	77 Ir iridium 192.2
							75 Re rhenium 186.2	76 Os osmium 190.2
							44 Ru ruthenium 101.1	45 Rh rhodium 102.9
							43 Tc technetium	44 Ru ruthenium 101.1
							25 Mn manganese 54.9	26 Fe iron 55.8
							43 Tc technetium	44 Ru ruthenium 101.1
							24 Cr chromium 52.0	25 Mn manganese 54.9
							42 Mo molybdenum 95.9	43 Tc technetium
							74 W tungsten 183.8	75 Re rhenium 186.2
							72 Hf hafnium 178.5	73 Ta tantalum 180.9
							104 Rf rutherfordium	105 Db dubnium
							72 Hf hafnium 178.5	73 Ta tantalum 180.9
							39 Y yttrium 88.9	40 Zr zirconium 91.2
							57-71 lanthanoids	58-71 actinoids
							21 Sc scandium 45.0	22 Ti titanium 47.9
							39 Y yttrium 88.9	40 Zr zirconium 91.2
							21 Sc scandium 45.0	22 Ti titanium 47.9

Key
atomic number
Symbol
name
relative atomic mass

OCR

Oxford Cambridge and RSA

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge