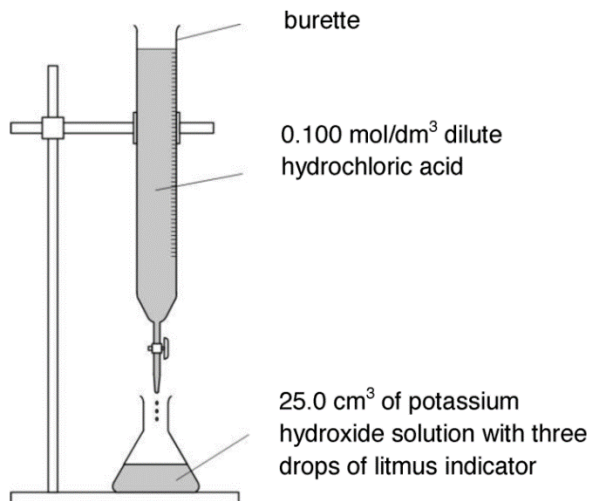
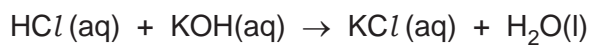


GCSE Chemistry A (Gateway Science)
J248/04 Chemistry A C4-C6 and C7 (Higher Tier)

Question Set 21

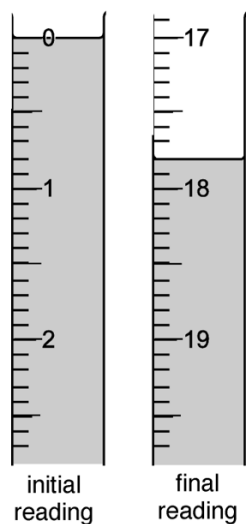
- 1 A student does three titrations with dilute hydrochloric acid and potassium hydroxide solution.

Hydrochloric acid neutralises the alkali potassium hydroxide.



Look at the diagrams. They show parts of the burette during the first titration.

First titration



Here is the student's results table.

Titration number	1	2	3
Final reading (cm ³)	17.8	37.5	32.1
Initial reading (cm ³)	0.0	20.4	15.0
<u>Titre</u> (volume of acid added) (cm ³)	17.8	17.1	17.1

- (a) Using the diagrams and table, calculate the mean titre.

Explain your answer.

$$\begin{aligned} 17.8 \text{ is anomalous} \rightarrow \text{mean} &= \frac{17.1 + 17.1}{2} \\ &= 17.1 \end{aligned}$$

Answer = 17.1 cm³ [2]

- (b) The student uses 25.0 cm³ of potassium hydroxide solution, KOH.

She also uses hydrochloric acid with a concentration of 0.100 mol/dm³.

Calculate the concentration, in mol/dm³, of the KOH(aq).

$$n_{\text{acid}} = CV = 0.1 \times 17.1 \times 10^{-3} = 1.71 \times 10^{-3} \text{ mol}$$

$$\Rightarrow n_{\text{alkali}} = 1.71 \times 10^{-3}$$

$$\Rightarrow C = \frac{n}{V} = \frac{1.71 \times 10^{-3}}{25 \times 10^{-3}} = 0.0684$$

Answer = 0.0684 mol/dm³ [2]

- (c) Use your answer to (b) to calculate the concentration of the KOH(aq) in g/dm³.

$$m = m_r \times n = 56.1 \times 0.0684 = 3.84$$

Answer = 3.84 g/dm³ [2]

Total Marks for Question Set 21: 6

Resource Materials

The Periodic Table of the Elements

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(0)										
1	2	<div style="border: 1px solid black; padding: 5px; text-align: center;"> Key atomic number Symbol name relative atomic mass </div>					17	18									
1 H hydrogen 1.0	2 He helium 4.0	3 Li lithium 6.9	4 Be beryllium 9.0	5 B boron 10.8	6 C carbon 12.0	7 N nitrogen 14.0	8 O oxygen 16.0	9 F fluorine 19.0	10 Ne neon 20.2								
11 Na sodium 23.0	12 Mg magnesium 24.3	13 Al aluminium 27.0	14 Si silicon 28.1	15 P phosphorus 31.0	16 S sulfur 32.1	17 Cl chlorine 35.5	18 Ar argon 39.9										
19 K potassium 39.1	20 Ca calcium 40.1	21 Sc scandium 45.0	22 Ti titanium 47.9	23 V vanadium 50.9	24 Cr chromium 52.0	25 Mn manganese 54.9	26 Fe iron 55.8	27 Co cobalt 58.9	28 Ni nickel 58.7	29 Cu copper 63.5	30 Zn zinc 65.4	31 Ga gallium 69.7	32 Ge germanium 72.6	33 As arsenic 74.9	34 Se selenium 79.0	35 Br bromine 79.9	36 Kr krypton 83.8
37 Rb rubidium 85.5	38 Sr strontium 87.6	39 Y yttrium 88.9	40 Zr zirconium 91.2	41 Nb niobium 92.9	42 Mo molybdenum 95.9	43 Tc technetium	44 Ru ruthenium 101.1	45 Rh rhodium 102.9	46 Pd palladium 106.4	47 Ag silver 107.9	48 Cd cadmium 112.4	49 In indium 114.8	50 Sn tin 118.7	51 Sb antimony 121.8	52 Te tellurium 127.6	53 I iodine 126.9	54 Xe xenon 131.3
55 Cs caesium 132.9	56 Ba barium 137.3	57-71 lanthanoids	72 Hf hafnium 178.5	73 Ta tantalum 180.9	74 W tungsten 183.8	75 Re rhenium 186.2	76 Os osmium 190.2	77 Ir iridium 192.2	78 Pt platinum 195.1	79 Au gold 197.0	80 Hg mercury 200.6	81 Tl thallium 204.4	82 Pb lead 207.2	83 Bi bismuth 209.0	84 Po polonium	85 At astatine	86 Rn radon
87 Fr francium	88 Ra radium	89-103 actinoids	104 Rf rutherfordium	105 Db dubnium	106 Sg seaborgium	107 Bh bohrium	108 Hs hassium	109 Mt meitnerium	110 Ds darmstadtium	111 Rg roentgenium	112 Cn copernicium	114 Fl flerovium	116 Lv livermorium				

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