GCSE Chemistry A (Gateway Science)

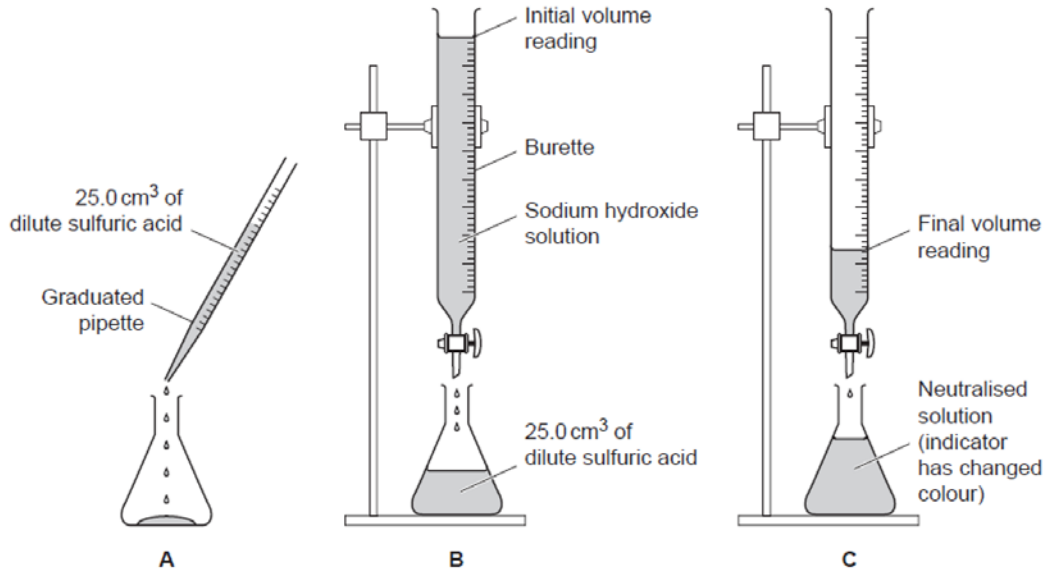
J248/04 Chemistry A C4-C6 and C7 (Higher Tier)

Question Set 15

1 Student **A** does a titration with an acid and an alkali.

He uses dilute sulfuric acid, sodium hydroxide solution and an indicator solution.

The diagram shows the apparatus he uses.



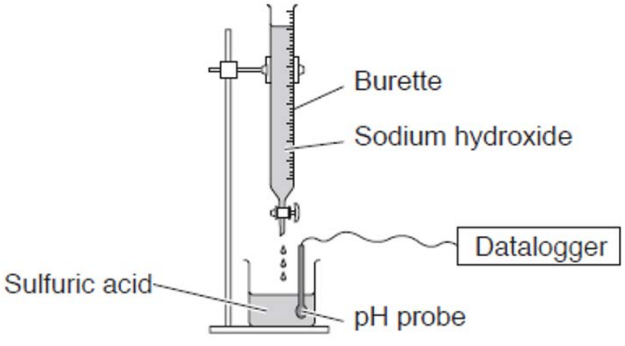
The student adds sodium hydroxide solution from the burette to the sulfuric acid until the indicator changes colour.

He then adds a few more drops of sodium hydroxide to be certain the sulfuric acid is neutralised.

He takes the final volume reading on the burette to find out how much alkali reacts with 25.0 cm^3 of dilute sulfuric acid.

(a) Describe and explain how the student could improve his experiment to get a more accurate value. **[4]**

(b) Student **B** does a titration.

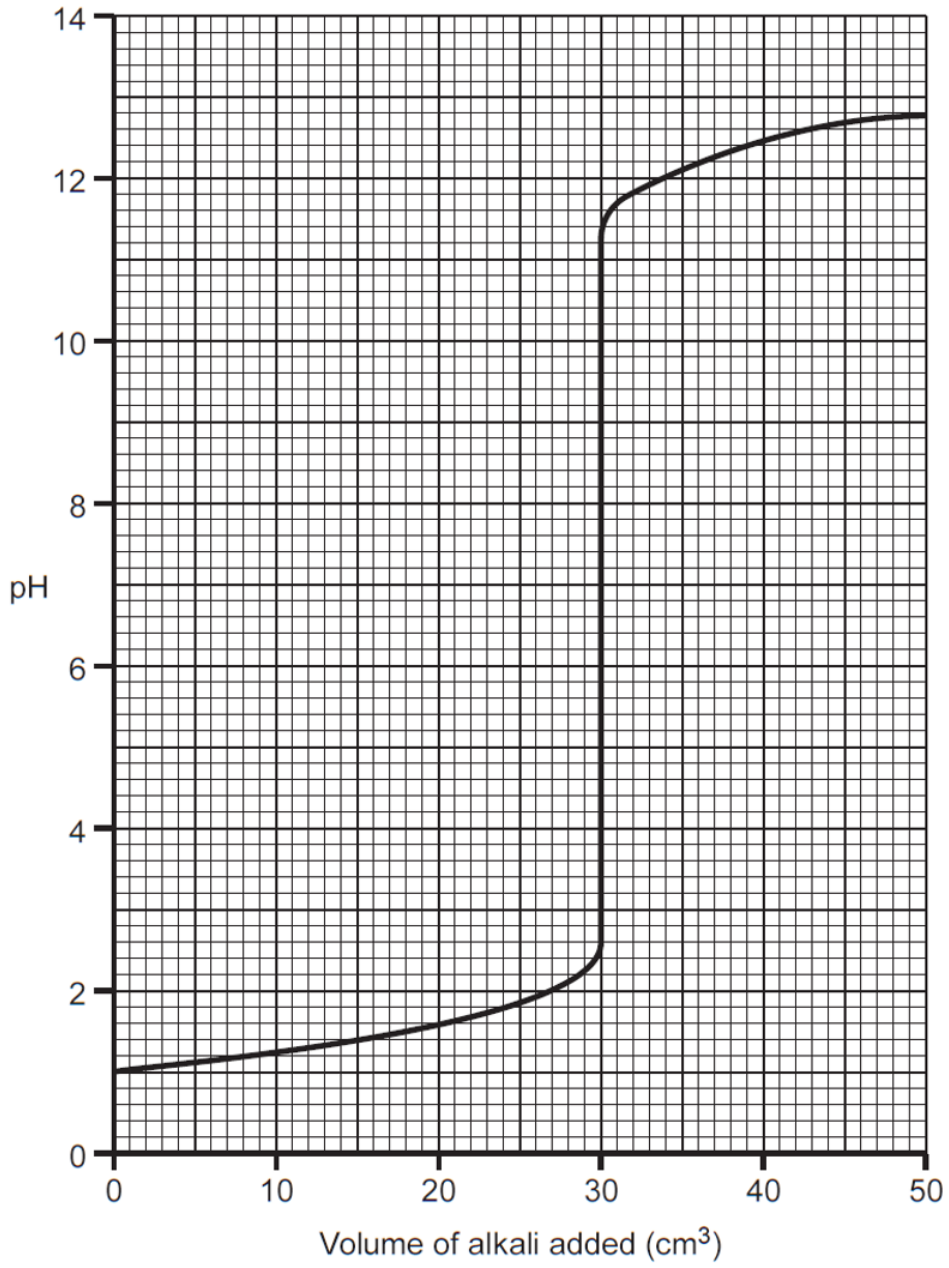


Sodium hydroxide solution is slowly added to the beaker of dilute sulfuric acid.

The pH probe is connected to a datalogger.

Suggest how student **B**'s method is better than student **A**'s. **[1]**

(c) Look at the display from the datalogger.



(i) What is the pH value when 15 cm^3 of alkali has been added?

Answer = ... cm^3 **[1]**

(ii) What volume of alkali is needed to exactly neutralise the sulfuric acid?

Answer = ... cm^3 **[1]**

(d) Student **B** does another experiment.

This time she uses:

- 20.0 cm^3 of dilute hydrochloric acid in the beaker
- sodium hydroxide solution of concentration 0.200 mol/dm^3 in the burette.

Look at student **B**'s results.

Titration number	**1**	**2**	**3**	**4**
Final burette reading (cm^3)	26.9	27.6	27.0	28.2
Initial burette reading (cm^3)	0.5	2.5	1.2	3.2
Titre (volume of alkali used) (cm^3)	26.4	25.1	25.8	25.0

(i) Student **B** decides to only use the results from titration numbers **2** and **4**.

Explain why. **[1]**

(ii) Look at the equation for the reaction between hydrochloric acid, HC*l*, and sodium hydroxide, NaOH.

$$HCl + NaOH \rightarrow NaCl + H_2O$$

Calculate the concentration of hydrochloric acid in mol/dm^3. Use the average titre, in cm^3, from titration numbers **2** and **4**.

Give your answer to **2** significant figures.

Answer = ... mol/dm^3 **[4]**

Total Marks for Question Set 15: 12

The Periodic Table of the Elements

(1)	(2)											(3)	(4)	(5)	(6)	(7)	(0)
1																	18
1 **H** hydrogen 1.0	2											13	14	15	16	17	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	3	4	5	6	7	8	9	10	11	12	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		

Key
atomic number
Symbol
name
relative atomic mass