

# ACIDS, BASES AND TITRATION

## 1

### MARK SCHEME

Q1.

	Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response.			6
<b>0 marks</b>	<b>Level 1 (1-2 marks)</b>	<b>Level 2 (3-4 marks)</b>	<b>Level 3 (5-6 marks)</b>	
No relevant content.	There is a simple description of using some of the equipment.	There is a description of an experimental method involving a measurement, <b>or</b> including addition of alkali to acid (or vice versa).	There is a description of a titration that would allow a successful result to be obtained.	

**examples of chemistry points made in the response could include:**

- acid in (conical) flask
- volume of acid measured using pipette
- indicator in (conical) flask
- sodium hydroxide in burette
- white tile under flask
- slow addition
- swirling
- colour change
- volume of sodium hydroxide added

**Extra information**

- allow acid in the burette to be added to sodium hydroxide in the (conical) flask
  - allow any specified indicator
- colour change need not be specified

**Q2.**

Question	Answers	Extra information	Mark
(a)(i)	hydrogen		1
(ii)	partially		1
(b)(i)	same size / mass / amount / length of magnesium (ribbon)  <b>or</b> same concentration of acids	allow react for same time ignore repeats  ignore volume / amount of acid	1
(b)(ii)	bubbles / gas given off <b>or</b> magnesium disappears / dissolves / reacts slower with ethanoic acid <b>or</b> faster with hydrochloric acid		1  1
(c)(i)	titration	allow titration identified in box if answer line blank	1
(ii)	burette		1
(iii)	(indicator) changed	allow solution changes colour but	1

	colour	not vinegar ignore specific colours	
(d)(i)	H <sup>+</sup> and CH <sub>3</sub> COO <sup>-</sup>	allow H <sub>3</sub> O <sup>+</sup> for H <sup>+</sup> allow CH <sub>3</sub> CO <sub>2</sub> <sup>-</sup> for CH <sub>3</sub> COO <sup>-</sup>	1
(ii)	not fully ionised / dissociated	accept partially / slightly ionised / dissociated accept does not ionise well ignore (does not produce many ions) do not accept ions ionise	1
(e)(i)	colour change in right (pH) range  <b>or</b>  this is a weak acid and strong alkali titration	it = phenolphthalein accept methyl orange does not change colour or methyl orange changes in the wrong (pH) range accept methyl orange is for strong acid and weak alkali titration.	1
(ii)	    NaOH / alkali in burette  add NaOH until (indicator) changes from colourless to pink or until (indicator) changes colour note (burette) volume used or final volume any one other point from • repeat • white tile / background • add dropwise / slowly • swirling / mix • read meniscus at eye level • some indication that some apparatus has been washed	must be description of an acid / alkali titration i.e. quantitative measures of volume  no titration = 0 marks  vinegar = ethanoic acid = acid  accept phonetic spelling do not accept biuret  do not accept incorrect indicator <b>or</b> incorrect colour change  allow unit indicator changes  allow work out the volume  <b>or</b> see how much is used	    1  1  1         1
Total			15

**Q3.**

Question	Answers	Extra information	Mark
(a)(i)	H <sup>+</sup>		1
(ii)	OH <sup>-</sup>		1
(iii)	Lower than		1
(b)	with HCl: UI goes red / pink has a pH 0 ,1 ,2 or 3	a comparison e.g. redder than ethanoic acid	1
	<b>or</b> with ethanoic acid: UI goes orange / yellow (1) has a pH 4 / or above (but less than 7) (1)	allow a comparison e.g. has pH less than ethanoic acid. do not accept an incorrect pH.	1
(c)	completely		1
Total			6

**Q4.**

Question	Answers	Extra information	Mark
(a)	in water: hydrogen ions /H <sup>+</sup> present		1
	when dry: HCl gas is covalent / molecular	accept hydrogen still bonded to chloride / chlorine or HCl is not ionic	1
(b)(i)	(KOH) has hydroxide ions / OH <sup>-</sup>		1
	fully ionised / dissociated	allow ions fully dissociate do not accept highly ionizing ignore reference to concentration / pH	1

(ii)	equal concentrations / numbers / amounts of H <sup>+</sup> and OH <sup>-</sup> ions or KCl: doesn't have any excess H <sup>+</sup> or OH <sup>-</sup> ions	accept the acid / base has been neutralised or the reaction is a neutralisation accept H <sup>+</sup> react with / cancel out OH <sup>-</sup> (to form water)	1
Total			5