

ACIDS BASES & TITRATION 2

MARK SCHEME

Q1.

Question	Answers	Extra information	Mark
(a)	burette		1
(b)	indicator changed colour	allow any indication of colour change	1
(c)(i)	0.2 or 18.3 to 18.5		1
(c)(ii)	18.4		1
(c)(iii)	improve reliability	allow improve accuracy allow to calculate a mean / average or get rid of anomalous result ignore fair test / correct results / random results	1
Total			5

Q2.

Question	Answers	Extra information	Mark
(a)	hydroxide (ion) / OH ⁻ / OH ⁻ (aq)	ignore OH	1
(b)	fully / all / completely ionised / dissociated	ignore strongly ionised or more ions or concentration ignore all 'noise' do not accept <u>ions</u> are fully ionised / dissociated	1
(c)	any valid test linked comparison e.g. UI or full range indicator or pH paper / solution / (pH) meter (1)	assume it = sodium hydroxide incorrect test / titration = 0 marks for question correct result / reference to pH with no test = 1 mark	1 1

	NaOH has higher pH or correct comparison of colours (1) or conductivity test (1) NaOH conducts better / more or bulb brighter (1)	allow converse for weak(er) pH values must be above 7 NaOH – purple, Ammonia – blue allow correct comparison of blue or purple	
Total			4

Q3.

Question	Answers	Extra information	Mark
	phenolphthalein	allow any correct single acid-base indicator that changes colour in the appropriate pH range (8 – 10) do not accept UI / litmus / methyl orange	1
Total			1

Q4.

Question	Answers	Extra information	Mark
(a)	(UI) paper is dry or no water present when (UI) paper used owtte	accept citric acid is a solid accept 'it is not a liquid / solution'	1
(b)	water / H ₂ O / hydrogen oxide	allow any indication of colour change	1
(c)	e.g. H (atom) loses an electron to form H ⁺ or only a proton left		1
(d)	is partially ionised in water		1
(e)(i)	e.g. same concentration/quantity of Mg	accept: volume of acid / ribbon for both / same time accept: volume of gas measured under the same conditions	1
(ii)	C A D B		1
(f)(i)	OH ⁻		1
(ii)	acidic		1
Total			8

Q5.

Question	Answers	Extra information	Mark
(a)(i)	hydrogen / H ⁺ / H ⁺ (aq)	allow H ₃ O ⁺ (aq) ignore H alone	1
(ii)	any valid test linked comparison e.g. magnesium or any (named) carbonate any one from: • weak(er) acid: slower rate / fewer bubbles or less gas • weak(er) acid longer for Mg to disappear or UI or pH paper / solution / meter / full range indicator (1) any one from: (1) • weak(er) acid has higher pH • correct comparison of colours or conductivity test (1) weak acid conducts less or bulb (1) less bright	NB titration = 0 allow zinc / iron do not allow calcium or alkali metals independent mark allow converse for strong(er) not litmus or any other paper independent mark allow converse for strong(er) acid pH values must be below 7 i.e. strong = red / pink weak = orange / yellow allow converse for stronger	1 1
(b)(i)	any two from eg: • nicotine kills people • nicotine causes cancer / diseases • nicotine is harmful / dangerous • nicotine is addictive	any plausible answer allow it would save lives allow it kills people ignore references to pollution / passive smoking	2

	<ul style="list-style-type: none"> • cost to NHS 		
(b)(ii)	<p>any two from eg:</p> <ul style="list-style-type: none"> • nicotinic acid / vitamin B3 / niacin has different properties to Nicotine • it is in many / listed foods or nicotine in food is not dangerous • more health risks to people / pellagra / diarrhoea / dermatitis / dementia / it will cause deaths or save lives • it is a vitamin or important part of diet • tobacco raises money / taxes • human rights issues • can't give up straight away / are addicted to it or perceived benefit of smoking 	<p>any sensible answer</p> <p>ignore if you ban nicotine, nicotinic acid cannot be made</p> <p>ignore malnutrition</p> <p>ignore just 'illness'</p>	2
Total			7

Q6.

Question	Answers	Extra information	Mark
(i)	an indicator		1
(ii)	changed colour		1
(iii)	titration		1
Total			3

Q7.

Question	Answers	Extra information	Mark
(a)	Drain Buster is a concentrated sodium hydroxide solution that would damage the skin		1
	therefore it is diluted so that it is safe to use for the experiment		1

(b)			
Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response.			
0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)
No relevant content.	There is a brief description of the titration that may include a risk assessment.	There is some description of the titration that may include a risk assessment.	There is a clear, balanced and detailed description of the titration and an appropriate risk assessment.
<p>examples of the chemistry points made in the response</p> <ul style="list-style-type: none"> • burette / acid / HCl used correctly • pipette used for Drain Buster solution / alkali / NaOH correctly • read meniscus at eye level • acid / HCl added dropwise • indicator used • white background/tile • end-point of titration recorded • swirling / mixing • repeat <p>example of risk assessment points made in the response e.g.</p> <ul style="list-style-type: none"> • Wear safety goggles - to protect eyes because hydrochloric acid is corrosive / irritant and / or sodium hydroxide is caustic 			
Total marks			8