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Cambridge Ordinary Level

MARK SCHEME for the May/June 2015 series

5070 CHEMISTRY

5070/31 Paper 3 (Practical Test), maximum raw mark 40

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1 (a) Titration

Accuracy 8 marks

For the two best titres give:
4 marks for a value within 0.2 cm^3 of supervisor
2 marks for a value within 0.3 cm^3 of supervisor
1 mark for a value within 0.4 cm^3 of supervisor

Concordance 3 marks

Give:
3 marks if all the ticked values are within 0.2 cm^3
2 marks if all the ticked values are within 0.3 cm^3
1 mark if all the ticked values are within 0.4 cm^3

Average 1 mark

Give 1 mark if the candidate calculates a correct average (error not greater than 0.05) of all his/her ticked values.

[12]

Calculations
Assuming a 25.0 cm^3 pipette and a titre of 20.2 cm^3.

(b) moles of sodium hydroxide in 25.0 cm^3 of **P**

$$= \frac{25.0 \times 0.0984}{1000}$$

= 0.00246 [1]

(c) concentration, in mol / dm^3, of H_3PO_3 in **Q**

$$= \frac{5.04}{82}$$

= 0.0615 [1]

(d) moles of H_3PO_3 in average titre of **Q**

$$= \frac{20.2 \times 0.0615}{1000}$$

= 0.00124 [1]

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(e) moles of sodium hydroxide which react with 1 mole of H_3PO_3

$$= \frac{0.00246}{0.00124}$$

= 1.98 [1]

(f) balanced equation for the reaction

$2NaOH + H_3PO_3 \rightarrow Na_2HPO_3 + 2H_2O$

whole numbers consistent with answer in **(e)** on left hand side of equation (1)

correct formulae for products and balancing of the equation (1) [2]

[Total: 18]

2 **R** is ammonia **S** is iron(II) sulfate

Test	Notes
General points For ppt allow solid, suspension, powder For gases Name of gas requires test to be at least partially correct. Effervesces = bubbles = gas vigorously evolved, but not gas evolved. Solutions Colourless not equivalent to clear, clear not equivalent to colourless.	
1 gas turns damp red litmus blue (1) ammonia (1)	 to score ammonia mark there must be some indication of a test, i.e. smell of ammonia, alkaline gas, tested with litmus
2 white ppt (1) soluble in excess (1) colourless solution (1)	

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Test			Notes
3			
(a)	white ppt	(1)	
(b)	solid disappears	(1)	
	colourless solution	(1)	
4			
(a)	no reaction	(1)	
(b)	bubbles	(1)	
	gas relights a glowing splint	(1)	
	oxygen	(1)	to score oxygen mark there must be some indication of a test, e.g. 'tested with a glowing splint', 'relights a splint'
	blue solution	(1)	
5			
(a)	white ppt	(1)	
(b)	solid remains	(1)	
6			
	green ppt	(1)	
	insoluble in excess	(1)	
	turns brown at surface	(1)	

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Test	Notes
7 **(a)** filtrate is yellow (1) **(b)** red-brown ppt (1) insoluble in excess (1)	

Any 20 of the 21 scoring points [20]

Conclusions

R is ammonia / NH_3 or ammonium hydroxide / NH_4OH
(ammonia identified in test 1) (1)

S is iron(II) sulfate / $FeSO_4$
(in test 4 white ppt insoluble in acid and in test 6 green ppt) (1)

[2]

[Total: 22]

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