SERIES 38 EXAMS

CHEMISTRY 233/3

MARKING SCHEME

Q1. Table 1

	I	II	III
Final burette reading cm^3	15.6	31.2	15.6
Initial burette reading cm^3	0.0	15.6	0.0
Volume of solution B used cm^3	15.6	15.6	12.5

The marks are to be distributed as follows.

a) Complete table ……. 1 mk

(i) Complete table with 3 titration's done award……. 1 mk

(ii) Incomplete table with 2 titration's done award……... 1/2 mk

(iii) Incomplete table with 1 titration done award…… 0 mk

Penalties

- Wrong arithmetic
- Inverted table
- Burette readings above 50 unless explained
- Unrealistic titre values i.e. values in hundreds or below 1.0cm^3

Penalise ½ mark for each to a maximum of ½ mark i.e penalise ½ mark once.

b) Use of decimals ……. (1 mk)

(i) Accept only 1 or 2 decimal places used consistently otherwise penalise FULLY and award 0 mark .

(ii) If the two decimal places are used the 2nd decimal place must be either "0" or "5" otherwise penalise fully.

c) Accuracy ……. (1 mk)

Compare the candidates titre values with the teachers value.

Conditions

(i) If at least one of the titre values is within $\pm$0.1cm^3 of the teachers value award…….. (1 mk)

(ii) If no value is within $\pm$0.1 of teachers value but atleast one is within $\pm$0.2 of teachers value award…….. ½ mk

d) Principle of averaging …… (1 mk)

values to be averaged must be shown and must be within $\pm$0.2 of each other.

Conditions

(i) If 3 consistent titrations are done and averaged award…….. (1 mk)

(ii) If 3 titrations are done and ONLY two are consistent and averaged award (1 mk)

(iii) If only two titration's are done are consistent and averaged award (1 mk)

(vi) If three titres are possible but only two are averaged award (0 mk)

(v) If 3 inconsistent titres are averaged award (0 mk)

(vi) If only 2 titration's are done are inconsistent and averaged award (0 mk)
(vii) If only 1 titration is done award …… (0 mk)

e\) Final answer……. (1 mk)
Compare the candidate's correct average titre with the teacher's value.
(i) If within ±0.1 of teachers value award …… (1 mk)
(ii) If not within ±0.1 of teacher's value but within ±0.2 award (1/2 mk)
(iii) If beyond ±0.2 f teacher's value award …… (0 mk)

TABLE II.

	I	II	III
Final burette reading cm^3	17.9	35.8	17.9
Initial burette reading cm^3	0.0	17.9	0.0
Volume of solution D used cm^3	17.9	17.9	17.9

CALCULATIONS

a) $\frac{15.6+15.6+15.6}{3}$ √ ½ = $15.6cm^3$√ ½

b) In $1000cm^3$ of B = 0.2 moles
in $15.6cm^3$ of b ≡ $\frac{15.6 \text{ (ans (a) above) x } 0.2}{1000}$ √ ½

= ans √ ½

c) Mole ratio NaoH: H_2SO_4 √ 1
2 : 1

Concentration of solution C used = $\frac{\left[\frac{\text{ans in (b)}}{2}\right] \text{ X } 1000}{25}$ √ 1

= ans. √ 1

d) i) $\frac{17.9+17.9+17.9}{3}$ √ ½ = 17.9 cm^3 √ ½

(ii) $\left[\frac{\text{ans(c) x25}}{1000}\right] \div 2$ √ 1

= Answer √ 1

(iii) $\frac{\text{ans(d(ii))X 100}}{\text{ans(d(i)}}$ √ 1

= Answer √ 1

(iv) $\frac{100x0.2}{1000}$ √ ½ = ans√ ½

(v) Ans (iv) – ans (iii) √ ½ = ans√ ½

(vi) Mole ratio: CO_3^{2-} : H^+ √ 1

1 : 1

Ans(v)x 1÷1 = ans √ 1

e)i) $\frac{1 \text{ x ans d (vi)}}{0.5}$ √ 1 = ans√ 1

ii) (ans (e(i) – 60)÷ 2√ ½ = ans√ ½

CONDITIONS

(i) Penalise ½ mk in answer if wrong units are given otherwise ignore when units are omitted.

(ii) Penalise ½ mk for wrong transfer of average titre in (iv) above otherwise penalise FULLY for a strange figure.

(iii) Answer in (iii) above should be atleast to 4 decimal places unless it works out exactly to less than 4 decimal places, otherwise penalise ½ mk on the answer.

Table 2

Conditions to apply as in table 1.

CALCULATIONS

(ii) No. of moles of NaoH used = $\frac{25 \times 1}{1000}$

= 0.025 moles √ ½

Mole ration NaoH : H_2SO_4

2 : 1 √ ½

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. .

No of moles of solution K used = $\frac{0.025}{2}$ √ ½

= 0.0125 moles √ ½

(iii) No of moles H_2SO_4 in $100cm^3$ of the solution = $\frac{100 \times 0.0125}{\text{average titre}}$ √ ½

= Answer √ ½

√ ½

(iv) No. of moles of H_2SO_4 that reacted Na_2CO_3 with 0.5g = Answer a (iv) – Answer b(iii)

= Answer √ ½

(v) Mole ratio X_2CO_3 : H_2SO_4

1 : 1 √ ½

√ ½

No of moles of X_2CO_3 in 0.5g = Answer (iv) above.

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. .

0.5g of X_2CO_3 ≡ Answer (iv) above

x

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. . ≡ 1 mole

Relative formular mass of x_2co_3 = $\frac{1 \times 0.5}{\text{Answer (iv)}}$ √ ½

= Answer √ ½

(vi) 1 moles of x_2co_3 ≡ Answer (v) above

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. . $x = \frac{\text{Answer (v)} - 60}{2}$ √ ½

= Answer √ ½

CONDITIONS

(i) The average titre in \(iii) should be transferred intact otherwise penalise fully.

(ii) Answer a (iv) and answer b(iii) in (iv) above should be transferred intact otherwise penalise FULLY.

(iii) Penalise fully for any working beyond the expected answer.

2(a) Observation Droplets of colourless √1 liquid formed on cooler parts of the test tube (penalize fully if water mentioned) Blue litmus remains blue while red litmus turns to blue √1 (penalize fully if only one litmus paper mentioned)	Inference Hydrated √ ½ salt Water of crystallization present. NH_4^+ present √ ½ (Reject NH_3)
(b) Observation Dissolves √ ½ to form a colourless solution/green solution √ ½	Inference Soluble salt present Fe^{2+} present (answer attached to green solution)
(c) Observation White precipitate insoluble on addition of dilute HNO_3(aq) √1	Inference Fe^{2+} present √1
(d) Observation White precipitate insoluble on addition of dilute $HNO_{3(aq)}$ √1 3. (a) Observation -melts√ ½ -burns with a yellow sooty √ ½ /smocky/luminous flame -leaving no residue √ ½	Inference SO_4^{2-} present √1 Inference C=C, -C≡ C - (penalize fully if one is left out)
(b) (i) Observations Purple acidified KMnO4 is decolourised/purple solution changes to colourless. (penalize fully if initial colour of $KMnO_4$ is not mentioned)	Inference C=C, -C≡C-√ ½
(ii) Observation Orange acidified $K_2Cr_2O_7$ changes to green.	Inference C=C, -C≡ C-√ ½