ZIMBABWE SCHOOL EXAMINATIONS COUNCIL
General Certificate of Education Advanced Level

MARKING SCHEME

NOVEMBER 2011

CHEMISTRY

9189/5

1   Dilution Table 1.1

-     Give <u>one mark</u> for all readings recorded to 2 d.p.   [1]

-     Give <u>one mark</u> for a recorded volume of FA1 in the range 22.00 cm^3 to 24.00 cm^3 [1]
      exclude limits, 22,05 to 23,95

-     Give <u>one mark</u> for a correct subtraction   *not from zero start.* [1]

Titration Table 1.2

0,2cm^3

-     Give <u>one mark</u> if there are at least 2 FA3 volumes within <u>0.1 cm^3</u> range   [1]

-     Give <u>one mark</u> for correct subtraction and ~~readings in correct positions~~   [1]
      no more than 1 zero starts .
      values

-     Give one mark for burette readings to 2 d.p. ticked used and working shown.   [1]
      for calculating average and filling

ACCURACY MARKS

Calculate the ratio = $\dfrac{\text{titre}}{\text{volume of FA1}}$ and assign accuracy marks by comparing the

Candidate's ratio with that obtained for the supervisor (work to 4 d.p.)

The spread penalty is applied using the following table.

ACCURACY MARKS

Mark	Difference from supervisor
12	$\leq 0,0100$
11	$0,0100^+$ to $0,0150$
10	$0,0150^+$ to $0,0200$
9	$0,0200^+$ to $0,0250$
8	$0,0250^+$ to $0,0300$
7	$0,0300^+$ to $0,0350$
6	$0,0350^+$ to $0,0400$
5	$0,0400^+$ to $0,0500$
4	$0,0500^+$ to $0,0600$
3	$0,0600^+$ to $0,800$
2	$0,0800^+$ to $0,1000$
1	$0,1000^+$ to $0,2000$
0	$>0,2000$

SPREAD PENALTY

Range used/cm³	Deduction
$\leq 0,200$	0
~~0,20⁺ to~~ 0,25	0
$0,25^+$ to $0,30$	1
$0,30^+$ to $0,35$	2
$0,35^+$ to $0,40$	3
$0,40^+$ to $0,50$	4
$0,50^+$ to $0,60$	5
$0,60^+$ to $0,70$	6
$0,70^+$ to $0,80$	7
$0,80^+$ to $0,90$	8
$0,90^+$ to $1,00$	9 ~~10~~
$1,00^+$ to 1,50	10
1,50 to 2,00	11
$> 2,00$	12

[12]

(a) Give one mark for $\dfrac{titre \times 0.100}{1\,000}$

Ignore evaluation / Evaluation value to 2, 3 or 4. [1]

(b) Give one mark for $\dfrac{titre \times 0.100}{1\,000} \times \dfrac{1}{2} = n$ of I_2

n of $Cu^{2+} = n \, SO_3^{2-}$ [1]

2 mole Cu^{2+} liberates 1 mole I_2.

$\therefore = \dfrac{titre \times 0,1}{1000}$

$\therefore$ n of moles of $Cu^{2+} = \dfrac{1}{2} \times titre \times \dfrac{0.1}{1000} \times 2$

$= n$ of answer to a [1]

moles of Cu^{2+} = 2 × moles of I_2.

(c) $\dfrac{\text{Ans of moles of } Cu^{2+} \text{in (b)} \times 10 \times 1\,000}{\text{Volume of FA1 diluted}}$ [2]

(d) $M_r = \dfrac{\text{con in g/dm}^3 \text{of Cu}}{\text{no of moles (Answer to c)}}$ [2]

(e)   Give one mark for calculation

$\dfrac{\text{Ans to d } - M_r\,CuSO_4}{M_r\,H_2O} = n$ [1]

Give one mark for answer   [1]

[Total: 27]

2   Give one mark for each point.

Minimum 40 to 100 cm³.

(i)   Using a measuring cylinder, place a known volume of sodium thiosulphate solution into a beaker   from drawn diagram volume [1] below half /at around half)

(ii)   Place the beaker over the cross drawn on a piece of paper.   [1]

(iii)   Add a known volume of sulphate acid to solution in (i); start a stop watch. (Viewed from above) [2]   equal or more than constant (a) Accept equal or greater volume (b) 40 to 100 cm³ (c) Ignore stirring agitating

(iv)   Record the time it takes for the cross to be invisible when viewed from above.   [1]

(v)   Repeat steps (i) to (iv) using less volume of thiosulphate but maintaining the total [1] volume used by adding water; The volume of acid must remain constant. (c) [1]   /concept of varying AW (a) from graph (b) ignore is given in (iii)

(vi)   Tabulate your results of volume of thiosulphate used and time taken for X to disappear. Accept a table fully labelled volume of [1]   T/minutes, acid /thiosulph volume of distilled water and time/

(vii) 1.   Plot a graph of volume of/AW thiosulphate against time. $V \times t / V^2 \times t$ (1/t) [1] (1/t) [1]

2.   Measure gradient at different times and use it to determine the effect of concentration on the rate of reaction.   [1]

Mark it as b

(b) (i) Plot a graph of volume against $\frac{1}{t}$ or $\frac{vol}{cm^3}$ / t [1]

measure gradient at different times $Vt = const$
and use it $V^2t = const$ first
/ calculate   second order
$\frac{1}{t}$ and conclude is $\frac{1}{t}$ decreasing non = zero
rate   order

(ii) If it's a straight line its 1st order. / time/rate relationship

$\frac{1}{t}$ [1] or

(iii) If its not a straight line its another order 2nd or zero   equation

OR   [1]

Plot a graph of rate against volume

Rate $= k [-thio]^n \cdot = \frac{1}{t}$.   (1)

                                                        (2)

[Total: 13]