Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Mark Schemes

Q1.

(a) Co-ordinate / dative / dative covalent / dative co-ordinate

Do not allow covalent alone

1

(b) (lone) pair of electrons on <u>oxygen/O</u>

If co-ordination to O^{2-}, CE=0

1

forms co-ordinate bond with <u>Fe</u> / donates electron pair to <u>Fe</u>

'Pair of electrons on O donated to Fe scores M1 and M2

1

(c) 180° / 180 / 90

Allow any angle between 85 and 95
Do not allow 120 or any other incorrect angle
Ignore units eg °C

1

(d) (i) 3 : 5 / 5 FeC_2O_4 reacts with 3 MnO_4^-

Can be equation showing correct ratio

1

(ii) **M1** Moles of MnO_4^- per titration = 22.35 × 0.0193/1000 = <u>4.31×10^{-4}</u>
Method marks for each of the next steps (no arithmetic error allowed for M2):

Allow <u>4.3×10^{-4}</u> (2 sig figs)
Allow other ratios as follows:
eg from given ratio of 7/3

1

M2 moles of FeC_2O_4= ratio from (d)(i) used correctly × 4.31×10^{-4}

M2 *= 7/3 × 4.31×10^{-4} = 1.006×10^{-3}*

1

M3 moles of FeC_2O_4 in 250 cm^3 = M2 ans × 10

M3 *= $1.006 \times 10^{-3} \times 10 = 1.006 \times 10^{-2}$*

1

M4 Mass of $FeC_2O_4.2H_2O$ = M3 ans × 179.8

M4 *= $1.006 \times 10^{-2} \times 179.8 = 1.81$ g*

1

M5 % of $FeC_2O_4.2H_2O$ = (M4 ans/1.381) × 100

Downloaded from www.merit-minds.com

M5 *= 1.81 × 100/1.381 = 131 % (130 to 132)*

1

(OR for M4 max moles of $FeC_2O_4.2H_2O$ = 1.381/179.8 (= 7.68×10^{-3})
for M5 % of $FeC_2O_4.2H_2O$ = (M3 ans/above M4ans) × 100)
eg using correct ratio 5/3:
Moles of $FeC_2O_4 = 5/3 \times 4.31 \times 10^{-4} = 7.19 \times 10^{-4}$
Moles of FeC_2O_4 in 250 $cm^3 = 7.19 \times 10^{-4} \times 10 = 7.19 \times 10^{-3}$
Mass of $FeC_2O_4.2H_2O = 7.19 \times 10^{-3} \times 179.8 = 1.29$ g
% of $FeC_2O_4.2H_2O$ = 1.29 × 100/1.381 = 93.4 (allow 92.4 to 94.4)
Note correct answer (92.4 to 94.4) scores 5 marks

Allow consequentially on candidate's ratio

eg ***M2*** *= $5/2 \times 4.31 \times 10^{-4} = 1.078 \times 10^{-3}$*

M3 *= $1.0078 \times 10^{-3} \times 10 = 1.078 \times 10^{-2}$*

M4 *= $1.078 \times 10^{-2} \times 179.8 = 1.94$ g*

M5 *= 1.94 × 100/1.381 = 140 % (139 to 141)*

Other ratios give the following final % values

1:1 gives 56.1% (55.6 to 56.6)

5:1 gives 281% (278 to 284)

5:4 gives 70.2% (69.2 to 71.2)

[10]

Downloaded from www.merit-minds.com

Q2.

(a) (i) Flask with side arm

1

Buchner funnel and horizontal filter paper

Allow Hirsch funnel and horizontal filter paper.

Do not allow standard Y-shaped funnel.

If there is not a clear air-tight seal (labelled or drawn) between the funnel and the flask maximum 1 mark.

1

(ii) M_r $KMnO_4$ = 158(.0)

1

Mass = 0.225 × 158 / 3 = 11.9 (g)

Lose M2 if no working shown.

Allow consequential mark on an incorrect M_r for $KMnO_4$

1

Precision mark: three significant figures

Allow if mass incorrect.

1

(iii) (Unpleasant) taste

Ignore smell.

1

(b) Difficult to see meniscus / line on graduated flask

Do not allow reference to over filling.

1

[7]

Downloaded from www.merit-minds.com