Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Inorganic 2

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Name of the Student:_____
Max. Marks : 16 Marks **Time : 16 Minutes**

Mark Schemes

Q1.

(a) $2Fe^{2+} + S_2O_8^{2-} \rightarrow 2Fe^{3+} + 2SO_4^{2-}$

1

$2Fe^{3+} + 2I^- \rightarrow 2Fe^{2+} + I_2$

1

two negative ions repel / lead to reaction that is slow / lead to reaction that has high E_a

1

iron able to act because changes its oxidation state
allow iron has variable oxidation state

1

With iron ions have alternative route / route with lower activation energy

1

(b) (i) $[Fe(H_2O)_6]^{3+} \rightarrow [Fe(H_2O)_5OH]^{2+} + H^+$
can have H_2O on LHS and H_3O^+ on R
do not penalise further hydrolysis equations
allow high charge density

1

Fe^{3+} ion has higher charge (to size ratio) (than Fe^{2+})

1

increases polarisation of co-ordinated water / attracts O releasing an H^+ ion / weakens O–H bond

1

(ii) $Cr_2O_7^{2-} + 14H^+ + 6Fe^{2+} \rightarrow 2Cr^{3+} + 7H_2O + 6Fe^{3+}$
or 6 mol Fe(II) react with 1 mol dichromate
If factor of 6 not used max = 3 for M2, M4 and M5
e.g. 1:1 gives ans= 8.93 to 8.98% (scores 3)

1

moles dichromate = $23.6 \times 0.218/1000 = 5.14 \times 10^{-4}$

1

moles iron = $5.14 \times 10^{-4} \times 6 = 0.00309$
M3 also scores M1

1

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mass iron = 0.00309 × 55.8 = 0.172

Mark is for moles of iron × 55.8 conseq

Allow use of 56 for iron

1

% by mass of iron = 0.172 × 100/0.321 = 53.7%

Answer must be to at least 3 sig figures allow 53.6 to 53.9

Mark is for mass of iron × 100/0.321 conseq

1

(c) brown precipitate / solid

Allow red-brown / orange solid

Not red or yellow solid

1

bubbles (of gas) / effervescence/ fizz

Allow gas evolved / given off

Do not allow just gas or CO_2 or CO_2 gas

1

$2[Fe(H_2O)_6]^{3+} + 3CO_3^{2-} \rightarrow 2Fe(H_2O)_3(OH)_3 + 3CO_2 + 3H_2O$

Allow

$2[Fe(H_2O)_6]^{3+} + 3CO_3^{2-} \rightarrow 2Fe(OH)_3 + 3CO_2 + 9H_2O$

Use of Na_2CO_3

e.g. … + $3Na_2CO_3 \rightarrow$ .. + .. + .. + $6Na^+$

1

[16]

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