

Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Mark Schemes

Q1.

- (a) It has mobile ions / ions can move through it / free ions

Do not allow movement of electrons.

1

- (b) (+) 0.18 V

1

- (c) The concentration is not 1.(0) (mol dm⁻³)

1

- (d) Cu (s) | Cu²⁺(aq) || Cu²⁺(aq) | Cu(s)

1

- (e) (Concentration) increases or ([Cu²⁺] ions) increase

Mark independently

1

The [Cu²⁺] ions in the two solutions become equal/same

Not, concentrations are constant

1

[6]

Q2.
A

[1]

Q3.

(a) (+) 5

1

(+) 2

1

Allow Roman numerals

(b) Cl^- / chloride (ions)

Allow 2Cl^-

Do not allow chlorine / Cl / Cl_2

Ignore (aq)

1

(c) nitric acid / HNO_3

If not nitric acid then $\text{CE} = 0$

If NO_3^- ions identified, lose M1 and mark on

Allow $0.96\text{V} > 0.34\text{V}$

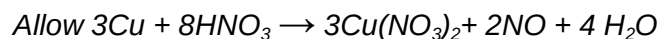
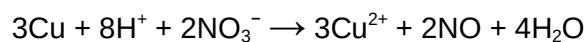
1

the $E^\ominus \text{NO}_3^- / \text{NO} > E^\ominus \text{Cu}^{2+} / \text{Cu}$ or in words

Allow NO_3^- is a better oxidising agent than Cu^{2+}

Allow NO_3^- has a more positive $E^\ominus$ than Cu^{2+}

1



1

EMF for the reaction is 0.62(V)

1

[7]

Q4.
B

[1]

Q5.



Accept any Fe(II) compound – correct formula or name

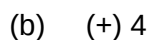
1

$$E^\ominus \text{VO}_2^+ / \text{VO}^{2+} > E^\ominus \text{Fe}^{3+} / \text{Fe}^{2+} > E^\ominus \text{VO}^{2+} / \text{V}^{3+}$$

If calculations of EMF are provided producing EMFs = 0.23(V) and -0.43(V), with a comment, allow M2

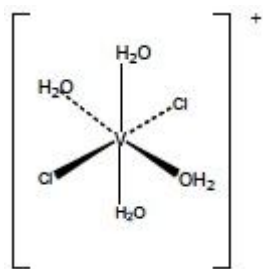
allow $E^\ominus \text{Fe}^{3+} / \text{Fe}^{2+}$ value of +0.77 is between the $E^\ominus$ values for the electrode half-equations containing the V species or wtte

1



IV or four

1



(c)

Ignore absence of charge

Wedges, dotted lines and [] not required

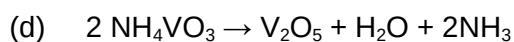
Do not penalise bond from H to V (in water ligands)

1

Cis/trans

allow E/Z, geometric and stereo(isomerism)

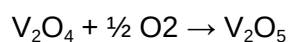
1



Accept multiples

Ignore state symbols

1



Both equations needed for 1 mark in this order

Allow multiples

1

[7]