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

Mark Schemes

Q1.

(a) *El*ectron acceptor / gains electrons / takes electrons away

Do not allow electron pair acceptor / gain of electrons / definition of redox (QWC)

1

(b) $Cd(OH)_2$

Do not allow 'Cd(OH)$_2$/Cd'

1

Species (on LHS) with the least positive/most negative electrode potential / lowest *E* / smallest *E*

Only allow this mark if M1 answer given correctly or blank

Do not allow negative emf

1

(c) (i) 1.5 (V) / 1.50

1

(ii) $2MnO_2 + 2H_2O + Zn \rightarrow 2MnO(OH) + 2OH^- + Zn^{2+}$

Ignore state symbols

e^- must be cancelled

(take care that Zn^{2+} is on RHS)

1

(iii) Allows ions to pass (through it) or words to that effect

Penalise passage of electrons

Allow mention of particular ions

1

(iv) Allows electrons to flow / makes electrical contact / conductor

Allow acts as an (inert) electrode / anode / cathode

1

(v) Zn is 'used up' / has reacted / oxidised

Allow idea that zinc reacts

Do not allow just zinc corrodes

1

(d) (i) 3 / +3 / III

1

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$2Ni(OH)_2 + Cd(OH)_2 \rightarrow 2NiO(OH) + Cd + 2H_2O$

For correct nickel and cadmium species in correct order (allow H_2O missing and OH^- not cancelled)

1

For balanced equation (also scores M2)

Allow max 1 for M2 and M3 if correct balanced equation but reversed.

Ignore state symbols

1

(ii) Metal / metal compounds are re-used / supplies are not depleted / It (the cell) can be re-used

Allow does not leak / no landfill problems / less mining / less energy to extract metals / less waste

Do not allow less CO_2 unless explained

1

(e) (i) $C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$

Allow C_2H_6O

1

(ii) $C_2H_5OH + 3H_2O \rightarrow 2CO_2 + 12H^+ + 12e^-$

Allow C_2H_6O

1

(iii) (+)0.23 (V)

1

(iv) $\underline{CO_2}$ released by combustion / fermentation / fuel cell / reaction with water

Can be answered with the aid of equations

1

(atmospheric) $\underline{CO_2}$ taken up in <u>photosynthesis</u>

1

[17]

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