

Redox

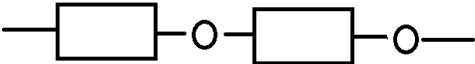
Mark Scheme 1

Level	IGCSE
Subject	Chemistry
ExamBoard	CIE
Topic	Chemical Reactions
Sub-Topic	Redox
Paper	(Extended) Theory
Booklet	Mark Scheme 1

TimeAllowed: 63 minutes

Score: / 52

Percentage: /100

Question	Answer	Marks
1(a)(i)	step 2 and it is electron gain / oxidation state decreases;	1
(a)(ii)	silver (ion) and it accepts electrons / gets reduced / oxidation state decreases;	1
(b)	<p><i>prediction:</i> the 'not covered' section will be black; the 'covered in thick card' section will be white / cream; the 'covered in thin card' section will be grey;</p> <p><i>explanation:</i> the more light, the more silver ions are reduced;</p>	1 1 1 1
(c)(i)	carbon dioxide + water → glucose + oxygen reactants correct; products correct;	1 1
(c)(ii)	chlorophyll	1
(c)(iii)	 <p>one correct –O– link between rectangles; two correct glucose units with continuation bonds;</p>	1 1
(c)(iv)	the reaction of glucose with oxygen to release (carbon dioxide and water and) energy; or the reaction of glucose in a biological system to release energy;	1

- 2 (a) chlorine/argon [1]
- (b) chlorine [1]
- (c) magnesium [1]
- (d) argon [1]
- (e) aluminium [1]
- (f) sodium [1]
- [Total:6]

- 3 (a) Any **two** from:
- bubbles / effervescence / fizzing
 - (some of the) solid / copper carbonate dissolves / disappears **or** some (brown) solid seen (undissolved)
 - (colourless) solution or liquid turns blue [2]
- (b) filter / centrifuge / decant
- wash with (distilled) water [1]
- (dry with) filter paper / tissues / warm windowsill / in sun / oven / fan / heat [1]
- (c) (i) Blue precipitate / ppt
- (ii) $\text{Cu}^{2+} + 2\text{OH}^- \rightarrow \text{Cu}(\text{OH})_2$ [1]
- (d) (i) $\text{Cu}(\text{OH})_2(\text{s}) \rightarrow \text{CuO}(\text{s}) + \text{H}_2\text{O}(\text{g})$
- Equation [1]
- State symbols of correct chemical equation [1]
- (ii) carbon / hydrogen [1]

[Total:10]

- 4 (a) (i) $\text{Cu}(\text{OH})_2 \rightarrow \text{CuO} + \text{H}_2\text{O}$ [1]
- (ii) Rb [1]
- (b) (i) electron loss [1]
- (ii) because they can accept electrons [1]
- (c) (i) copper and mercury [1]
- (ii) add copper / mercury / metal to (named) acid **and** no reaction / no bubbles / no hydrogen [1]
- (d) (i) Mn [1]
- (ii) (solution) becomes colourless / decolourises
NOT: clear [1]

[Total: 8]

- 5 (a) (i) number of outer electrons increases [1]
or number of electrons more than complete energy level
or number of electrons to be lost
or accept clear examples
NOT just different groups or valencies
- (ii) gain electrons [1]
number of electrons to be gained is less across period [1]
or number of outer electrons incr
- (b) Al_2S_3 [1]
 Si_3P_4 [1]
- (c) (i) silicon [1]
(ii) sodium [1]
(iii) sulphur or chlorine [1]
- (d) unreactive or inert or does not react [1]

- (e) 3Na to 1P [1]
COND next two marks
correct charges [1]
8e around P [1]
If covalent then only one mark for 3Na to 1P
- (f) (i) $11.5/23 = 0.5$ [1]
(ii) 0.25 [1]
conseq to (i)
(iii) $0.25 \times 32 = 8 \text{ g}$ [1]
conseq
(iv) 2.0 g [1]
only **conseq** to (iii) if answer to (iii) is less than 10
NB If (ii) is 0.3(125), no excess is possible, (iv) **ZERO**

TOTAL = 16