

Chemistry Year 12 REDOX SAMPLE TEST - SOLUTIONS

Multiple Choice:

- | | | | | | | |
|----|---|-----|---|-----|---|----------|
| 1. | D | 6. | D | 11. | B | |
| 2. | D | 7. | B | 12. | D | |
| 3. | A | 8. | C | 13. | C | |
| 4. | C | 9. | A | 14. | A | |
| 5. | D | 10. | D | 15 | B | 15 marks |

Written:

- | | | | |
|-------|--|---|----------------------|
| 1 (a) | Diag - 3 marks | 1 for each beaker + soln + metal
1 for salt bridge | 3 marks |
| (b) | Labels: - 1 each

Anode

Cathode

Positive electrode

Negative electrode | direction e- flow

direction positive ion movement

direction negative ion movement | 7 marks |
| (c) | Zn (s)

Cu+2 (aq) + 2 e- | -----> Zn+2 (aq) + 2 e-
-----> Cu (s) | + 0.76 V
+ 0.34 V |
| | Zn (s) + Cu+2 (aq) | -----> Zn+2 (aq) + Cu (s) | + 1.10 V |
| | | 1 mark half eqns, 1mark Eo Total | 2 marks |

2 1 M AgNO₃

- (a) Cathode: (x4) $\text{Ag}^+ (\text{aq}) + \text{e}^- \rightarrow \text{Ag} (\text{s})$ + 0.80 V
 Anode: (x1) $2 \text{H}_2\text{O} (\text{l}) \rightarrow \text{O}_2 (\text{g}) + 4 \text{H}^+ (\text{aq}) (10^{-7} \text{ M}) + 4 \text{e}^-$ - 0.82 V
 $4 \text{Ag}^+ (\text{aq}) + 2 \text{H}_2\text{O} (\text{l}) \rightarrow 4 \text{Ag} (\text{s}) + \text{O}_2 (\text{g}) + 4 \text{H}^+ (\text{aq}) (10^{-7} \text{ M})$ - 0.02 V

- (b) Minimum voltage required = 0.02 V **1 mark**

(c) Observations: Solid precipitated at cathode (-ve)
Colourless gas bubbles at anode (+ve) **1 mark**
1 mark

3 (a) Anode: $2 \text{Cl}^- (\text{l}) \longrightarrow \text{Cl}_2 (\text{g}) + 2 \text{e}^-$
 Cathode: $\text{Na}^+ (\text{l}) + \text{e}^- \longrightarrow \text{Na} (\text{l})$ **2 marks**

$$(b) Q = It = 2.05 \times 5 \times 60 \times 60 = 3.69 \times 10^4 \text{ C} \quad \text{1 mark}$$

$$n(e-) = \frac{Q}{9.649 \times 10^4} = \frac{3.69 \times 10^4}{9.649 \times 10^4} = 0.382 \text{ moles e-} \quad \text{1 mark}$$

$$n(\text{Na}) = 0.382 \text{ moles} \quad \text{1 mark}$$

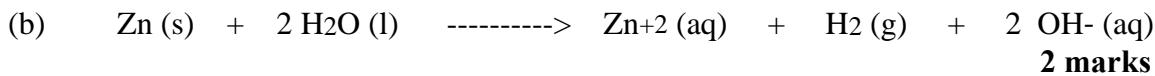
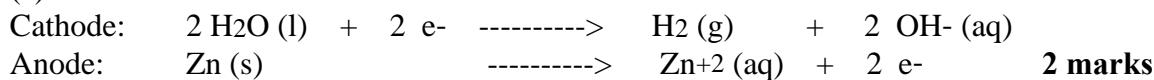
$$m(\text{Na}) = n(\text{Na}) \times A \text{ Wt} = 0.382 \times 22.99 = 8.79 \text{ g} \quad \text{1 mark}$$

4. Corrosion of Iron:

- (a) Coat with paint, grease, plastic, ceramic - excludes O₂ and H₂O
- (b) Coat with less reactive metal (Eg: Sn) - excludes O₂ and H₂O
- (c) Use sacrificial anode - connect to more reactive metal (Eg: Zn, Mg)
 - oxidises in preference to the Fe
- (d) Galvanize - coat with Zn - excludes O₂ and H₂O,
 - oxidises in preference to the Fe if surface scratched
- (e) Connect up to negative of a power source - supplies e-s which prevents loss of e-s and oxidation by Fe

(1 mark each any four different methods) **4 marks**

5 (a)



$$(c) m(\text{Zn}) = 1.00 \text{ g} \quad n(\text{Zn}) = \frac{1}{65.39} = 1.53 \times 10^{-2} \text{ moles} \quad \text{1 mark}$$

$$n(e-) = 2 \times n(\text{Zn}) = 2 \times 1.53 \times 10^{-2} = 3.06 \times 10^{-2} \text{ moles} \quad \text{1 mark}$$

$$QT = n(e-) \times 9.649 \times 10^4 = 3.06 \times 10^{-2} \times 9.649 \times 10^4 \\ = 2.95 \times 10^3 \text{ C} \quad \text{1 mark}$$

$$\frac{QT}{2.95 \times 10^3} = \frac{I \times t}{5 \times 10^{-5} \times t}$$

$$t = \frac{2.95 \times 10^3}{5 \times 10^{-5}} = 5.90 \times 10^7 \text{ sec} = 683 \text{ days} \quad \text{1 mark} \quad \text{1 mark}$$