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 direction e- flow
Cathode direction positive ion movement
Positive electrode direction negative ion movement
Negative electrode **7 marks**

(c) $Zn\ (s)$ ----------> $Zn^{+2}\ (aq)$ + 2 e- + 0.76 V
$Cu^{+2}\ (aq)$ + 2 e- ----------> $Cu\ (s)$ + 0.34 V

$Zn\ (s) + Cu^{+2}\ (aq)$ ----------> $Zn^{+2}\ (aq) + Cu\ (s)$ + 1.10 V

1 mark half equns, 1mark E^o Total **2 marks**

2 1 M $AgNO_3$

(a) Cathode: (x4) $Ag^+\ (aq)$ + e- ----------> $Ag\ (s)$ + 0.80 V
Anode: (x1) $2\ H_2O\ (l)$ ----------> $O_2\ (g)$ + $4\ H^+\ (aq)\ (10^{-7}\ M)$ + 4 e- - 0.82 V

$4\ Ag^+\ (aq) + 2\ H_2O\ (l)$ ----------> $4\ Ag\ (s) + O_2\ (g) + 4\ H^+\ (aq)\ (10^{-7}\ M)$ - 0.02 V

3 marks

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

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

3 (a) Anode: $2\ Cl^-\ (l)$ ----------> $Cl_2\ (g)$ + 2 e-
Cathode: $Na^+\ (l)$ + e- ----------> $Na\ (l)$ **2 marks**

(b) $Q = It = 2.05 \times 5 \times 60 \times 60 =$ **3.69×10^4 C** **1 mark**

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

$n(Na) =$ **0.382 moles** **1 mark**

$m(Na) = n(Na) \times A\ Wt = 0.382 \times 22.99 =$ **8.79 g** **1 mark**

4. Corrosion of Iron:
   (a) Coat with paint, grease, plastic, ceramic - excludes O_2 and H_2O
   (b) Coat with less reactive metal (Eg: Sn) - excludes O_2 and H_2O
   (c) Use sacrificial anode - connect to more reactive metal (Eg: Zn, Mg)
   - oxidises in preference to the Fe
   (d) Galvanize - coat with Zn - excludes O_2 and H_2O,
   - 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)

Cathode: $2\ H_2O\ (l) + 2\ e^- \text{----------} > H_2\ (g) + 2\ OH^-\ (aq)$

Anode: $Zn\ (s) \text{----------} > Zn^{+2}\ (aq) + 2\ e^-$ **2 marks**

(b) $Zn\ (s) + 2\ H_2O\ (l) \text{----------} > Zn^{+2}\ (aq) + H_2\ (g) + 2\ OH^-\ (aq)$ **2 marks**

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

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

$Q_T = n(e^-) \times 9.649 \times 10^4 = 3.06 \times 10^{-2} \times 9.649 \times 10^4$

$=$ **2.95×10^3 C** **1 mark**

$Q_T = I \times t$

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

$t = \frac{2.95 \times 10^3}{5 \times 10^{-5}} =$ **5.90×10^7 sec = 683 days**

1 mark **1 mark**