

SCH4U QUEST – Unit 5: Electrochemistry
Pierre Elliott Trudeau High School

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TIME ALLOTTED: 30 minutes

DATE: Jun 16 2015

K/U	Appl
5 / 8	8.5 / 9

Knowledge/Understanding

Multiple Choice. Choose the most appropriate answer and shade its corresponding letter onto the Scantron sheet

- Identify the oxidizing agent in the reaction:

$$\overset{0}{\text{Mg}}_{(s)} + 2\overset{+1}{\text{H}}\overset{-1}{\text{Cl}}_{(aq)} \rightarrow \overset{+1}{\text{H}}\overset{-1}{\text{H}}_{2(g)} + \overset{+2}{\text{Mg}}\overset{-1}{\text{Cl}}_{2(aq)}$$

a) $\text{MgCl}_{2(aq)}$
b) $\text{HCl}_{(aq)}$
 c) $\text{Mg}_{(s)}$
 d) $\text{H}_{2(g)}$
 e) This is not a redox reaction
- Identify the spectator ion in the reaction:

$$\overset{0}{3\text{Zn}}_{(s)} + \overset{+2}{\text{Fe}}_2(\overset{-2}{\text{SO}}_4)_3(aq) \rightarrow 3\overset{+2}{\text{Zn}}\overset{-2}{\text{SO}}_4(aq) + 2\overset{0}{\text{Fe}}_{(s)}$$

a) $\text{Zn}_{(s)}$
 b) $\text{Zn}^{2+}_{(aq)}$
c) $\text{SO}_4^{2-}_{(aq)}$
 d) $\text{Fe}^{3+}_{(aq)}$
 e) There is no spectator ion in this reaction
- Which of the following is a stronger oxidizing agent than $\text{Ni}^{2+}_{(s)}$?

a) $\text{Hg}^{2+}_{(l)}$
 b) $\text{Fe}^{2+}_{(s)}$
 c) $\text{Co}^{2+}_{(s)}$
 d) $\text{Tl}^{+}_{(s)}$
 e) $\text{Cr}^{3+}_{(s)}$
- Which of these reactions will proceed spontaneously, based on relative strength of reducing agents?

a) $\text{Cr}_{(s)} + \text{Ag}^{+}_{(aq)} \rightarrow \text{Cr}^{3+}_{(aq)} + \text{Ag}_{(s)}$
 b) $\text{Ni}_{(s)} + \text{Ca}^{2+}_{(aq)} \rightarrow \text{Ni}^{2+}_{(aq)} + \text{Ca}_{(s)}$
 c) $\text{Sn}_{(s)} + \text{Ba}^{2+}_{(aq)} \rightarrow \text{Sn}^{2+}_{(aq)} + \text{Ba}_{(s)}$
 d) $\text{Sn}_{(s)} + \text{Ca}^{2+}_{(aq)} \rightarrow \text{Sn}^{2+}_{(aq)} + \text{Ca}_{(s)}$
 e) $\text{Cu}_{(s)} + \text{Mg}^{2+}_{(aq)} \rightarrow \text{Cu}^{2+}_{(aq)} + \text{Mg}_{(s)}$
- What is the correct balanced redox reaction for:

$$\text{B}_2\text{O}_3(aq) + \text{Mg}_{(s)} \rightarrow \text{MgO}_{(s)} + \text{Mg}_3\text{B}_2(aq)$$

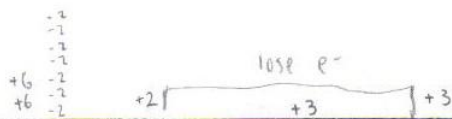
a) $\text{B}_2\text{O}_3(aq) + 3\text{Mg}_{(s)} \rightarrow \text{MgO}_{(s)} + \text{Mg}_3\text{B}_2(aq)$
d) $2\text{B}_2\text{O}_3(aq) + 6\text{Mg}_{(s)} \rightarrow \text{MgO}_{(s)} + \text{Mg}_3\text{B}_2(aq)$
 b) $6\text{B}_2\text{O}_3(aq) + 2\text{Mg}_{(s)} \rightarrow \text{MgO}_{(s)} + \text{Mg}_3\text{B}_2(aq)$
 e) $6\text{B}_2\text{O}_3(aq) + \text{Mg}_{(s)} \rightarrow \text{MgO}_{(s)} + 3\text{Mg}_3\text{B}_2(aq)$
c) $\text{B}_2\text{O}_3(aq) + 6\text{Mg}_{(s)} \rightarrow 3\text{MgO}_{(s)} + \text{Mg}_3\text{B}_2(aq)$
- Which of the following statements are correct for an electrochemical cell?

a) the anode and cathode both increase in mass
 b) the anode and cathode both decrease in mass
c) the anode increases in mass while the cathode decreases in mass
d) the anode decreases in mass while the cathode increases in mass
 e) there is no change in mass for either electrode in an electrochemical cell
- In a galvanic cell involving aluminum and nickel, which half reaction would occur at the anode?

a) $\text{Al}_{(s)} + \text{Ni}^{2+}_{(aq)} \rightarrow \text{Ni}_{(s)} + \text{Al}^{3+}_{(aq)}$
 b) $\text{Ni}_{(s)} + \text{Al}^{3+}_{(aq)} \rightarrow \text{Al}_{(s)} + \text{Ni}^{2+}_{(aq)}$
c) $\text{Ni}_{(s)} \rightarrow \text{Ni}^{2+}_{(aq)} + 2\text{e}^{-}$
 d) $\text{Al}_{(s)} \rightarrow \text{Al}^{3+}_{(aq)} + 3\text{e}^{-}$
 e) $\text{Ni}^{2+}_{(aq)} + 2\text{e}^{-} \rightarrow \text{Ni}_{(s)}$
- What is the correct standard cell notation for a tin-thallium cell?

a) $\text{Pt}_{(s)} | \text{Sn}^{2+}_{(aq)} || \text{Tl}^{+}_{(aq)} | \text{Pt}_{(s)}$
 b) $\text{Tl}^{+}_{(aq)} | \text{Tl}_{(s)} || \text{Sn}_{(s)} | \text{Sn}^{2+}_{(aq)}$
 c) $\text{Tl}_{(s)} | \text{Tl}^{+}_{(aq)} || \text{Sn}_{(s)} | \text{Sn}^{2+}_{(aq)}$
d) $\text{Tl}_{(s)} | \text{Tl}^{+}_{(aq)} || \text{Sn}^{2+}_{(aq)} | \text{Sn}_{(s)}$
 e) $\text{Sn}_{(s)} | \text{Sn}^{2+}_{(aq)} || \text{Tl}^{+}_{(aq)} | \text{Tl}_{(s)}$

6/6
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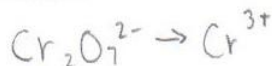


9. $\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + \text{Fe}^{2+}(\text{aq}) \rightarrow \text{Cr}^{3+}(\text{aq}) + \text{Fe}^{3+}(\text{aq})$ ** In an acidic solution **

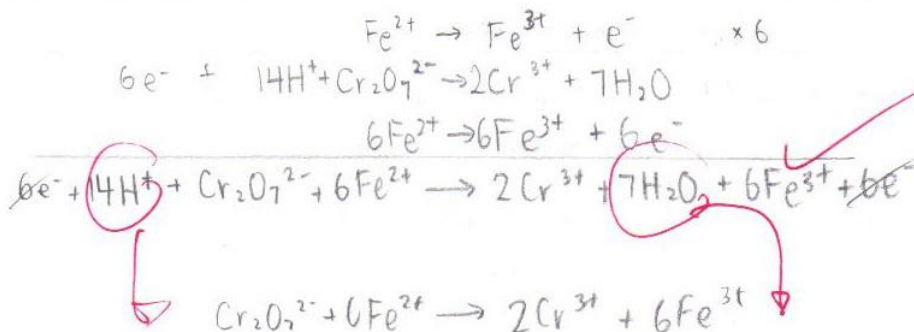
a) Write out the oxidation half-reaction *oxid* (1 mark)



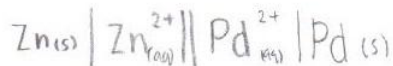
b) Write out the reduction half-reaction (1 mark)



c) Using the half-reaction method, balance the redox reaction above. (2 mark)



10. a) Write out the cell notation for a Zinc (ii) – Palladium (ii) Galvanic cell (1 mark)



b) Label the diagram below for the Galvanic cell in part (a). Be sure to fully indicate all components (4 marks)

