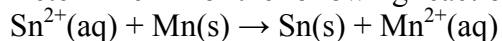


Spring 2009 Practice Quiz 4 on Electrochemistry

1) Determine E° for the following reaction, using the given standard reduction potentials:



$$E^\circ \text{ for } \text{Mn}^{2+}(\text{aq}) \rightarrow \text{Mn} = -1.18 \text{ V}$$

$$E^\circ \text{ for } \text{Sn}^{2+}(\text{aq}) \rightarrow \text{Sn} = -0.14 \text{ V}$$

Answer

Answer: 1.04 V

2) Given the half reaction: $\text{NO}_3^-(\text{aq}) \rightarrow \text{NO}(\text{g})$, in acidic solution, how many electrons appear in the half-reaction when it is properly balanced?

- A. 3
- B. 4
- C. 6
- D. 8
- E. None of the above.

Answer: A

3) Sodium is produced by electrolysis of molten sodium chloride. What are the products at the anode and cathode, respectively?

- A. $\text{Na}(\text{l})$ and $\text{O}_2(\text{g})$
- B. $\text{Cl}^-(\text{aq})$ and $\text{Na}_2\text{O}(\text{l})$
- C. $\text{Cl}_2(\text{g})$ and $\text{Na}_2\text{O}(\text{l})$
- D. $\text{O}_2(\text{g})$ and $\text{Na}(\text{l})$
- E. $\text{Cl}_2(\text{g})$ and $\text{Na}(\text{l})$

Answer: E

4) If the standard free energy change for combustion of 1 mole of $\text{CH}_4(\text{g})$ is $-818 \text{ kJ} \cdot \text{mol}^{-1}$, calculate the standard voltage that could be obtained from a fuel cell using this reaction.

- A. -1.06 V
- B. $+0.53 \text{ V}$
- C. $+4.24 \text{ V}$
- D. $+8.48 \text{ V}$

E. +1.06 V

Answer: E

5) If the standard potentials for the couples Cu^{2+}/Cu , Ag^+/Ag , and Fe^{2+}/Fe are +0.34, +0.80, and -0.44 V, respectively, which is the strongest reducing agent?

A. Fe

B. Ag

C. Ag^+

D. Cu

E. Fe^{2+}

Answer: A

6) The number of electrons necessary to produce 1.00 g of Cu from Cu^{2+} at the cathode of an electrolytic cell is:

A. 1.90×10^{22}

B. 3.04×10^3

C. 9.47×10^{21}

D. 1.91×10^{25}

Answer: A

7) Imagine creating a battery with lithium metal and fluorine gas. Write down the balanced reaction for that battery and assign the following cell convention for the anodic process:

1) What reaction is occurring at the anode?

2) What is the sign of that electrode.

3) Are electrons flowing through the external circuit toward the anode?

A. Li/Li^+ , negative, yes

B. F_2/F^- , negative, yes

C. Li/Li^+ , negative, no

D. F_2/F^- , positive, yes

E. Li/Li^+ , positive, no

Answer: C

8) What is the oxidation number of manganese in the following compounds?

KMnO_4 , K_2MnO_4 , MnO_2 , MnCl_2

- A. +7, +6, +2, +2
- B. -7, -6, -4, -2
- C. +6, +7, +4, +2
- D. zero in all neutral species
- E. +7, +6, +4, +2

Answer: E