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1. chem10b 20.4-3

In a voltaic cell electrons flow from the anode to the cathode.

Student Response	Value	Correct Answer

2. chem10b 20.1-35

How many grams of Cu are obtained by passing a current of 12 A through a solution of CuSO₄ for 15 minutes _____ ?

Student Response	Correct Answer
A. 7.1	
B. 3.6	
C. 14	
D. 0.016	
E. 1.8	

3. chem10b 20.4-9

The standard reduction potential of X is 1.23 V and that of Y is -0.44 V therefore X is oxidized by Y.

Student Response	Value	Correct Answer

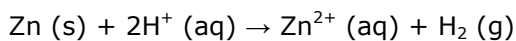
4. chem10b 20.2-20

What is the anode in an alkaline battery _____?

Student Response	Correct Answer
A. MnO ₂	
B. Zn powder	
C. KOH	
D. Mn ₂ O ₃	
E. Pt	

5. chem10b 20.5-1

The standard cell potential (E°) of a voltaic cell constructed using the cell reaction below is 0.76 V:



With $P_{\text{H}_2} = 1.0 \text{ atm}$ and $[\text{Zn}^{2+}] = 1.0 \text{ M}$, the cell potential is 0.66 V. The concentration of H^+ in the cathode compartment is _____ M.

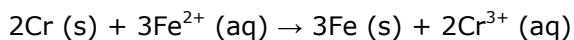
Student Response	Correct Answer
A. 2.0×10^{-2}	
B. 4.9×10^1	
C. 1.0×10^{-12}	
D. 4.2×10^{-4}	
<input checked="" type="checkbox"/> E. 1.4×10^{-1}	

6. chem10b 20.1-23

Table 20.2

Half-reaction	E° (V)
$\text{Cr}^{3+} (\text{aq}) + 3\text{e}^- \rightarrow \text{Cr (s)}$	-0.74
$\text{Fe}^{2+} (\text{aq}) + 2\text{e}^- \rightarrow \text{Fe (s)}$	-0.440
$\text{Fe}^{3+} (\text{aq}) + \text{e}^- \rightarrow \text{Fe}^{2+} (\text{s})$	+0.771
$\text{Sn}^{4+} (\text{aq}) + 2\text{e}^- \rightarrow \text{Sn}^{2+} (\text{aq})$	+0.154

The standard cell potential (E°_{cell}) for the voltaic cell based on the reaction below is _____ V.



Student Response	Correct Answer
A. +3.10	
B. +0.30	
C. -0.16	
D. +0.83	
E. +2.80	

7. chem10b 20.1-17

In a voltaic cell, electrons flow from the _____ to the _____.

Student Response	Correct Answer
A. salt bridge, anode	
B. anode, salt bridge	
C. cathode, anode	
D. salt bridge, cathode	
E. anode, cathode	

8. chem10b 20.1-12

The balanced half-reaction in which dichromate ion is reduced to chromium metal is a _____ process.

Student Response	Correct Answer
A. three-electron	
B. four-electron	
C. twelve-electron	
D. two-electron	
E. six-electron	

Score: 1/1

9. chem10b 20.2-8

The purpose of the salt bridge in an electrochemical cell is to _____.

Student Response	Correct Answer
A. provide oxygen to facilitate oxidation at the anode.	
B. provide a source of ions to react at the anode and cathode.	
C. provide a means for electrons to travel from the cathode to the anode.	
D. maintain electrical neutrality in the half-cells via migration of ions.	
E. provide a means for electrons to travel from the anode to the cathode.	

10. chem10b 20.1-15

The electrode at which oxidation occurs is called the _____ .

Student Response	Correct Answer
A. reducing agent	
B. anode	
C. voltaic cell	
D. oxidizing agent	
E. cathode	

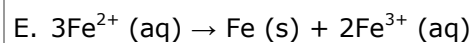
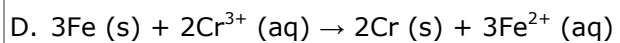
11. chem10b 20.2-16

Table 20.2

Half-reaction	E° (V)
$\text{Cr}^{3+}(\text{aq}) + 3\text{e}^- \rightarrow \text{Cr}(\text{s})$	-0.74
$\text{Fe}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Fe}(\text{s})$	-0.440
$\text{Fe}^{3+}(\text{aq}) + \text{e}^- \rightarrow \text{Fe}^{2+}(\text{aq})$	+0.771
$\text{Sn}^{4+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Sn}^{2+}(\text{aq})$	+0.154

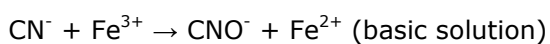
Which of the following reactions will occur spontaneously as written?

Student Response	Correct Answer
A. $\text{Sn}^{4+}(\text{aq}) + \text{Fe}^{3+}(\text{aq}) \rightarrow \text{Sn}^{2+}(\text{aq}) + \text{Fe}^{2+}(\text{aq})$	
B. $\text{Sn}^{4+}(\text{aq}) + \text{Fe}^{2+}(\text{aq}) \rightarrow \text{Sn}^{2+}(\text{aq}) + \text{Fe}(\text{s})$	
C. $3\text{Sn}^{4+}(\text{aq}) + 2\text{Cr}(\text{s}) \rightarrow 2\text{Cr}^{3+}(\text{aq}) + 3\text{Sn}^{2+}(\text{aq})$	



12. chem10b 20.2-6

What is the coefficient of Fe^{3+} when the following equation is balanced?



Student Response	Correct Answer
A. 1	
B. 2	
C. 3	
D. 4	
E. 5	

1. chem10b 20.1-7

What is the oxidation number of potassium in KMnO_4 ?

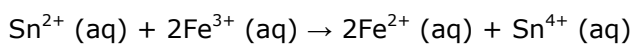
Student Response	Correct Answer
A. +1	
B. -1	
C. 0	
D. +3	
E. +2	

2. chem10b 20.1-21

Table 20.2

Half-reaction	E° (V)
$\text{Cr}^{3+}(\text{aq}) + 3\text{e}^- \rightarrow \text{Cr}(\text{s})$	-0.74
$\text{Fe}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Fe}(\text{s})$	-0.440
$\text{Fe}^{3+}(\text{aq}) + \text{e}^- \rightarrow \text{Fe}^{2+}(\text{s})$	+0.771
$\text{Sn}^{4+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Sn}^{2+}(\text{aq})$	+0.154

The standard cell potential (E°_{cell}) for the voltaic cell based on the reaction below is _____ V.



Student Response	Correct Answer
A. +1.21	
B. -0.46	
C. +0.617	
D. +0.46	
E. +1.39	

3. chem10b 20.2-13

Which one of the following is the best oxidizing agent ?

Student Response	Correct Answer
A. Ca	
B. O_2	
C. Na	
D. Li	
E. H_2	

4. chem10b 20.4-10

Disadvantages of the methanol fuel cell compared to the hydrogen fuel cell are consumption of catalyst and environmentally safe product.

Student Response	Value	Correct Answer

5. chem10b 20.1-31

Corrosion of iron is retarded by _____.

Student Response	Correct Answer
A. the presence of salts	
B. low pH conditions	
C. high pH conditions	
D. both the presence of salts and high pH conditions	
E. both the presence of salts and low pH conditions	

6. chem10b 20.1-19

1V = _____.

Student Response	Correct Answer
A. 96485 C	
B. 1 J/C	
C. 1 J/s	
D. 1 C/J	
E. 1 amp · s	

Score: 1/1

7. chem10b 20.4-8

In a half reaction the amount of a substance that is reduced or oxidized is directly proportional to the number of electrons generated in the cell.

Student Response	Value	Correct Answer

8. chem10b 20.2-17

Table 20.2

Half-reaction	E° (V)
$\text{Cr}^{3+}(\text{aq}) + 3\text{e}^- \rightarrow \text{Cr}(\text{s})$	-0.74
$\text{Fe}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Fe}(\text{s})$	-0.440
$\text{Fe}^{3+}(\text{aq}) + \text{e}^- \rightarrow \text{Fe}^{2+}(\text{s})$	+0.771
$\text{Sn}^{4+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Sn}^{2+}(\text{aq})$	+0.154

Which of the following reactions will occur spontaneously as written?

Student Response	Correct Answer
A. $\text{Sn}^{4+}(\text{aq}) + \text{Fe}^{2+}(\text{s}) \rightarrow \text{Sn}^{2+}(\text{aq}) + \text{Fe}(\text{s})$	
B. $\text{Sn}^{2+}(\text{aq}) + \text{Fe}^{2+}(\text{s}) \rightarrow \text{Sn}^{4+}(\text{aq}) + \text{Fe}^{3+}(\text{aq})$	
C. $2\text{Cr}(\text{s}) + 3\text{Fe}^{2+}(\text{s}) \rightarrow 3\text{Fe}(\text{s}) + 2\text{Cr}^{3+}(\text{aq})$	
D. $2\text{Cr}^{3+}(\text{aq}) + 3\text{Sn}^{2+}(\text{aq}) \rightarrow 3\text{Sn}^{4+}(\text{aq}) + 2\text{Cr}(\text{s})$	
E. $3\text{Fe}^{2+}(\text{aq}) + \text{Cr}^{3+}(\text{aq}) \rightarrow \text{Cr}(\text{s}) + 3\text{Fe}^{3+}(\text{aq})$	

9. chem10b 20.1-29

The lead-containing reactant(s) consumed during recharging of a lead-acid battery is/are _____.

Student Response	Correct Answer
A. Pb (s) only	
B. PbSO_4 (s) only	
C. PbO_2 (s) only	
D. both PbO_2 (s) and PbSO_4 (s)	
E. both Pb (s) and PbO_2 (s)	

10. chem10b 20.1-1

The gain of electrons by an element is called _____.

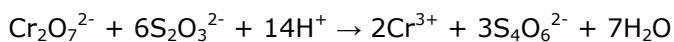
Student Response	Correct Answer
A. fractionation	
B. disproportionation	
C. oxidation	

D. sublimation

E. reduction

11. chem10b 20.1-3

_____ is the oxidizing agent in the reaction below.



Student Response	Correct Answer
A. $\text{S}_4\text{O}_6^{2-}$	
B. Cr^{3+}	
C. $\text{S}_2\text{O}_3^{2-}$	
D. H^+	
E. $\text{Cr}_2\text{O}_7^{2-}$	

12. chem10b 20.2-3

Which one of the following reactions is a redox reaction?

Student Response	Correct Answer
A. $\text{AgNO}_3 + \text{HCl} \rightarrow \text{HNO}_3 + \text{AgCl}$	
B. $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$	
C. $\text{Pb}^{2+} + 2\text{Cl}^- \rightarrow \text{PbCl}_2$	
D. $\text{H}_2\text{O} + \text{NaCl} \rightarrow \text{NaOH} + \text{HCl}$	
E. None of the above is a redox reaction.	

1. chem10b 20.4-11

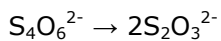
A positive number for maximum useful work in a spontaneous process (voltaic cell) indicates that the cell will perform work on its surroundings.

Student Response	Value	Correct Answer
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2. chem10b 20.1-10

_____ electrons appear in the following half-reaction when it is balanced.



Student Response	Correct Answer
A. 6	
B. 2	
C. 3	
D. 4	
E. 1	

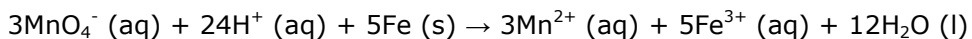
3. chem10b 20.2-20

What is the anode in an alkaline battery _____?

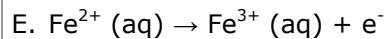
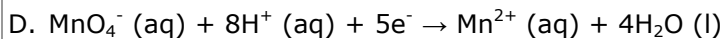
Student Response	Correct Answer
A. MnO ₂	
B. Pt	
C. KOH	
D. Mn ₂ O ₃	
E. Zn powder	

4. chem10b 20.1-16

The half-reaction occurring at the anode in the balanced reaction shown below is _____.



Student Response	Correct Answer
A. $\text{Fe} (\text{s}) \rightarrow \text{Fe}^{2+} (\text{aq}) + 2\text{e}^-$	
B. $2\text{MnO}_4^- (\text{aq}) + 12\text{H}^+ (\text{aq}) + 6\text{e}^- \rightarrow 2\text{Mn}^{2+} (\text{aq}) + 3\text{H}_2\text{O} (\text{l})$	



5. chem10b 20.1-1

The gain of electrons by an element is called _____.

Student Response	Correct Answer
A. oxidation	
B. disproportionation	
C. reduction	
D. fractionation	
E. sublimation	

6. chem10b 20.1-32

How many minutes will it take to plate out 2.19 g of chromium metal from a solution of Cr^{3+} using a current of 35.2 amps in an electrolyte cell _____ ?

Student Response	Correct Answer
A. 5.77	
B. 1.92	
C. 115	
D. 17.3	
E. 346	

Score: 1/1

7. chem10b 20.1-11

The balanced half-reaction in which chlorine gas is reduced to the aqueous chloride ion is a _____ process.

Student Response	Correct Answer
A. six-electron	

B. three-electron
C. one-electron
D. four-electron
E. two-electron

8. chem10b 20.1-20

The more _____ the value of E°_{red} , the greater the driving force for reduction.

Student Response	Correct Answer
A. extensive	
B. negative	
C. exothermic	
D. positive	
E. endothermic	

Score: 1/1

9. chem10b 20.1-15

The electrode at which oxidation occurs is called the _____ .

Student Response	Correct Answer
A. oxidizing agent	
B. anode	
C. voltaic cell	
D. reducing agent	
E. cathode	

10. chem10b 20.4-3

In a voltaic cell electrons flow from the anode to the cathode.

Student Response	Value	Correct Answer

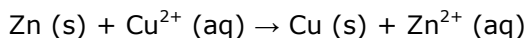
11. chem10b 20.1-30

Galvanized iron is iron coated with _____.

Student Response	Correct Answer
A. phosphate.	
B. magnesium.	
C. iron oxide.	
D. chromium.	
E. zinc.	

12. chem10b 20.1-28

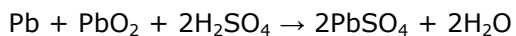
The standard cell potential (E°_{cell}) for the reaction below is +1.10 V. The cell potential for this reaction is _____ V when the concentration of $[\text{Cu}^{2+}] = 1.0 \times 10^{-5} \text{ M}$ and $[\text{Zn}^{2+}] = 1.0 \text{ M}$



Student Response	Correct Answer
A. 1.25	
B. 0.95	
C. 1.10	
D. 1.40	
E. 0.80	

13. chem10b 20.1-5

Which substance is the reducing agent in the reaction below?



Student Response	Correct Answer
A. Pb	
B. H ₂ O	
C. PbSO ₄	

D. H₂SO₄

E. PbO₂

14. chem10b 20.4-5

The standard reduction potential, _____, is proportional to the stoichiometric coefficient.

Student Response	Value	Correct Answer

15. chem10b 20.1-6

What is the oxidation number of chromium in Cr₂O₇²⁻ ion ?

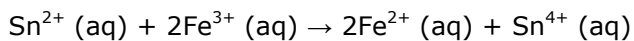
Student Response	Correct Answer
A. +7	
B. +3	
C. +12	
D. +14	
E. +6	

16. chem10b 20.1-21

Table 20.2

Half-reaction	E° (V)
Cr ³⁺ (aq) + 3e ⁻ → Cr (s)	-0.74
Fe ²⁺ (aq) + 2e ⁻ → Fe (s)	-0.440
Fe ³⁺ (aq) + e ⁻ → Fe ²⁺ (s)	+0.771
Sn ⁴⁺ (aq) + 2e ⁻ → Sn ²⁺ (aq)	+0.154

The standard cell potential (E°_{cell}) for the voltaic cell based on the reaction below is _____ V.



Student Response	Correct Answer
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A. +0.46
B. -0.46
C. +1.39
D. +0.617
E. +1.21

17. chem10b 20.1-37

How many grams of copper will be plated out by a current of 2.3 A applied for 25 minutes to a 0.50-M solution of copper(II) sulfate _____ ?

Student Response	Correct Answer
A. 0.019	
B. 1.1	
C. 0.036	
D. 2.2	
E. 1.8×10^{-2}	

18. chem10b 20.1-14

The balanced half-reaction in which sulfate ion is reduced to sulfite ion is a _____ process.

Student Response	Correct Answer
A. four-electron	
B. six-electron	
C. three-electron	
D. two-electron	
E. one-electron	

19. chem10b 20.1-29

The lead-containing reactant(s) consumed during recharging of a lead-acid battery is/are _____.

Student Response	Correct Answer
A. Pb (s) only	
B. PbSO ₄ (s) only	
C. PbO ₂ (s) only	
D. both PbO ₂ (s) and PbSO ₄ (s)	
E. both Pb (s) and PbO ₂ (s)	

20. chem10b 20.2-23

One of the differences between a voltaic cell and an electrolytic cell is that in an electrolytic cell _____.

Student Response	Correct Answer
A. O ₂ gas is produced at the cathode	
B. a nonspontaneous reaction is forced to occur	
C. electrons flow toward the anode	
D. oxidation occurs at the cathode	
E. an electric current is produced by a chemical reaction	

1. chem10b 20.1-25

The relationship between the change in Gibbs free energy and the emf of an electrochemical cell is given by _____.

Student Response	Correct Answer
A. $\Delta G = -nF/(ERT)$	
B. $\Delta G = -nRTF$	
C. $\Delta G = -E/(nF)$	
D. $\Delta G = -nF/E$	
E. $\Delta G = -nFE$	

2. chem10b 20.2-23

One of the differences between a voltaic cell and an electrolytic cell is that in an electrolytic cell _____.

Student Response	Correct Answer
A. electrons flow toward the anode	
B. a nonspontaneous reaction is forced to occur	
C. O ₂ gas is produced at the cathode	
D. an electric current is produced by a chemical reaction	
E. oxidation occurs at the cathode	

3. chem10b 20.2-9

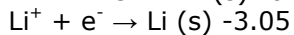
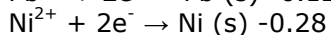
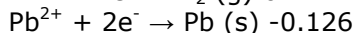
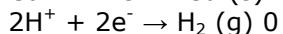
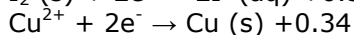
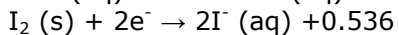
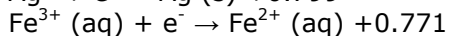
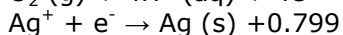
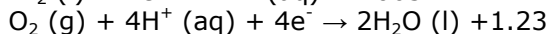
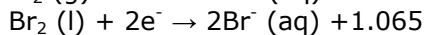
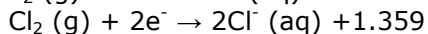
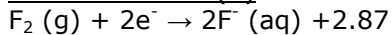
Which transformation could take place at the anode of an electrochemical cell?

Student Response	Correct Answer
A. CO ₂ → C ₂ O ₄ ²⁻	
B. O ₂ → H ₂ O ₂	
C. NO → NO ₃ ⁻	
D. VO ₂ ⁺ → VO ²⁺	
E. H ₂ AsO ₄ → H ₃ AsO ₃	

4. chem10b 20.5-8

The town of Natrium, West Virginia, derives its name from the sodium produced in the electrolysis of molten sodium chloride (NaCl) mined from ancient salt deposits. The number of kilowatt-hours of electricity required to produce 4.60 kg of metallic sodium from the electrolysis of molten NaCl(s) is _____ when the applied emf is 4.50 V.

Student Response	Correct Answer
A. 48.3	
B. 0.0241	
C. 0.0414	
D. 12.1	
E. 24.1	

5. chem10b 20.2-15**Table 20.1**Half Reaction $E^\circ(V)$ 

Using Table 20.1, which substance can oxidize $I^-(aq)$ to $I_2(s)$?

Student Response	Correct Answer
A. Ag (s)	
B. Ni^{2+} (aq)	
C. Cu^{2+} (aq)	
D. Br^- (aq)	
E. Br_2 (l)	

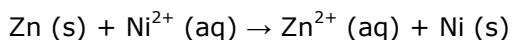
6. chem10b 20.1-19

1V = _____.

Student Response	Correct Answer
A. 1 amp · s	
B. 96485 C	
C. 1 C/J	
D. 1 J/C	
E. 1 J/s	

7. chem10b 20.5-5

The standard emf for the cell using the overall cell reaction below is +0.48 V:



The emf generated by the cell when $[\text{Ni}^{2+}] = 2.50 \text{ M}$ and $[\text{Zn}^{2+}] = 0.100 \text{ M}$ is

Student Response	Correct Answer
A. 0.44	
B. 0.50	
C. 0.56	
D. 0.40	
E. 0.52	

8. chem10b 20.4-11

A positive number for maximum useful work in a spontaneous process (voltaic cell) indicates that the cell will perform work on its surroundings.

Student Response	Value	Correct Answer

9. chem10b 20.1-14

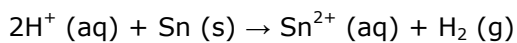
The balanced half-reaction in which sulfate ion is reduced to sulfite ion is a _____ process.

Student Response	Correct Answer
A. two-electron	
B. four-electron	
C. six-electron	
D. one-electron	
E. three-electron	

Score: 1/1

10. chem10b 20.2-18

Consider an electrochemical cell based on the reaction:

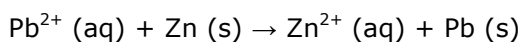


Which of the following actions would change the measured cell potential?

Student Response	Correct Answer
A. increasing the pressure of hydrogen gas in the cathode compartment	
B. increasing the pH in the cathode compartment	
C. increasing the $[\text{Sn}^{2+}]$ in the anode compartment	
D. lowering the pH in the cathode compartment	
E. Any of the above will change the measure cell potential.	

11. chem10b 20.1-27

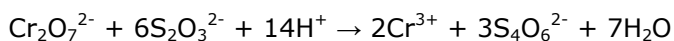
The standard cell potential (E°_{cell}) for the reaction below is +0.63 V. The cell potential for this reaction is _____ V when $[\text{Zn}^{2+}] = 1.0 \text{ M}$ and $[\text{Pb}^{2+}] =$



Student Response	Correct Answer
A. 0.41	
B. 0.74	
C. 0.63	
D. 0.85	
E. 0.52	

12. chem10b 20.1-3

_____ is the oxidizing agent in the reaction below.



Student Response	Correct Answer
A. H^+	

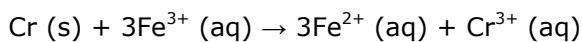
B. $S_2O_3^{2-}$
C. $Cr_2O_7^{2-}$
D. $S_4O_6^{2-}$
E. Cr^{3+}

1. chem10b 20.1-22

Table 20.2

Half-reaction	E° (V)
$Cr^{3+}(aq) + 3e^- \rightarrow Cr(s)$	-0.74
$Fe^{2+}(aq) + 2e^- \rightarrow Fe(s)$	-0.440
$Fe^{3+}(aq) + e^- \rightarrow Fe^{2+}(s)$	+0.771
$Sn^{4+}(aq) + 2e^- \rightarrow Sn^{2+}(aq)$	+0.154

The standard cell potential (E°_{cell}) for the voltaic cell based on the reaction below is _____ V.



Student Response	Correct Answer
A. -1.45	
B. +2.99	
C. +1.51	
D. +1.57	
E. +3.05	

2. chem10b 20.1-11

The balanced half-reaction in which chlorine gas is reduced to the aqueous chloride ion is a _____ process.

Student Response	Correct Answer
A. four-electron	
B. one-electron	

C. six-electron

D. three-electron

E. two-electron

3. chem10b 20.1-18

The reduction half reaction occurring in the standard hydrogen electrode is _____.

Student Response	Correct Answer
A. $\text{H}_2 (\text{g}, 1 \text{ atm}) \rightarrow 2\text{H}^+ (\text{aq}, 1\text{M}) + 2\text{e}^-$	
B. $2\text{H}^+ (\text{aq}, 1\text{M}) + 2\text{e}^- \rightarrow \text{H}_2 (\text{g}, 1 \text{ atm})$	
C. $\text{O}_2 (\text{g}) + 4\text{H}^+ (\text{aq}) + 4\text{e}^- \rightarrow 2\text{H}_2\text{O} (\text{l})$	
D. $2\text{H}^+ (\text{aq}) + 2\text{OH}^- \rightarrow \text{H}_2\text{O} (\text{l})$	
E. $2\text{H}^+ (\text{aq}, 1\text{M}) + \text{Cl}_2 (\text{aq}) \rightarrow 2\text{HCl} (\text{aq})$	

4. chem10b 20.2-23

One of the differences between a voltaic cell and an electrolytic cell is that in an electrolytic cell _____.

Student Response	Correct Answer
A. an electric current is produced by a chemical reaction	
B. O_2 gas is produced at the cathode	
C. oxidation occurs at the cathode	
D. electrons flow toward the anode	
E. a nonspontaneous reaction is forced to occur	

5. chem10b 20.2-12

Which one of the following types of elements is most likely to be a good oxidizing agent?

Student Response	Correct Answer
A. alkaline earth elements	
B. halogens	

C. lanthanides

D. transition elements

E. alkali metals

6. chem10b 20.1-34

How many grams of Ca metal are produced by the electrolysis of molten CaBr_2 using a current of 30.0 amp for 10.0 hours _____ ?

Student Response	Correct Answer
A. 0.0622	
B. 112	
C. 224	
D. 22.4	
E. 448	

7. chem10b 20.1-35

How many grams of Cu are obtained by passing a current of 12 A through a solution of _____ for 15 minutes _____ ?

Student Response	Correct Answer
A. 7.1	
B. 14	
C. 3.6	
D. 1.8	
E. 0.016	

8. chem10b 20.2-9

Which transformation could take place at the anode of an electrochemical cell?

Student Response	Correct Answer
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A. $\text{NO} \rightarrow \text{NO}_3^-$
B. $\text{O}_2 \rightarrow \text{H}_2\text{O}_2$
C. $\text{CO}_2 \rightarrow \text{C}_2\text{O}_4^{2-}$
D. $\text{H}_2\text{AsO}_4 \rightarrow \text{H}_3\text{AsO}_3$
E. $\text{VO}_2^+ \rightarrow \text{VO}^{2+}$

9. chem10b 20.2-14

Table 20.1

Half Reaction $E^\circ(\text{V})$

$\text{F}_2(\text{g}) + 2\text{e}^- \rightarrow 2\text{F}^-(\text{aq})$	+2.87
$\text{Cl}_2(\text{g}) + 2\text{e}^- \rightarrow 2\text{Cl}^-(\text{aq})$	+1.359
$\text{Br}_2(\text{l}) + 2\text{e}^- \rightarrow 2\text{Br}^-(\text{aq})$	+1.065
$\text{O}_2(\text{g}) + 4\text{H}^+(\text{aq}) + 4\text{e}^- \rightarrow 2\text{H}_2\text{O}(\text{l})$	+1.23
$\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag}(\text{s})$	+0.799
$\text{Fe}^{3+}(\text{aq}) + \text{e}^- \rightarrow \text{Fe}^{2+}(\text{aq})$	+0.771
$\text{I}_2(\text{s}) + 2\text{e}^- \rightarrow 2\text{I}^-(\text{aq})$	+0.536
$\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}(\text{s})$	+0.34
$2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2(\text{g})$	0
$\text{Pb}^{2+} + 2\text{e}^- \rightarrow \text{Pb}(\text{s})$	-0.126
$\text{Ni}^{2+} + 2\text{e}^- \rightarrow \text{Ni}(\text{s})$	-0.28
$\text{Li}^+ + \text{e}^- \rightarrow \text{Li}(\text{s})$	-3.05

Using Table 20.1, which substance can be oxidized by $\text{O}_2(\text{g})$ in acidic aqueous solution?

Student Response	Correct Answer
A. $\text{Ag}(\text{s})$	
B. $\text{Br}_2(\text{l})$	
C. $\text{Br}^-(\text{aq})$	
D. $\text{Ni}^{2+}(\text{aq})$	
E. $\text{Cu}^{2+}(\text{aq})$	

10. chem10b 20.2-17

Table 20.2

Half-reaction	$E^\circ(\text{V})$
$\text{Cr}^{3+}(\text{aq}) + 3\text{e}^- \rightarrow \text{Cr}(\text{s})$	-0.74
$\text{Fe}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Fe}(\text{s})$	-0.440
$\text{Fe}^{3+}(\text{aq}) + \text{e}^- \rightarrow \text{Fe}^{2+}(\text{aq})$	+0.771
$\text{Sn}^{4+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Sn}^{2+}(\text{aq})$	+0.154

Which of the following reactions will occur spontaneously as written?

Student Response	Correct Answer
A. $2\text{Cr}^{3+}(\text{aq}) + 3\text{Sn}^{2+}(\text{aq}) \rightarrow 3\text{Sn}^{4+}(\text{aq}) + 2\text{Cr}(\text{s})$	
B. $3\text{Fe}^{2+}(\text{aq}) + \text{Cr}^{3+}(\text{aq}) \rightarrow \text{Cr}(\text{s}) + 3\text{Fe}^{3+}(\text{aq})$	
C. $\text{Sn}^{4+}(\text{aq}) + \text{Fe}^{2+}(\text{s}) \rightarrow \text{Sn}^{2+}(\text{aq}) + \text{Fe}(\text{s})$	
D. $\text{Sn}^{2+}(\text{aq}) + \text{Fe}^{2+}(\text{s}) \rightarrow \text{Sn}^{4+}(\text{aq}) + \text{Fe}^{3+}(\text{aq})$	
E. $2\text{Cr}(\text{s}) + 3\text{Fe}^{2+}(\text{s}) \rightarrow 3\text{Fe}(\text{s}) + 2\text{Cr}^{3+}(\text{aq})$	

11. chem10b 20.2-20

What is the anode in an alkaline battery _____?

Student Response	Correct Answer
A. Zn powder	
B. KOH	
C. MnO_2	
D. Pt	
E. Mn_2O_3	

12. chem10b 20.2-4

Which substance is the reducing agent in the following reaction?



Student Response	Correct Answer
A. H_2O	
B. NO_2	
C. S	
D. HNO_3	
E. Fe_2S_3	

