**Name: Period: Seat#:**

**Worksheet #8**

**Directions:** Show all work and/or annotate with an AP Chem level explanation for non-math answers.   
Use binder paper as needed.

**Standard Reduction Potentials at 25C E (volts)**

F2(g) + 2e-  2F-(aq) +2.87

Au3+ + 3e-  Au(s) +1.50

Cl2(g) + 2e-  2Cl-(aq) +1.36

O2(g) + 4H3O+(aq) + 4e-  6H2O(l) +1.23

Br2(l) + 2e-  2Br-(aq) +1.08

Ag+(aq) + e-  Ag(s) +0.80

Hg22+(aq) + 2e-  2Hg(l) +0.79

2

I2(s) + 2e-  2I-(aq) +0.535

Cu2+(aq) + 2e-  Cu(s) +0.337

Sn4+(aq) + 2e-  Sn2+(aq) +0.15

Sn2+(aq) + 2e-  Sn(s) -0.14

Cd2+(aq) + 2e-  Cd(s) -0.40

Zn2+(aq) + 2e-  Zn(s) -0.763 2  
2H2O(l) + 2e-  H2(g) + 2OH-(aq) -0.828

Al3+(aq) + 3e-  Al(s) -1.66

K+(aq) + e-  K(s) -2.93

Li+(aq) + e-  Li(s) -3.045

1. Which of the following is the correct cell notation for the reaction

Hg 2+ + Cd(s)  Cd2+ + 2Hg(l)

2

* 1. Cd2+ | Cd | | Hg 2+ | Hg

2

* 1. Cd2+ | Hg22+ | | Cd | Hg
  2. Cd | Cd2+ | | Hg 2+ | Hg

2

* 1. Cd2+ | Hg | | Hg 2+ | Cd

2

* 1. Hg | Cd | | Hg 2+ | Cd2+

2

1. Consider an electrochemical cell where the following reaction takes place:

3Sn2+(aq) + 2Al(s)  3Sn(s) + 2Al3+(aq)

Which of the following is the correct cell notation for this cell?

* 1. Al | Al3+ | | Sn2+ | Sn
  2. Al3+ | Al | | Sn | Sn2+
  3. Sn | Sn2+ | | Al3+ | Al
  4. Sn | Al3+ | | Al | Sn2+
  5. Al | Sn2+ | | Sn | Al3+

1. Given the two half reactions and their potentials, which net reaction is spontaneous?

Ni2+(aq) + 2e-  Ni(s) E° = -0.25 V

Mg2+(aq) + 2e-  Mg(s) E° = -2.37 V

* 1. Ni(s) + Mg2+(aq)  Mg(s) + Ni2+(aq)
  2. Ni2+(aq) + Mg(s)  Mg2+(aq) + Ni(s)
  3. Ni(s) + Mg(s)  Mg2+(aq) + Ni2+(aq)
  4. Mg2+(aq) + Ni2+(aq)  Mg(s) + Ni(s)
  5. Mg2+(aq) + Mg(s)  Ni(s) + Ni2+(aq)

1. Calculate E° for the following reaction: Sn4+(aq) + 2K(s)  Sn2+(aq) + 2K+(aq)

a) +6.00 V d) +2.78 V

b) -3.08 V e) -2.78 V

c) +3.08 V

1. Calculate E° for the following reaction: 2Al3+(aq) + 3Cd(s)  2Al(s) + 3Cd2+(aq)

a) -2.06 V d) -4.52 V

b) +4.52 V e) -1.26 V

c) +2.06 V

1. Using data from the reduction potential table and the reaction

2Ag(s) + Pt2+(aq)  Pt(s) + 2Ag+(aq) E° = 0.38 V  
calculate the standard reduction potential of the half-reaction

Pt2+(aq) + 2e-  Pt(s)

a) -1.18 V d) 1.18 V

b) -0.40 V e) 2.00 V

c) 0.40 V

1. Using data from the reduction potential table, predict which of the following is the best *oxidizing* agent.
   1. F2 d) Ag+
   2. Ag e) Al3+
   3. Sn4+
2. An electrochemical cell of notation   
   Pd | Pd2+ | | Cu2+ | Cu has an E° = -0.65 V. If we know that the standard reduction potential of Cu2+/Cu is E° = 0.34 V, what is the standard reduction potential for Pd2+/Pd?

a) -0.99 V d) 0.62 V

b) -0.31 V e) +0.99 V

c) +0.31 V

1. The standard cell potential for

3Sn4+(aq) + 2Al(s)  3Sn2+(aq) + 2Al3+(aq) is E° = 1.81 V. What is Ecell when

[Sn4+] = 1.0,

[Sn2+] = 1.0 x 10-2, and

[Al3+] = 1.5 x 10-3 at 298 K.

a) 1.70 V d) 1.86 V

b) 1.76 V e) 1.93 V

c) 1.81 V

1. Predict the product at the anode when electric current is passed through a solution of KI.
   1. I2(l) d) K(s)
   2. K+(aq) e) O2(g)
   3. H2(g)
2. If electric current is passed through aqueous LiBr, the product at the cathode would be \_\_\_\_\_and the product at the anode would be \_\_\_\_\_.
   1. H2O(l), Li+(aq) d) Br2(l), H2(g)
   2. Br2(l), Li(s) e) H2(g), Br2(l)
   3. Li(s), Br2(l)
3. How long would it take to deposit 1.36 g of copper from an aqueous solution of copper(II) sulfate by passing a current of two amperes through the solution?
   1. 2070 sec d) 736 sec

b) 1.11 x 10-5 sec e) 1030 sec

c) 2570 sec

1. If a current of 6.0 amps is passed through a solution of Ag+ for 1.5 hours, how many grams of silver are produced?

a) 0.60 g d) 3.0 g

b) 36 g e) 1.0 g

c) 0.34 g

1. How is aluminum currently produced in industry?
   1. by reduction of Al3+ in Al2O3 with Na(s)
   2. electrochemical reduction of pure Al2O3 to give Al and O2
   3. electrolysis of AlF3 to give Al and F2
   4. electrolysis of a mixture of Al2O3 and Na3AlF6 to give Al and O2
   5. by reduction of Al3+ in Al2O3 with CO(g)
2. How was aluminum originally made?
   1. the Hall-Heroult process
   2. Al2O3 mixed with cryolite is electrolyzed
   3. electrolysis of molten Al2O3
   4. mining and purifying directly
   5. reducing AlCl3 with sodium
3. Under acidic conditions the bromate ion is reduced to the bromide ion. Write the balanced half-reaction for this process.
   1. BrO3- + 6H+ + 6e  Br- + 3H2O
   2. 2BrO3- + 6H+  Br2- +6H2O + 3e

c) BrO3- + 6H2O + 10e  Br2- + 12H+ + 3O2

d) 2BrO3- + 6H2O  2Br- + 12H+ + 6O2 + 8e

e) 2BrO3- + 6H+  Br2- + 3H2O + 3e

1. Balance the following redox equation which occurs in acidic solution.

N2H4(g) + BrO3-(aq)  Br-(aq) + N2(g)

a) 3N2H4 + BrO3-  3N2 + Br- + 3H2O + 6H+

b) N2H4 + BrO3- + 2H+  2Br- + N2 +3H2O

c) 3N2H4 + 2BrO3- + 12H+ 

3N2 + 2Br- + 6H2O + 12H+

d) N2H4 + 2BrO3- + 8H+  2Br- + N2 + 6H2O

e) 3N2H4 + 2BrO3-  3N2 + 2Br- + 6H2O

1. Which of the following is NOT a redox reaction?
   1. 2HgO(s)  2 Hg(l) + O2(g)
   2. H2(g) + Br2(g)  2HBr(g)
   3. 2HCl(aq) + Zn(s)  H2(g) + ZnCl2(aq)
   4. H2CO3(aq)  H2O(l) + CO2(g)
   5. 2KClO3  2KCl(s) + 3 O2(g)

Answers

1. C 7. A 13. B

2. A 8. E 14. D

3. B 9. E 15. E

4. C 10. A 16. A

5. E 11. E 17. E

6. D 12. A 18. D