**Dougherty Valley HS AP Chemistry**

**WORKSHEET #7\***

**Electrochemistry – NChO Extra\* Practice**

**Name: Date: Period: Seat #:**

**Directions**: Any worksheet that is labeled with an \* means it is suggested extra practice. We do not always have time to assign every possible worksheet that would be good practice for you to do. You can do this worksheet when you have extra time, when you finish something early, or to help you study for a quiz or a test. If and when you choose to do this Extra Practice worksheet, please do the work on binder paper. You will include this paper stapled into your Rainbow Packet when you turn it in, even if you didn’t do any of this. We want to make sure we keep it where it belongs so you can do it later if you want to (or need to). If you did the work on binder paper you can include that in your Rainbow Packet after this worksheet. If we end up with extra class time then portions of this may turn into required work. If that happens you will be told which problems are turned into required. Remember there is tons of other extra practice on the class website…and the entire internet! See me if you need help finding practice on a topic you are struggling with.

1998

40. For this reaction, E°cell = 0.79 V.

 6I¯(aq) + Cr2O72¯(aq) + 14H+

 → 3I2 (aq) + 2Cr3+(aq) + 7H2O(aq)

 Given that the standard reduction potential for
Cr2O72¯(aq) → 2Cr3+ (aq) is 1.33 V, what is E°red for I2(aq)?

 a) +0.54 V b) -0.54 V

 c) +0.18 V d) -0.18 V

41. What is the product formed at the anode in the electrolysis of 1.0 M NaNO3(aq)?

 a) H2(g) b) NO2(g)

 c) O2(g) d) Na(s)

42. Which of these ions is the best reducing agent?

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| --- |
| Standard Reduction Potentials, E° |
| Fe3+(aq) + e¯ → Fe2+(aq)  |  +0.77 V  |
| Cu2+(aq) + e¯ → Cu+(aq)  |  +0.15 V  |

 a) Fe3+ b) Fe2+
c) Cu2+ d) Cu+

43. Zn(s) + Cl2(g, 1 atm)

  Zn2+(aq, 1 M) + 2Cl¯(aq, 1 M)

 An electrochemical cell based on this reaction has a cell voltage, E°, of 2.12 V. Which change could make the cell voltage greater than 2.12 V?

 a) add more Zn(s)
b) add more Cl¯(aq) ions
c) decrease the concentration of Zn2+(aq) ions
d) decrease the partial pressure of Cl2

1997

43. What is the function of H2O2 in this reaction?

6H+ + 2MnO4¯ + 5H2O2 → 2Mn2+ + 5O2 + 8H2O

 a) catalyst b) reducing agent
c) oxidizing agent d) inhibitor

44. How much hydrogen is produced from the electrolysis of water in the same time that 2.2 L of oxygen is formed?

 a) 0.14 L b) 1.1 L

 c) 2.2 L d) 4.4 L

45. Which of these changes will cause the value of the potential for this half-reaction to be less negative? (E° = -0.28 V for the reaction.)

Co2+(aq) + 2 e¯ → Co(s)

 a) increasing the amount of solid Co
b) decreasing the amount of solid Co
c) increasing the concentration of Co2+(aq)
d) decreasing the concentration of Co2+(aq)

1996

43. Use these reduction potentials to determine which one of the reactions below is spontaneous.

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| --- | --- |
| Reaction  | ReductionPotentials, E° |
| Ag+ + e¯ → Ag  | 0.800 V |
| Pb2+ + 2e¯ → Pb  | - 0.126 V |
| V2+ + 2e¯ → V  | - 1.18 V |

 a) V2+ + 2 Ag → V + 2 Ag+
b) V2+ + Pb → V + Pb2+
c) 2 Ag+ + Pb2+ → 2 Ag + Pb
d) 2 Ag+ + Pb → 2 Ag + Pb2+

44. It is possible to produce chlorine gas by electrolyzing any of these chlorine-containing compounds under the proper conditions. Which compound will require the smallest number of coulombs to produce one mole of chlorine?

 a) Ca(OCl)2 b) NaClO2
c) KClO3 d) Mg(ClO4)2

1994

46. If solid nickel metal were added to separate aqueous solutions each containing 1M concentrations of Ag+, Cd2+, and Sn2+ ions, how many metals would plate out, based on the given standard reaction potentials?

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| Standard Reduction Potentials  |
| Ag+/Ag | 0.799 V |
| Sn2+/Sn | -0.141 V |
| Ni2+/Ni | -0.236 V |
| Cd2+/Cd | -0.400 V |

 a) zero b) one

 c) two d) three

48. Solutions of Ag+, Cu2+, Fe3+ and Ti4+ are electrolyzed with a constant current until 0.10 mol of metal is deposited. Which will require the greatest length of time?

 a) Ag+ b) Cu2+

c) Fe3+ d) Ti4+

1993

67. How many grams of cobalt metal will be deposited when a solution of cobalt(II) chloride is electrolyzed with a current of 10. amperes for 109 minutes?

 a) 0.66 b) 4.0

 c) 20 d) 40

66. What voltage will be produced by the electrochemical cell?



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| Reduction Potentials |
| Pb2+ + 2e¯ → Pb  |  -0.13 V  |
| Al3+ + 3e¯ → Al  |  -1.68 V  |

 a) 2.97V b) 1.55V

 c) -1.81V d) -2.97V

1992

59. A spoon is made the cathode in an electroplating apparatus containing a AgNO3 solution. How many grams of Ag will be plated on the spoon if a current of 2.00 A is passed through the apparatus for 1.90 min.?

 a) 0.255 g b) 0.150 g

 c) 0.128 g d) 0.0638 g

60. A cell is set up using the following reactions:

Zn | Zn2+ (0.5M) || Ni2+ (0.1 M) | Ni

|  |  |
| --- | --- |
| Ni2+ + 2e¯ → Ni  |  E° = -0.250 V  |
| Zn2+ + 2e¯ → Zn  |  E° = -0.763 V  |

 What is the voltage of the cell?

 a) -0.513 V b) -1.013 V

 c) 0.492 V d) 0.513 V

Answers:

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| 1998 | 40 a, 41 c, 42 d, 43 c |
| 1997 | 43 b, 44 d, 45 c |
| 1996 | 43 d, 44 a |
| 1994 | 46 c, 48 d |
| 1993 | 67 c, 66 b |
| 1992 | 59 a, 60 c |