Dougherty Valley HS Chemistry - AP
Electrochemistry – Extra Practice

Worksheet #7*

Name: **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.

1) Calculate the quantity of electricity (Coulombs) necessary to deposit 100.00 g of copper from a $CuSO_4$ solution. *3.0367×10^5 C*

2) How many minutes will take to plate out 40.00 g of Ni form a solution of $NiSO_4$ using a current of 3.450 amp? *635.3 min*

3) What is the equivalent weight of a metal if a current of 0.2500 amp causes 0.5240 g of metal to plate out a solution undergoing electrolysis in 1 hour? (Comment: One mole of electrons will plate out one equivalent weight of metal.) *56.18 g per equivalent weight*

4) How many hours will it take to plate out copper in 200.0 mL of a 0.1500 M Cu^{2+} solution using a current of 0.200 amp? *8.04 hours*

5) A constant electric current deposits 0.3650 g of silver metal in 12960 seconds from a solution of silver nitrate. What is the current? What is the half reaction for the deposition of silver? *0.0252 A*

6) A metal cup of surface area 200. cm^2 needs to be electroplated with silver to a thickness of 0.200 mm. The density of silver is 1.05×10^4 kg m^{-3}. The mass of a silver ion is 1.79×10^{-25} kg and the charge is the same magnitude as that on an electron. How long does the cup need to be in the electrolytic tank if a current of 12.5 A is being used? *3.00 s*

7) A constant current of 0.912 A is passed through an electrolytic cell containing molten $MgCl_2$ for 14.5 h. What mass of Mg is produced? *5.996 g*

8) Using a current of 4.75 A, how many minutes does it take to plate out 1.50 g of Cu from a $CuSO_4$ solution? *15.98 min*

9) A vanadium electrode is oxidized electrically. Its mass decreases by 114 mg during the passage of 650. Coulombs. What is the oxidation state of the vanadium product? *3 electrons*

10) What current is needed to deposit 0.480 g of chromium metal from a solution of Cr^{3+} in a period of 1.25 hr? *0.594 A*

11) A constant current is passed through an electrolytic cell containing molten $MgCl_2$ for 17.0 h. If 4.73 L of Cl_2 (at STP) is produced at the anode, what is the current in amperes? *0.665 A*

12) If a current plates out 13.5 g of aluminum, what mass of magnesium would be plated out in the same time by the same current? *18.2 g*

13) The following electrochemical cell is made:
Cu(s) **|** Cu^{2+}(aq, 0.1 M) **||** I^- (aq, 0.1 M) **|** I_2(s) **|** C(s)

a) Write balanced chemical equations for both the anode and the cathode according to the cell not ation given above.
(Note: C = carbon – an inert electrode)

b) Write a net balanced equation.

c) The cell potential was measured and found to be 0.279 V. Calculate $E°_{cell.}$ *0.190 V*

14) A NiCad battery works using the following reactions:
Anode rxn: $Cd(s) + 2OH^-(aq) \leftrightarrow Cd(OH)_2(s) + 2e^-$
Cathode rxn: $NiO(OH)_{(s)} + H_2O_{(l)} + e \leftrightarrow Ni(OH)_{2(s)} + OH^-_{(aq)}$
For the combined reaction, $E°_{cell} = 1.30$ V

a) Does the cell potential depend on $[OH^-]$? Write a net balanced rxn to support your answer.

b) If the cell used 10.0 g of NiO(OH)(s) (and a stoichiometric amount of Cd), how many hours could the battery power a motor with a 0.50 A draw? *5.8 hours*

15) A solution contains Ni^{2+}, Cd^{2+}, and Fe^{2+} that is being reduced in an electrolytic cell to the metal form.

a) Given the reduction potentials below, which element will be reduced first? Why?

Ion	Ni^{2+}	Cd^{2+}	Fe^{2+}
E° (for reduction to M(s))	-0.23 V	-0.40 V	-0.45 V

b) Give the charge of and name of the electrode where the reduction will occur.

EVEN MORE PRACTICE! Hard work now during the chapter will set you up for success and save you time long term! Make smart, mature choices!

On the back!

16) Consider doing some of the Honors Chem worksheets! *(You would be surprised how many AP Chem students miss points on exams for Honors level questions and not even the AP level questions! You will hear me all year long saying "don't lose points in AP Chem for Honors level material!")*

https://mychemistryclass.net/HCrainbowpacket15.html

17) Read, take notes, try some problems from your Tro online Textbook. *(Remember that the textbook often covers more material than we need for this class. If it isn't something I talked about in my lectures/handouts/ worksheets, then you can skip it! I won't officially assign reading or problems from the textbook because it isn't a very efficient way to teach this class, but some students might need to read the textbook sections, or do extra practice in order for things to "click" differently for them. That is ok! Not everyone is going to need the same amount or type of studying. A lot of this class is figuring out what you personally need to do in order to feel successful. You will have access to the textbook all year, don't forget about it!)*

Chapter 19: Electrochemistry

mlm.pearson.com/northamerica/masteringchemistry/

18) Don't forget that there is extra practice on the class website too! AP Chem Tab → Study Materials Link → Scroll to the chapter we are on → Extra Study Materials Link. *(I don't always have answer keys for the extra materials. If there is one, it will be in the folder!)*

19) Don't forget that there is extra practice on GoFormative too! www.goformative.com *(Another teacher made some assignments on GoFormative the year the school was Remote due to Covid. I have not proofread all the remote assignments, but I have published them so they are available for you to try if you would like!)*

20) Don't forget that there is extra practice on AP Classroom too! https://myap.collegeboard.org *(AP Classroom is a bit clunky, doesn't allow me to easily post questions in the order we go, sometimes crashes, still has old material we no longer cover, etc. BUT it is a source of questions that we know came from College Board! You can use the "tags" I made to pull up practice that is just on the chapter you are interested in studying.)*

21) ScienceGeek.net has some good online practice tests. I haven't checked all of them, but the ones I have checked are pretty good! https://www.sciencegeek.net/APchemistry/APtaters/directory.shtml

22) Don't forget that you can sign up for my Access periods! You must sign up by Tuesday 8am of the week you want to attend. The links are on the front page of my class website and at the top of my Class Calendar.

23) Don't forget that our school has free peer tutoring available through the Academic Leadership class! The links are on the top of my Class Calendar