

He that can see a louse as far  
away as China is unconscious of  
an elephant on his nose.

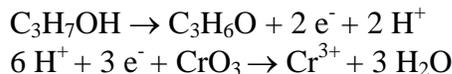
--Malay proverb

## Unit 13 Sample Test

The test will follow the usual format, with 5 multiple choice questions, two required problems and one option, two reactions to write and one essay.

*The following are representative of typical multiple choice questions but do not necessarily indicate topics to be addressed on your actual test.*

\_\_\_\_\_ 1. 2-propanol,  $C_3H_7OH$ , can be oxidized to acetone,  $C_3H_6O$ , under acidic conditions. The two balanced half-reaction for this process are given below:



In this reaction, 4 moles of  $CrO_3$  would react exactly to completion with

- a. 4 moles of 2-propanol
- b. 2 moles of 2-propanol
- c. 6 moles of 2-propanol
- d. 3 moles of 2-propanol
- e. 1 mole of 2-propanol

\_\_\_\_\_ 2. Consider the reaction:  $C + H_2O \rightarrow CO + H_2$

Which of the following statements is **FALSE**?

- a. carbon is oxidized in the reaction
- b. oxygen is reduced in the reaction
- c. carbon monoxide is the name of one product of this reaction
- d. the oxidation number of the product hydrogen is 0

\_\_\_\_\_ 3. During the electrolysis of a dilute aqueous solution of  $CoBr_2$ , which substance is produced at the *anode*?

- a. Co
- b.  $O_2$
- c.  $Br_2$
- d.  $H_2$

\_\_\_\_\_ 4. Which of the following is likely to oxidize the chloride ion to the chlorine molecule?

- a.  $Zn^{2+}$
- b.  $Fe^{3+}$
- c. Na
- d.  $MnO_4^-$
- e.  $Mn^{2+}$

\_\_\_\_\_ 5. In a *galvanic* cell consisting of zinc and silver in appropriate electrolytes, which of the following is **TRUE**?

- a. the zinc electrode gains mass and the silver electrode loses mass
- b. electrons flow from the silver electrode to the zinc electrode
- c. cations in the electrolyte move toward the silver electrode
- d. the voltage remains constant as the cell operates

The next section consists of representative problems which might be found in the required section.

6. A steady current of 1.00 amp is passed through an electrolytic cell containing a 0.10 M solution of  $\text{CuF}_2$  using inert graphite electrodes until 1.54 g of copper is deposited.

\_\_\_\_\_ a. At which electrode is the copper deposited? (anode/cathode)

\_\_\_\_\_ b. How many *minutes* does the current flow to obtain this deposit?

\_\_\_\_\_ c. How many Litres of *what gas* would be produced at the other electrode while the copper is deposited? (assume STP)

7. Consider the reaction:  $\text{Cu}^{2+}(\text{aq}) + \text{Pb}(\text{s}) \rightarrow \text{Cu}(\text{s}) + \text{Pb}^{2+}(\text{aq})$

a. Draw and label a *galvanic* cell for this reaction, including the anode, cathode, flow of electrons and direction of flow for the anions and cations.

b. Calculate  $E^\circ$

c. Calculate  $\Delta G^\circ$

8. Balance the following redox reaction and identify the oxidizing agent, reducing agent, the substance oxidized and the substance reduced.



9. For each of the following pairs, circle the metal which would be *protected from corrosion* when placed in contact with the other metal:

a. Zn and Cu

b. Mg and Fe

c. Sn and Pb

d. Sn and Cu

*The next section consists of representative reactions to complete and write balanced net-ionic equations for. Note that some reactions do not occur in aqueous solution and thus molecular equations are all that would be needed. In some cases no reaction may occur, based on either solubility rules or the activity series. In those cases, no products are required in the reaction. NR written to the right of the arrow will suffice. Each student is expected to choose two from this section. **Phase symbols ((s), (aq) etc.) are required.***

10. dihydrogen sulfide gas is bubbled into an acidic solution of sulfate ions; solid sulfur and sulfur dioxide gas are among the products

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11. copper(II) chloride + lead(II) nitrate → \_\_\_\_\_

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type: \_\_\_\_\_

12. zinc metal + sulfuric acid → \_\_\_\_\_

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type: \_\_\_\_\_

13. nitric acid + calcium nitrate → \_\_\_\_\_

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type: \_\_\_\_\_

*The final section of the test will consist of one essay question selected from the following topics:*

- use of Standard Reduction Potential Table to predict the products of electrolysis
- the use and function of starch indicator
- sacrificial metals in corrosion prevention
- rechargeable batteries

[Answers](#)