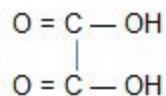


Name:
College ID:
Thomas Edison State University
General Chemistry II with Labs (CHE-122)
Section no.:
Semester and year:

Written Assignment 7: Lewis Acids and Bases

Answer all assigned questions and problems, and show all work.

1. Oxalic acid ($\text{C}_2\text{H}_2\text{O}_4$) has the following structure:



An oxalic acid solution contains the following species in varying concentrations: $\text{C}_2\text{H}_2\text{O}_4$, C_2HO_4^- , $\text{C}_2\text{O}_4^{2-}$, and H^+ .

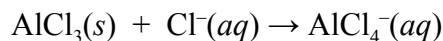
- Draw Lewis structures of C_2HO_4^- and $\text{C}_2\text{O}_4^{2-}$. (5 points)
- Which of the above four species can act only as acids, which can act only as bases, and which can act as both acids and bases? (5 points)

(Reference: Chang 15.7)

2. Classify each of the following species as a Lewis acid or a Lewis base: (a) CO_2 , (b) H_2O , (c) I^- , (d) SO_2 , (e) NH_3 , (f) OH^- , (g) H^+ , (h) BCl_3 . (24 points)

(Reference: Chang 15.93)

3. Describe the following reaction in terms of the Lewis theory of acids and bases: (4 points)



(Reference: Chang 15.94)

4. Which would be considered a stronger Lewis acid: (a) BF_3 or BCl_3 , (b) Fe^{+2} or Fe^{+3} ? Explain. (4 points)

(Reference: Chang 15.95)

5. Complete the following statements for the complex ion $[\text{Co}(\text{en})_2(\text{H}_2\text{O})\text{CN}]^{2+}$. (16 points)

- en is the abbreviation for:
- The oxidation number of Co is:
- The coordination number of Co is:
- _____ is a bidentate ligand.

(Reference: Chang 23.11)

6. Give the oxidation numbers of the metals in the following species: (12 points)

- $\text{K}_3[\text{Fe}(\text{CN})_6]$
- $\text{K}_3[\text{Cr}(\text{C}_2\text{O}_4)_3]$
- $[\text{Ni}(\text{CN})_4]^{2-}$

(Reference: Chang 23.13)

7. What are the systematic names for the following ions and compounds? (12 points)

- $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$
- $\text{Cr}(\text{NH}_3)_3\text{Cl}_3$
- $[\text{Co}(\text{en})_2\text{Br}_2]^+$
- $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$

(Reference: Chang 23.15)

8. Write the formulas for each of the following ions and compounds: (12 points)

- a. tetrahydroxozincate(II)
- b. pentaquochlorochromium(III)
- c. tetrabromocuprate(II)
- d. ethylenediaminetetraacetateferrate(II)

(Reference: Chang 23.17)

9. Oxalic acid, $\text{H}_2\text{C}_2\text{O}_4$, is sometimes used to clean rust stains from sinks and bathtubs. Explain the chemistry underlying this cleaning action. (3 points)

(Reference: Chang 23.41)

10. The label of a certain brand of mayonnaise lists EDTA as a food preservative. How does EDTA prevent the spoilage of mayonnaise? (3 points)

(Reference: Chang 23.66)