CH 223 Spring 2026:
Problem Set #6
Instructions

Step One:

• **Learn the material** for Problem Set #6 by **reading Chapter 19 and Chapter 21** of the textbook and/or by watching the videos found on the website (https://mhchem.org/223video). Focus on the nomenclature parts of both chapters.

• **Try the problems** for Problem Set #6 found on the next pages on your own first. Write your answers in the space provided or write your answers on separate paper (your choice.) Include your name on your problem set!

Step Two:

Watch the recitation video for Problem Set #6:

http://mhchem.org/3/6

Self correct *all* of the problems while viewing the video. Mark correct problems with a star (or other similar mark), and correct all incorrect problems (show the correct answer and the steps required to achieve it.)

Step Three:

Turn the Problem Set in at the beginning of recitation to the instructor on **Wednesday, June 3 (section L1, AC 1303, 9 AM** *Memorial Day***)** *or* **Wednesday, June 3 (section L2.)** The graded problem set will be returned to you the following week during recitation.

Do *not* include this page to avoid a point penalty; your front page should be page II-6-3.

If you have any questions regarding this assignment, please email (mike.russell@mhcc.edu) the instructor! Good luck on this assignment!

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CH 223 Problem Set #6

Name:

Complete the problem set on your own first using these sheets for your work or separate paper (your choice.) **Self correct your work *(all problems!)*** using the recitation video for this problem set, found here: **http://mhchem.org/3/6**

***** *Covering:* **Chapter Nineteen, Chapter Twenty-one** *and* **Chapter Guide Six**

***** *Important Tables and/or Constants:* **periodic table** found here: http://mhchem.org/pertab, "**Coordination Compounds**" *(Handout),* "**Organic Chemistry Nomenclature Guide**" *(Handout,* http://mhchem.org/OCG*)*, "**Organic Chemistry Lab**"

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1. Identify two transition metals ions with the following electron configurations:
   a. [Ar]3d^6

   b. [Ar]3d^{10}

   c. [Ar]3d^5

   d. [Ar]3d^8

2. Give the oxidation number of the metal in each of the following complexes:
   a. $[Fe(NH_3)_6]^{2+}$

   b. $[Zn(CN)_4]^{2-}$

   c. $[Co(NH_3)_5(NO_2)]^{+}$

   d. $[Cu(en)_2]^{2+}$

3. Write formulas for the following ions or compounds:
   a. diamminetriaquahydroxochromium(II) nitrate

   b. hexaammineiron(III) nitrate

   c. pentacarbonyliron(0) (where the ligand is CO)

   d. ammonium tetrachlorocuprate(II)

4. Name the following ions or compounds:
   a. $[Co(H_2O)_4Cl_2]^{+}$

   b. $Co(H_2O)_3F_3$

   c. $[Pt(NH_3)Br_3]^{1-}$

   d. $[Co(en)(NH_3)_3Cl]^{2+}$

5. In which of the following complexes are geometric isomers possible? If isomers are possible, draw their structures and label them as *cis* or *trans*, or as *fac* or *mer*.
   a. $[Co(H_2O)_4Cl_2]^{+}$

   b. $Co(NH_3)_3F_3$

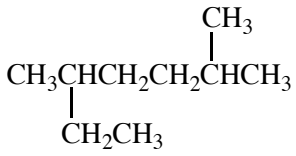
   c. $[Pt(NH_3)Br_3]^{1-}$

   d. $[Co(en)_2(NH_3)Cl]^{2+}$

   e. Does 2-butanol exhibit optical isomerism? Draw a Lewis structure and explain.

6. What is the molecular formula for an alkane with 6 carbon atoms? Draw and name the five isomers.

7. Give the systematic name for the alkane shown to the right:



Structure for Problem #7

8. Draw and name the five alkenes with the formula C_7H_{14} and a seven carbon ("straight") chain. Remember *cis* and *trans*!

9. Draw structural formulas for the following compounds:
    a. butan-1-ol *and* butan-2-ol

    b. 1,1-dibromoethane

    c. 3,3-dimethylbutan-2-ol

    d. 3-methyl-1-butyne

    e. cycloheptane

    f. diethyl ether

    g. 2-methoxypropane

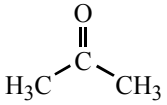
    h. 2-methylhexanoic acid

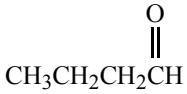
    i. acetic acid

    j. trimethylamine

    k. ethylmethylamine

10. Name the following compounds:

a. 

b. 

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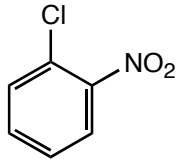
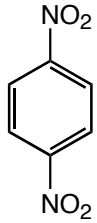
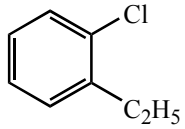
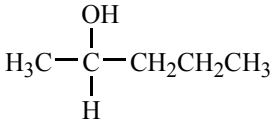
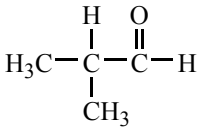
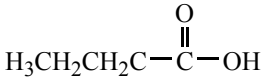
d. 

e. 

f. 

g. 

h. 

i. 

11. Give the official IUPAC organic chemistry name for the following chemical compounds:

a. acetone

b. toluene

c. acetylene

d. formaldehyde

e. acetaldehyde

f. ethylene