Chemistry 1A Homework

Chemistry: The Central Science, 13th edition

Look over the Appendices in the back of the book to see what's there.

Read the Math appendix (Appendix A), which is on pp. 1092-1098. This section reviews several math concepts that you should have learned already in previous math or science classes. These concepts are all extremely important, and we will be using them frequently in this class.

Note: answers to the red homework problems are in the back of the book, on pages A-1 to A-30. Check your work using these answers, but do not ever copy the answers from the back of the book. If explanations are needed to answer the question, explain the answer in your own words. If a calculation is required, show your complete setup and work.

You should definitely know how to do <u>all</u> of these assigned problems. However, you only have to complete 80% of the problems for full credit on the homework assignment. Homework will be assigned by the week, not by the chapter. The homework assignment will cover the problems related to the concepts covered that week.

Problem numbers in parentheses are optional. You should look at them and make sure you know how to do them, but you don't have to include them in your homework assignment. Don't skip the underlined questions.

Chapter 1

These problems can be found on pp. 33-39 of the textbook.

1, 2, 5, 6, 7, 8, 11, 13, 15, 17, 19, 21, 23, 25, 26, 28, 29, 31, 33, 35, 37, 39, 40, 41, 42, 43, 44, 45, 47, 49, 51, 53, 55, 57, 60, 70, 77, 79, 80, 85, 86

Chapter 2

These problems can be found on pp. 73-79 of the textbook.

1, 2, 3, 4, 5, 6, 7, 8, 11, 13b, 15, 16, 17, 21, 22, 23, 24, 25, 26, 27, 29, 31, 33, 35, 38, 39, 41, 43, 45, 47, 49, 50, 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, <u>96</u>, 100, 105, 111.

Chapter 3

These problems can be found on pp. 112-121 of the textbook.

1, 3, 5, 6, 7, 9, 11, 13, 15, 17, 19, 21, 23acf, 25ad, 27a, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, (63), 65, 67c, 69, 71, (73), 75, (77), 79, 81, 83, 85, 87, 108

Chapter 4

These problems can be found on pp. 156-163 of the textbook.

1, 2, (5, 7), 13, 15, 17, 19, 21, 23, 25, 26, 27, 29,
Ionic Equations Worksheet
31, 33, 35, 37, 39, 40, 41, 43, 45, 47, 49, 51, 55, 57, (59), 61, 63, 65, 67, 69, 73, 75, 77, 79, 81, 87, 102, 108

Additional Problem: (don't skip this one)
A sample of 1.50 g of lead (II) nitrate is mixed with 125 mL of 0.100 M sodium sulfate solution.
(a) Write the net ionic equation for the reaction that occurs.
(b) Which is the limiting reactant in the reaction?
(c) What are the concentrations of all ions that remain in solution after the reaction is complete?

Chapter 10

These problems can be found on pp. 432-440 of the textbook.

13, 21, 23, 25, 26, 28, 29, 35, 37, 39, 43, 47, 49, 51, 53, 55, 57, 59, 63, 67, 72, 76, 81, 82, 83ab, 91

Effusion/Diffusion Problems (handout)

7, 8, 9, 10 from the textbook (It makes more sense to do these after going through the entire chapter.)

Chapter 5

These problems can be found on pp. 202 - 211 of the textbook.

3, 9, 17, 25, 39, 41, 43, 45, 47, 50, 53, 55, 57, 59, 63, 65, 67, 69, 71, 73ac, 75, 77, 79, 99, 102, 105, 109, 110, 115

Chapter 11, p. 475: # 41, 43, 45

Thermochemistry Practice Problems #1, 4, 7, 8, 10, 11, 12, (13)

Practice Problems: energy involved in phase changes – do a few of them, but make sure you know how to do all of them.

Chapter 6

These problems can be found on pp. 248-255 of the textbook.

#7 (note that this "system" does not correspond to energy levels in an atom. It is a different, unrelated type of system. I mention this because the pattern of energy levels here is different from the pattern/spacing of energy levels in an atom.)

 # 15, 17, 19abc, 25, 29abd, 37, 39, 41, 47bc, (53), 55, 56, 57, 58, 61, 62, 63, 64, 65, 66

Additional Problem #1: Sketch the shape of a 4s, a 4p, and a 4d orbital. Show nodes as dotted lines. Point out which are radial nodes and which are nodal planes.

 # 67, 71, 72 in the textbook

Additional Problem #2: Write the full electron configuration and the arrow diagram for each of the following atoms in their ground state:
a. O b. P

Additional Problem #3: Write the full electron configuration for each of the following atoms:
a. Ca b. As c. Sn

Additional Problem #4: Write the arrow diagram for the outer electrons in each of the following atoms:
a. Fe b. Rh c. Mo

Additional Problem #5: Which of the quantum numbers governs (a) the shape of an orbital, (b) the energy of an orbital, (c) the spin properties of the electron, (d) the spatial orientation of the orbital?

 # 74, 75, 77, 79, 81, 91ab (just calculate one of the three lines), **105 from the textbook**

Chapter 7

These problems can be found on pp. 289-297 of the textbook.

13, 14, 17, (19), 23, 25, 27, 28, 29, 32, 33, 34, 37, 40, 41, 43, 45, 47, 51, 55, 61, 65, 69

Chapter 8

Problems in parentheses are optional.
These problems can be found on pp. 333-341 of the textbook.

(1, 2, 3, 4), 9, (11), 17, 19, 21, 22ab, 24, 31, 37, 38, 39, 41, 45, 47, 52, 55, (57), 69ac, 73, 90, 92

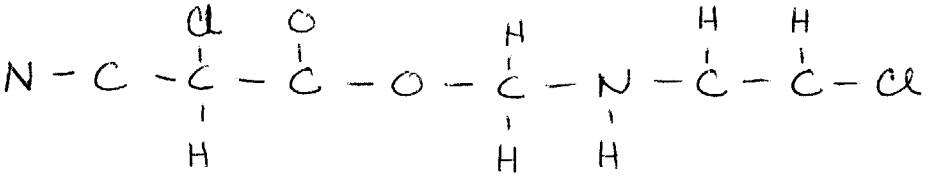
Additional Problems:

1. Draw Lewis structures for each of the following molecules or polyatomic ions. If equivalent resonance structures are possible, show all of them. If non-equivalent resonance structures are possible, show the most likely structure. (Remember to minimize formal charge, if possible.)

a.	CBr_4	h.	O_3	o.	PCl_5
b.	PCl_5	i.	SO_3^{2-}	p.	PCl_6^-
c.	HCN	j.	NO_3^-	q.	$XeOF_4$
d.	NCl_3	k.	H_2SO_4	r.	ICl
e.	SCl_2	l.	$HClO_3$	s.	ICl_3
f.	$CHCl_3$	m.	$H_2PO_4^-$	t.	ICl
g.	CH_2O	n.	PCl_4^+		

2. Draw three non-equivalent resonance structures for the ion CNO^-. (N is the central atom.) Determine the formal charge of each atom in each of the structures, and decide which is the most likely structure. Explain your reasoning.

3. Given the following skeleton structure, fill in any lone pairs and multiple bonds. (Give each atom its usual number of bonds and lone pairs.)



4. Draw Lewis structures for each of the following organic molecules.
   a. CH_3CH_2OH
   b. $(CH_3)_2NH$
   c. $CH_3CH(CH_3)COOH$
   d. CH_3COOCH_3

Chapter 9

These problems can be found on pp. 388-397 of the textbook.

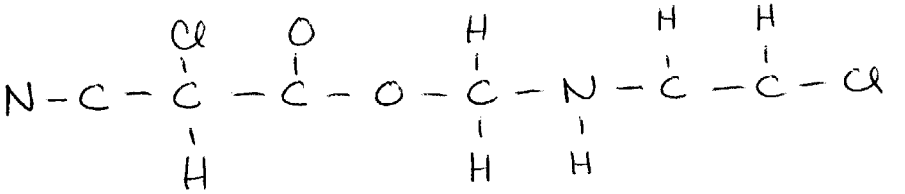
5, (17), 25, 27, 28, 29, 32, 35, 38, 41, 40, 45, 46, 51, 53, 55, 56, 57, 59, 61, 63, 67, 75, 76ab, 77, 78, 81 (for #75-81, be able to write the molecular orbital electron configuration and labeled arrow diagram.)

Additional Problems:

1. For all of the molecules or polyatomic ions in problem 1, determine the shape, bond angle, and hybridization, draw a sketch, and determine whether the molecule/ion is polar or nonpolar. Note: these are the same molecules from additional problem #1 in the homework for Chapter 8.

a.	CBr_4	h.	O_3	o.	PCl_5
b.	PCl_5	i.	SO_3^{2-}	p.	PCl_6^-
c.	HCN	j.	NO_3^-	q.	$XeOF_4$
d.	NCl_3	k.	H_2SO_4	r.	ICl
e.	SCl_2	l.	$HClO_3$	s.	ICl_3
f.	$CHCl_3$	m.	$H_2PO_4^-$	t.	ICl
g.	CH_2O	n.	PCl_4^+		

2. Given the following skeleton structure, fill in any lone pairs and multiple bonds. (Give each atom its usual number of bonds and lone pairs.) Then state the shape, bond angle, and hybridization around each of the central atoms.



3. For each of the following, describe the bonding using valence-bond theory. Include unhybridized and hybridized orbital arrow diagrams and draw a picture showing the orbital overlap for each species.

a. NH_3 b. XeF_4 c. PCl_4^-

4. Look at the molecule pictured in #9.61 on page 392. For each of the carbon atoms and for the oxygen atom in the OH group, describe the bonding using valence bond theory. Include unhybridized and hybridized orbital arrow diagrams and draw a picture showing the orbital overlap for each species.

5. For the HCN molecule, describe the bonding using valence bond theory. Include unhybridized and hybridized orbital arrow diagrams for the central atom and draw a picture showing the orbital overlap.

Chapter 11

These problems can be found on pp. 471-479 of the textbook.

1, 2, 3, 5, 6, 7, 9, 15, 17, 18, 19, 21, 23, 25, 27, 33, 39, 41, 43, 45, 47, 49, 50, 53, 55, 57, 59, 61, 73, 75, 78, 80, 83a

Chapter 12

These problems can be found on pp. 521-529 of the textbook.

9, 10, 11, 12, 13, 15, 16, 17, 30, 45, 63, 64, 65, 66

Chapter 13

These problems can be found on pp. 566-573 of the textbook.

2, 5, 7, 9, 10, 12, 15, 23, 25, 27, 28, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53abc, 55 (also calculate molality), 59, 61, 63, 65, 69, 71, 73, 75, 77, 79, 80, 81, 90a, 103

Additional Problem:
A 1.146 m solution of KBr in water has a density of 1.10 g/mL. Calculate the molarity of KBr in this solution.