208A Assigned Homework Problems

For the 4th Edition of Wade

Chapter 1: Major concepts: Lewis structures, Resonance, Acidity/Basicity

3abdh, 4, 5, 7abcdef, 8bfgh, 10, 13, 14 (Keq as a power of 10), 15, 16, 17, 18, 23, 30abceh, 31, 33acd, 34-46.

Chapter 2: Major concepts: Hybridization, intermolecular attractions, functional groups

Omit section 2-1. Section 2-2 – omit the antibonding orbitals.

2, 3, 4, 5abef, 8, 15, 16, 17, 18, 19-20 (only identify functional groups), 21, 25acdegh, 26 (no lewis structures), 30d, 36, 37, 39-42.

Chapter 3: Major concepts: Nomenclature, Newman projections, heat of combustion, cycloalkanes, cyclohexane conformations

1, 2, 3, 4, 6ad (common names only), 7, 8, 9, 11, 12, 14, 15, 16, 17, 18, 20-25, 27-30, 33c, 34abdefj, 37, 40, 42, 43, 44, 46.

Also read section 6-2 (nomenclature of alkyl halides) and do problems 6-2bcefg, 6-3, 6-51

Chapter 4: Major concepts: Radical Halogenation, Bond Strengths, Hammond postulate, ΔH calculations, Hyperconjugation

Note: In radical chlorination of alkanes, the relative reactivity of 3°:2°:1° hydrogens is actually 5 :4 :1. Your book makes the mistake of saying it is 4.5 : 4 : 1.

2, 3, 4, 5a, 7, 8, 9, 10, 14- 21, 23-30, 33, 34, 35, 37, 38, 39, 40, 41, 42, 44abcef, 45, 46, 47, 48, 50.

Chapter 5: Major concepts: Stereocenters, Stereoisomers, (R) and (S) configurations, Meso structures, Fischer Projections, Optical Purity

Omit section 5-9 (chiral compounds without chiral atoms)

2abcde, 3, 4, 5, 10, 11, 12, 13, 15, 17(2,3,4), 18, 19, 20, 22acd, 23, 27, 28, 31, 32abcfgh, 33, 34, 36.

<u>Chapter 6:</u> Major concepts: S_N1, S_N2, E1, E2 reactions. Importance of alkyl group, steric hindrance, solvent, basicity of nucleophile, and stereochemistry

Omit section 6-6B (allylic halogenation)

6a, 10, 11, 13bcdef, 14-25, 27, 29, 30, 32, 33, 34, 35, 36, 37, 38, 41- 45, 47, 52, 53, 54, 55, 57, 59, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 72, 77- 84.

<u>Chapter 7:</u> Major concepts: Alkenes: degrees of unsaturation, nomenclature (*E* or *Z*), synthesis via E1 and E2 reactions, measuring stability by heat of hydrogenation

Omit section 7-9C

1, 4, 5(omit g), 8, 9, 10, 11, 13, 15, 16, 17, 18, 20, 21, 22, 27, 28ab, 29bcd, 30, 31, 32a, 33, 34, 35, 36, 38-44.

<u>Chapter 8:</u> Major concepts: Regiochemical (which side of alkene) and stereochemical (cis or trans addition) predictions of alkene reaction products.

Omit section 8-16C (anionic polymerization)

1- 5, 7-18, 20- 28, 29-30(structures only), 31-41, 44-49, 50, 52-61, 63, 64, 65, 67, 69.

Note: in order to do many of these problems, you will need to learn nomenclature of alcohols. This is covered in chapter 10, section 10-3.

Also read chapter 26, sections 26-1‡26-2B. (Polymers). Do problems 1, 2, 3, 4, 5ab.

<u>Chapter 9:</u> Major concepts: Nomenclature of alkynes, similarity between alkyne and alkene reactions.

5 – 8, 10, 11c, 12-18, 19-20 (structures only), 21, 23, 24, 25, 27, 29, 32, 33, 34, 36-40, 41a

<u>Chapter 10:</u> Major concepts: Nomenclature of alcohols, hydrogen bonding, oxidation/reduction, inductive effect, Grignard reaction, acid/base chemistry

Skip sections 10-3D (421-422), 10-6C (429-430), 10-9D (437-439). In addition, I will **not** test nomenclature of thiols.

1b-f, 2 (IUPAC), 4, 5, 6, 7, 8, 11-15, 19, 20, 22, 23, 24ad, 25ad, 26abc, 27, 31a-e, 32b, 33bcdeh, 34-37, 38abcdfhklmn, 39a-e, 40abc, 41d, 43abcdf, 46-48.

Also do problem 6 in chapter 8.

<u>Chapter 11:</u> Major concepts: Oxidation/reduction, conversion to halides and tosylates, ether synthesis

Omit section 11-12 (esterification), 11-13B, and 11-13C. Ignore anything to do with the stereochemistry of thionyl chloride reactions.

1, 2abceg, 3, 4, 5, 6a-f, 7- 13, 15, 16, 17, 19b, 21. 22, 24- 27, 28acd, 29, 31-34, 36a, 37, 39, 40, 41 (try to find a different answer for c), 42, 46, 47 (omit d), 48, 50, 51, 52 (omit **Z**), 54, 55 (omit d and find a different answer for a).

<u>Chapter 12:</u> Only concept: Using IR spectroscopy to identify functional groups.

Omit section 12-9C and 12-13 to the end of the chapter. This is primarily Mass Spec, and it will not be covered in our class.

2, 3, 4, 6a, 14, 15adef, 16, 19a

<u>Chapter 13:</u> Only concept: Using NMR to determine the structure of compounds.

I will not cover "diastereotopic" or "enantiotopic" protons. In addition, I will not test you on the "physics" of NMR. I will only expect you to predict the NMR spectrum of a compound, or to use the NMR spectrum to determine the structure of a compund.

1acd, 2, 3, 4, 5, 6acd, 7, 8ab, 9, 10a, 11, 12, 13b (the peak is a double of triplets, J = 7 Hz and 16 Hz), 19, 20, 21, 23, 24d (4.2 ppm is a quintet, 4.9 is doublet of doublets, J = 1 Hz, 10 Hz; 5.2 is doublet of doublets, J = 1 Hz, 16 Hz), 24e, 25 (number of peaks only – no shifts), 28, 32 (compound 2), 34, 35abcdefjk, 36, 39abc, 40, 44, 45 (A: singlet at 1.7 ppm, singlet at 1.6 ppm, doublet at 1.55 ppm, J = 7 Hz), 48 (7.0 ppm is a doublet of triplets, J = 10, 7 Hz; 6.05 ppm is a doublet, J = 10 Hz; 2.1 ppm is a triplet, J = 7 Hz)

Here are the **molecular formulae** and IR for selected problems:

<u>Prob.</u>	<u>IR (cm^{-1})</u>	
10a	2950	
21a	3200-3400, 2935	
21b	3200-3500 (broad peak with two short sharp peaks), 2960	
24d	3200-3400, 3055, 2915	
24e	3300, 2935, 2200	
32	2955	**C_4H_9Br**
36	3200-3500, 2950	
43	2925	
44	3200-3500, 2960	**C_3H_8O**
48	3050, 2945, 1680	**$C_6H_{10}O$**

<u>Chapter 14:</u> Major concepts: synthesis and reactions of ethers, opening epoxides, oxidation/reduction of sulfur compounds.

I will not test the nomenclature of sulfides.

4, 5, 8, 9abde, 10-16, 19-26, 28abch, 29abf, 30abcde, 31, 33, 35-37, 39, 41-43, 44 (formula is $C_6H_{14}O_3$, NMR: triplet at 3.7 ppm, triplet at 3.6 ppm, singlet at 3.4 ppm)

208B Assigned Homework Problems

Chapter 15: Major concepts: Allylic position, dienes, resonance, kinetic and thermodynamic control of reactions.

Omit sections 15-3 and 15-8 (Molecular orbitals), 15-12, and 15-13 (pericyclic reactions and UV-VIS spectroscopy). Skip section 15-11 (Diels-Alder reaction): we will cover this reaction later in the semester.

1, 2, 4-12, 24, 25a-g, 27, 29, 31, 37a (try to see how the book's answer is not a good synthetic approach)

Also read section 25-8 (Terpenes, 1177-1180), and do problems 11, 12, 13, 15d (circle the isoprenes), and 27 in chapter 25.

Read section 26-5 (Synthetic rubbers, 1193-1195 (what is wrong about the red arrows on page 1193?), and do problem 11.