

CHEMISTRY 350 PROBLEMS, Based on Carey Version 8 or Wade Version 6

Dr. Craig P. Jasperse (note: if you have a different Wade version or a McMurry, I can work with you to use your existing book rather than spending for a new one.)

Chapter Topic	Carey 8 Chapter	Wade 6 Chapter	Carey 8 Problems	Wade 6 Problems
Intro and Review	1	1	1, 3-8, 10, 12-19, 22, 24-26, 29, 30, 31a, 33, 37, 41, 42, 44, 46, 47, 48, 50-52, 54-57, 60, 65, 69-71, 75-78	1(Si only), 2a-f, 3a-g, 4, 5a-c, 6(all!), 7a,b,d,e,g, 8a,e,f,g,h, 9, 10d-h, 11, 15, 17a, 18a-c, 19a-f [determine which is the "nucleophile" (electron pair donor) and which is the "electrophile" (electron pair receiver), and draw the arrows to show bond making and breaking. Do not do the "Bonsted-Lowry" discussion.] 21, 23, 25-29, 31, 32, 34-37, 40-43, (for 42 and 43, you should be able to process H ₂ SO ₄ by memory, the others by structure without needing to look at a list of acidity values), 44 (use nucleophile/electrophile designation, and definitely practice the arrow pushing), 46
Structure and Properties	1	2	See list of problems above from Carey's Chapter 1.	1b (draw), 2 (skip part about 104.5° angle as opposed to 109° angle), 3, 4, 5a-f, 7a,b, 8, 9, 10 (three do, three don't; beware of "e", which is deceptive), 11, 16, 17 (omit a), 18-20, 21 (skip d), 22, [Note: for functional group problems, skip the "cyclic" designation!], 27, 28, 29 (we will see this is crucial to the performance of all proteins!), 30, 31, 33-35, 38-40, 41 (skip c), 42, 44
Alkanes	2,3	3	Ch 2: 3-5, 8, 10, 11a,b, 18, 19, 21, 22a,b, 23, 24a,b, 25, 26, 29, 30a,b, 43, 44 Ch 3: 1-4, 7, 8, 11, 12, 17, 19-24, 27, 28, 32a-e	1a, 2a, 3, 4a-e, 5, 6a,b, 7a,b, 9a, 11-13, 15b-d, 16, 17a,b, 18-21, 25-29, 33, 34 (omit c and d), 35 (omit b), 37 (omit e,g,h), 38, 39, 40b, 42, 43a,b, 44, 46
Chemical Reactions.		4	16, 18 (prop. only), 19, 20, 22,	1a-c, 2, 3, 4a, 9a, 11-13, 15, 16, 18, 19a-d, 24, 25, 28-32, 35-39, 41, 42a, 43, 44, 46 (skip d) (Be Sure to do 46, very important)
Stereo chemistry	7	5	1, 2, 3c,d, 4, 5, 9, 10, 13, 15, 22, 23, 24, 26, 27, 32-34, 38a,c-f,h-k	2 (label as chiral or achiral. If chiral, also draw the enantiomer.), 3 (star chiral C's, identify each chiral molecule, and be able to draw the enantiomers.), 4, 5 (assign as chiral or achiral), 6 [skip f,g. For all others, give the (R)/(S) designations.], 14, 20a-e, 21 (skip f), 22, 23c, 26a,c,d,j-p, 27, 30d, f-h 31a, f-i, 36
Alkyl Halides: S _N 2, S _N 1, E2, E1 Reactions	4, 5, 8	6	Ch 8: 1-3, 5, 7, 9-11, 15b, 16, 18, 20, 22a-g, 23, 24, 25a-f, 30, 31, 32a,b,d-h, 33a, 34, 40, 47, 49-51 Ch 5 (E2/E1): 22-24, 36, 37a,b,e,	1, 2c,e,f, 3 (parts 1 and 3, don't classify B or name k), 6, 7 (the density of chloroform is 1.50), 8a, 10 S _N 2 Reactions: 11-13, 14a,b,d,e, 15(skip b,g), 16, 18 (skip neopentyl bromide. And, substitution is more important than leaving group), 19a,b, 20(skip c,e,f), 21 [(the catch here is to understand why inversion can occur if (S) goes to (S)] S _N 1 Reactions: 22, 23, 24, 25, 26 (skip the mechanisms, but note how rearrangement forms a more stable cation), 27, 29 (very interesting. Probably not test fodder.) Elimination reactions: 30, 31, 32, 33b-d, 34-39, 40, 42a,c-e,

			40c,d,g,h,i,j	43a-c,e,f, 44**, 45("solvolysis" is substitution by solvent, and is always S _N 1), 46, 48-54, 56, 59-61
Alkenes	5	7	1, 2, 4, 11-17, 19, 22-24, 28a-h, 30, 33a-d (rank), 34a,b, 36, 37, 40	1 (for b, counting geometric isomers, I count 14 possible alkene isomers and 15 possible cyclic isomers! The answer book only shows a few of the possibilities.), 4, 5a,b,c,f,g,h, 6a,d,e, 7a,c,e(name is ambiguous), 8a,c,e, 10a-d (more stable only. Skip the part about how much difference in energy), 12a,c, 13, 16, 17, 18, 19, 24, 25, 27-29 (note: in 28a, 29c,d cation rearrangements occur. I won't ask for mechanisms with cation rearrangement on your test, but a simple elimination of H ₂ O such as 29b or c is extremely likely.) 31, 32a,b,d, 33, 34 (for part c: how many rings does it have?), 36a-c, 38 (try to predict the major product. For test purposes I usually wouldn't want the minors), 39a,b,d (the point is to predict the major product), 44, 45
Alkene Addition Reactions	6	8	1-5, 8, 9, 15, 19, 21, 26a-h, 27, 28, 32, 34, 36a-f,I,k, 37b-d, 42, 58-61, 63, 65-69	1-4, 6, 8-11, 13-21(look at answer to e, just for interest sake), 22 (for b, book answer is poor. Should use a hindered base), 23, 24, 29, 30 (mech for ring-opening only), 32b,d, 33, 34b,d,f, 35 (d,l means racemic mix of chiral products), 36, 37, 47 (good practice for "predict the product" reactions.), 48a, b, c,e,f 49a,b,c,d,e,f,h, 50a-l, 55, 58-61, 68
Conjugated Systems	10	15	1, 2, 4, 7, 8, 9, 10, 13, 14, 16, 17, 18, 19, 25a, 28a-f, 29, 30, 32, 33, 35, 36a-c, 37, 41, 42, 47, 48, 49, 50	1, 2, 4, 5, 6, 7(skip c), 9, 10-11(NBS=Br ₂ /hν), 12, 13, 14, 15 (skip d), 16 (ignore stereochem), 18, 24, 25a-d,g-i, 26, 27, 30, 31, 33a-f
Aromatics	11	16	1, 2, 3a,c, 13, 15, 18, 21, 24, 25, 26, 33f,I, 34, 36a, 39a-d, h, i, 43a, b, e, f, 44, 45, 46, 47, 50, 51, 59, 60, 61, 63	3(skip cyclooctatetraene), 5, 7b-d, 8, 9a, 10, 11, 12, 15, 16 (purine picture on top of page), 18, 22a, c,e,g, 24, 27a-f, 28a-c,e,f, 29, 32, 34 (hint: N lone pairs are strongly basic when sp ³ or sp ² but weakly basic when p), 35, 36, 37 ("xylene" means dimethyl benzene), 43
Aromatic Reactions	12	17	2, 3, 4, 6, 10, 12, 15, 17, 18, 19, 21, 22, 23, 24, 34a-k, 35a-f, 36a,c,d,f, 37, 38, 39a-l,n, 44, 45a-d,g,I,l,m, 46a,c-e, 47a,b,d, 50, 52 Ch 11: 10, 11	2, 4(p-xylene is 1,4-dimethylbenzene), 6, 7, 8, 9, 12a, 14, 15, 16b(i-iv), 17a,c, 20a-c, 21, 22(skip c,d), 33, 34 (1), 36, 37, 44a,b,d,f,h,j,l, 45, 46a,b,e,f,g, 47b-f,h,i,j,l, 48, 49, 51, 57, 60, 61

Chemistry 350, Jasperse, Fall 2011	Carey 8	Wade 6
Topic	Readings	Readings
Intro. Octet Rule, Lewis Structure, Electroneg, Polarity, Formal Charge Resonance; Structural Formulas; Acids/Bases, Electrophiles/Nucleophiles Orbitals, π -Bonds, Hybridization + Shape; Drawing 3-D Shapes	1.1-6 1.7-11 1.12-14	1.1-1.6 1.7-1.14 2.1-2.6
Bond Rotation, Isomerism, Polarity, Intermolecular Forces, Solubility Classification of Organic Compounds. The Functional Groups. Classification, Formulas, Physical Properties, Nomenclature of Alkanes	1.14-18 2.1-10, 4.1 2.11-24	2.7-2.11 2.12-2.14 3.1-3.5
Labor Day Holiday		No Class
Conformations and Stability of Acyclic Alkanes and Cycloalkanes	3.1-6	3.6-3.12
Conformations and Stability of Cyclohexanes	3.7-15	3.13-3.16
Alkane Chlorination. Factors to Think About in a Chemical Reaction. Transition States, Multistep Reactions, Halogenation of Higher Alkanes. Test 1. Chapters 1-3.	4.13, 4.15-19, 4.8-11 4.13, 4.15-19, 4.8-11	4.1-4.9 4.10-4.14 Test
Reactive Intermediates (Radicals, Cations, Anions) Chirality, R/S Classification of Chiral Carbons. Miscellaneous Stereochemistry	4.10, 4.17, 4.15-19 7.1-3 7.4,5,6,8,10	4.15-4.16 5.1-5.3 5.4-5.9
Diastereomers; More than One Chiral Carbon Catchup	7.11-14	5.11-5.16 Catchup
Nomenclature, Structure, Properties, Reactivity of Alkyl Halides.	4.1-6	6.1-6.7
The Sn2 Substitution Reaction. The Sn1 Substitution Reaction. The E1 and E2 Elimination Reactions. Substitution vs. Elimination?	8.1-5 8.6-10 5.8, 5.10, 5.14-18, 8.11	6.8-6.12 6.13-6.16 6.17-6.21
Fall Breather, NO CLASS		No Class
Catchup		Catchup
Alkenes: Structure, Nomenclature, Isomers.	5.1-5	7.1-7.6
Alkene Stability; Synthesis. Test 2. Chapters 4-6	5.6-13	7.7-7.10 Test
Synthesis of Alkenes; Classifying/Recognizing Reaction Mechanisms; Alkenes	5.14-16, 6.1-2	7.10-8.2
Addition of H-Cl, H-Br, and H-OH to Alkenes. Oxymercuration/Dermercuration; Hydroboration/Oxidation; Hydrogenation Addition of Halogens, Formation of Halohydrins; Epoxidation	6.3-6, 6.18 6.9-13, p275-278 6.14-17, 6.19	8.1-8.5 8.5-8.7,8-10 8.8-8.9
Oxidation Reactions of Alkenes Catchup; Practice Problems	6.19, 6.20, 15.5	8.12-8.16 Catchup
Intro; Conjugation, Molecular Orbitals, Dienes, Allylic Cations, Additions to Dienes	10.1-14	15.1-6
More allylic cations/radicals/conjugation and Applications; Diels-Alder Reaction Test 3. Chapters 7,8	10.1-14, 11.13, 11.14, 11.16	15.7-11 Test
Diels-Alder Reaction; Aromaticity	10.15-18	15.11, 16.1-2
Aromaticity; Huckel's Rule and Complex Aromatics	11.1-8	16.1-7
Complex Aromaticity, Application, Nomenclature	11.18-23	16.8-11, 13
Electrophilic Aromatic Substitution: Intro, Mech, Kinetic Effects, Directing Effects	12.1-8	17.1,6-8
Reactions in Detail: Halogenation, Nitration, Alkylation	12.9-11	17.2-5,10,11
Reactions in Detail: Sulfonation, Acylation	12.9-11	17.2-5,10,11
Addition to Disubstituted Benzenes; Synthetic Applications	12.12-16	17.9, Practice
Side Chain Reactions; Retrosynthesis; Synthetic Applications; Practice Catchup	11.11, 11.12, 11.15, 21.9	17.14, practice -
Integrated practice problems, Review for Test 4		---
Test #4 Covering Chapters 15-17		Test
Final Exam. 9:00 THURSDAY		Final Exam