CHEM 3331	Summer 2007	Name:
Dr. Minger	Exam #1	

General Instructions. There are 4 pages of questions and 7 pages total, including this cover sheet and 2 scratch pages. Be sure you have them all. Read each problem carefully so that you know what is being asked and what you need to write or draw. Good luck!

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IA	IIA	IIIB	IVB	VΒ	VIΒ	YIIB		VIII		IB	IIB	IIIA	IVA	٧A	VIA	VIIA	GASES
1 H 1.00797																1 H 1.00797	He 4.0026
3 Li 6.939	Be 9.0122											B 10.811	C 12.0112	7 N 14.0067	0 15.9994	9 F 18.9984	10 Ne 20.183
11 Na 22.9898	12 Mg 24.312											13 Al 26.9815	14 Si 28.086	15 P 30.9738	16 S 32.064	17 CI 35.453	18 Ar 39.948
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
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K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
39.102	Ca	Sc	Ti 47.90	V 50.942	Cr 51.996	Mn 54.9380	Fe 55.847	Co 58.9332	Ni 58.71	Cu 63.54	Zn 65.37	Ga 69.72	Ge	As 74.9216	Se	Br 79.909	Kr 83.80
39.102 37	Ca 40.08	Sc 44.956 39	Ti	V 50.942	Cr 51.996 42	Mn	Fe 55.847	Co	Ni 58.71 46	Cu 63.54	Zn 65.37	Ga 69.72	Ge 72.59 50	As 74.9216 51	Se 78.96	Br	Kr 83.80 54
39.102 37 Rb	Ca 40.08 38 Sr	Sc 44.956 39 Y	Ti 47.90 40 Zr	7 50.942 41 Nb	Cr 51.996 42 Mo	Mn 54.9380 43 Tc	Fe 55.847 44 Ru	Co 58.9332 45 Rh	Ni 58.71 46 Pd	Cu 63.54 47 Aq	Zn 65.37 48 Cd	Ga 69.72 49 In	Ge 72.59 50 Sn	As 74.9216 Sb	Se 78.96 Te	Br 79.909 53	Kr 83.80 54 Xe
39.102 37 Rb 85.47	Ca 40.08 38 Sr 87.62	Sc 44.956 39 Y 88.905	Ti 47.90 40 Zr 91.22	50.942 41 Nb 92.906	Cr 51.996 42 Mo 95.94	Mn 54.9380 43 Tc (99)	Fe 55.847 44 Ru 101.07	Co 58.9332 45 Rh 102.905	Ni 58.71 46 Pd 106.4	Cu 63.54 47 Ag 107.870	Zn 65.37 48 Cd 112.40	Ga 69.72 49 In 114.82	Ge 72.59 50 Sn 118.69	As 74.9216 51 Sb 121.75	Se 78.96 52 Te 127.60	Br 79.909 53 1 126.904	Kr 83.80 54 Xe 131.30
39.102 37 Rb 85.47 55	Ca 40.08 38 Sr 87.62 56	Sc 44.956 39 Y	Ti 47,90 40 Zr 91,22 72	50.942 41 Nb	Cr 51.996 42 Mo 95.94 74	Mn 54.9380 43 Tc	Fe 55.847 44 Ru	Co 58.9332 45 Rh	Ni 58.71 46 Pd	Cu 63.54 47 Aq	Zn 65.37 48 Cd	Ga 69.72 49 In	Ge 72.59 50 Sn 118.69 82	As 74.9216 51 Sb 121.75 83	Se 78.96 52 Te 127.60 84	Br 79.909 53	Kr 83.80 54 Xe 131.30 86
39.102 37 Rb 85.47 55	Ca 40.08 38 Sr 87.62 56	Sc 44.956 39 Y 88.905 *57	Ti 47,90 40 Zr 91,22 72	50.942 41 Nb 92.906	Cr 51.996 42 Mo 95.94 74	Mn 54.9380 43 Tc (99) _75	Fe 55.847 44 Ru 101.07	Co 58.9332 45 Rh 102.905 77	Ni 58.71 46 Pd 106.4	Cu 63.54 47 Ag 107.870 79	Zn 65.37 48 Cd 112.40 80	Ga 69.72 49 In 114.82	Ge 72.59 50 Sn 118.69 82	As 74.9216 51 Sb 121.75 83	Se 78.96 52 Te 127.60 84	Br 79.909 53 1 126.904 85	Kr 83.80 54 Xe 131.30 86
39.102 37 Rb 85.47	Ca 40.08 38 Sr 87.62 56 Ba	Sc 44.956 39 Y 88.905	Ti 47.90 40 Zr 91.22	50.942 41 Nb 92.906	Cr 51.996 42 Mo 95.94	Mn 54.9380 43 Tc (99)	Fe 55.847 44 Ru 101.07 76	Co 58.9332 45 Rh 102.905	Ni 58.71 46 Pd 106.4	Cu 63.54 47 Ag 107.870	Zn 65.37 48 Cd 112.40	Ga 69.72 49 In 114.82	Ge 72.59 50 Sn 118.69 82 Pb	As 74.9216 51 Sb 121.75	Se 78.96 52 Te 127.60	Br 79.909 53 1 126.904	Kr 83.80 54 Xe 131.30
39.102 Rb 85.47 55 Cs	Ca 40.08 38 Sr 87.62 56 Ba	Sc 44.956 39 Y 88.905 *57 La	Ti 47,90 40 Zr 91,22 72 Hf	50.942 41 Nb 92.906 73 Ta	Cr 51.996 42 Mo 95.94 74 W 183.85 106	Mn 54.9380 Tc (99) 75 Re	Fe 55.847 44 Ru 101.07 76 Os	Co 58.9332 45 Rh 102.905 77 Ir	Ni 58.71 46 Pd 106.4 78 Pt	Cu 63.54 47 Ag 107.870 79 Au	Zn 65.37 48 Cd 112.40 80 Hg 200.59 112	Ga 69.72 49 In 114.82 81 TI	Ge 72.59 50 Sn 118.69 82 Pb	As 74.9216 51 Sb 121.75 83 Bi	Se 78.96 52 Te 127.60 84 Po	Br 79.909 53 1 126.904 85 At	Kr 83.80 54 Xe 131.30 86 Rn
39.102 37 Rb 85.47 55 Cs 132.905	Ca 40.08 38 Sr 87.62 56 Ba 137.34	\$c 44.956 39 Y 88.905 *57 La 138.91	Ti 47.90 40 Zr 91.22 72 Hf 178.49	V 50.942 41 Nb 92.906 73 Ta 180.948	Cr 51.996 42 Mo 95.94 74 W 183.85	Mn 54.9380 Tc (99) 75 Re 186.2	Fe 55.847 44 Ru 101.07 76 Os 190.2	Co 58.9332 45 Rh 102.905 77 Ir 192.2	Ni 58.71 46 Pd 106.4 78 Pt 195.09	Cu 63.54 47 Ag 107.870 79 Au 196.967	Zn 65.37 48 Cd 112.40 80 Hg 200.59	Ga 69.72 49 In 114.82 81 TI	Ge 72.59 50 Sn 118.69 82 Pb	As 74.9216 51 Sb 121.75 83 Bi	Se 78.96 52 Te 127.60 84 Po	Br 79.909 53 1 126.904 85 At	Kr 83.80 54 Xe 131.30 86 Rn

1) Predict the major organic product of each of the following reactions or reaction sequences. If no reaction occurs, write "N.R." (35 pts)

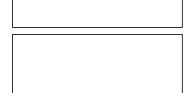
$$\begin{array}{c} & & \\ & \\ \hline \\ & \\ & \\ \end{array}$$

OH 1. SOCI₂
2. AICI₃
3. H₂NNH₂, KOH,
$$\Delta$$
, triethylene glycol











2a) Draw an arrow-pushing mechanism for *the formation of the electrophile only* in the following transformation. Show all bonds, arrows, formal charges and necessary lone pairs clearly to receive full credit (10 pts).

2b) Draw an arrow-pushing mechanism for the following transformation. Show all bonds, arrows, formal charges and necessary lone pairs clearly to receive full credit (10 pts).

2c) Using the principles of electrophilic aromatic substitution mechanisms, propose an arrow-pushing mechanism for the bromination of furan. Furan is much more reactive than benzene and does not require a Lewis acid catalyst. Show all bonds, arrows, formal charges and necessary lone pairs clearly to receive full credit (10 pts).

3) Provide the starting material necessary to produce each of the molecules shown using the given reagents. Some may have more than one possible precursor, but you just have to draw one (15 pts).



NBS, CCl₄,
$$\Delta$$







4) Propose multi-step syntheses of each of the following target molecules using the starting materials shown. You may use any inorganic reagents and organic reagents containing four or fewer carbons. You don't have to draw any mechanisms, just write the reagents needed for each step and the product of each step (20 pts).

