

Name above this line

First Letter of Last Name

Although this room is crowded, do your best not share answers or information. **No notes, books, calculators, cell phones, iPods, computers or electronics of any sort allowed. Please turn off the ringer on your phone now.**

Be sure you have all of the exam pages.

PERIODIC TABLE OF THE ELEMENTS

Atomic masses are based on ¹²C. Atomic masses in parentheses are for the most stable isotope.

6 — Atomic number C — Symbol 12.011 — Atomic mass																								
Groups 1A																		VIIIA						
Periods	1																	2						
	H 1.00079																	He 4.00260						
	3 Li 6.941	4 Be 9.01218																	5 B 10.81	6 C 12.011	7 N 14.0067	8 O 15.9994	9 F 18.998403	10 Ne 20.179
	11 Na 22.98977	12 Mg 24.305																	13 Al 26.98154	14 Si 28.0855	15 P 30.97376	16 S 32.06	17 Cl 35.453	18 Ar 39.948
	19 K 39.0963	20 Ca 40.08	21 Sc 44.9559	22 Ti 47.90	23 V 50.9415	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.70	29 Cu 63.546	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.9216	34 Se 78.96	35 Br 79.904	36 Kr 83.80						
	37 Rb 85.4678	38 Sr 87.62	39 Y 88.9059	40 Zr 91.22	41 Nb 92.9064	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.9055	46 Pd 106.4	47 Ag 107.868	48 Cd 112.41	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.9045	54 Xe 131.30						
	55 Cs 132.9054	56 Ba 137.33	57 La 138.9055	72 Hf 178.49	73 Ta 180.9479	74 W 183.85	75 Re 186.207	76 Os 190.2	77 Ir 192.22	78 Pt 195.09	79 Au 196.9665	80 Hg 200.59	81 Tl 204.37	82 Pb 207.2	83 Bi 208.9804	84 Po (209)	85 At (210)	86 Rn (222)						
	87 Fr (223)	88 Ra 226.0254	89 Ac 227.0278	104 Unq (261)	105 Unp (262)	106 Unh (263)																		

*Lanthanide series

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
140.12	140.9077	144.24	(145)	150.4	151.96	157.25	158.9254	162.50	164.9304	167.26	168.9342	173.04	174.967

† Actinide series

90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
232.0381	231.0359	238.029	237.0482	(244)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(260)

page	points	
3	23	
4	9	
5	12	
6	12	
7	20	
8	12	
9	12	
	100	

ID number

List the pKa for the following compounds

- | | |
|----------------|-----------------------------------|
| a. HCl | f. ethylamine |
| b. 1-butyne | g. H ₃ PO ₄ |
| c. acetic acid | h. acetone |
| d. water | i. cyclohexane |
| e. 2-propanol | j. cyanide |

Rank the following from most reactive toward substitution under usual SN2 conditions with a #1, to the least reactive with a 6.



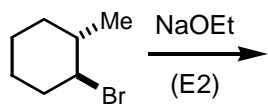
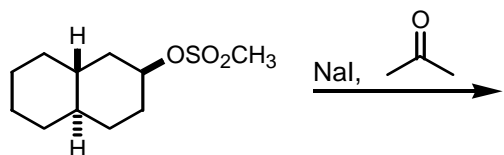
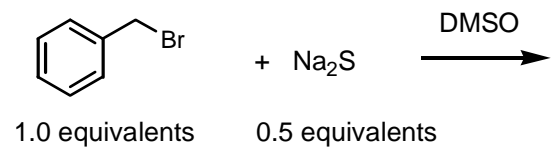
Draw the following compounds

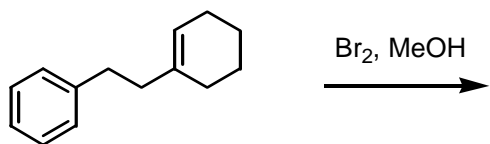
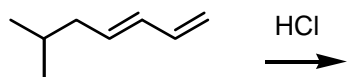
- | | |
|------------|----------------------------------|
| a. toluene | d. DMF |
| b. THF | e. para-toluenesulfonyl chloride |
| c. DMSO | |

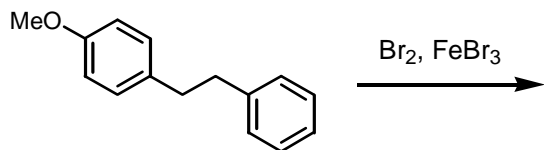
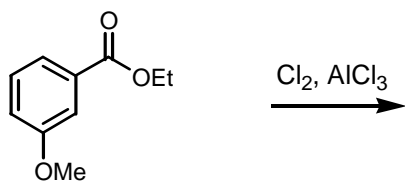
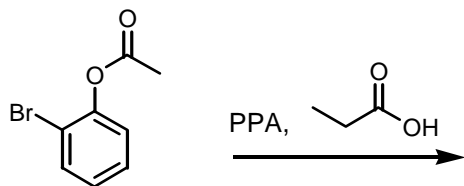
What, according to the instructor, the most important question in Chemistry?

Give an example of a hydrazone.

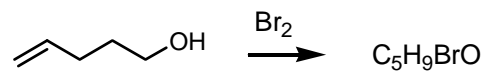
Show the products from the following reactions, including stereochemistry where possible. If more than one product is expected, indicate which is the major. 4 marks each



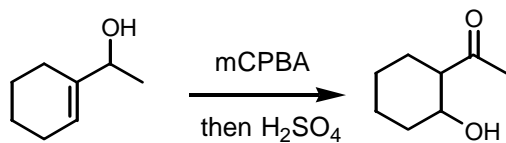




8 marks. Show the product and a mechanism on how it is formed.



12 marks. Provide a detailed reaction mechanism to show how the following transformation occurs.



Short synthesis. Provide the reagents and conditions necessary to efficiently effect the following transformations in high yield. Some can be done in one step, others take several. Your answers must address stereochemistry where shown.

