

Key

Name above this line

First Letter of Last Name  K
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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  $^{12}\text{C}$ . Atomic masses in parentheses are for the most stable isotope.

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

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List the pKa for the following compounds

a. HCl -7

f. ethylamine 39

b. 1-butyne 25

g. H<sub>3</sub>PO<sub>4</sub> -5

c. acetic acid 4.8

h. acetone 19

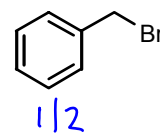
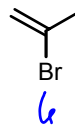
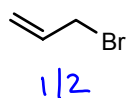
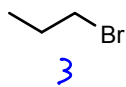
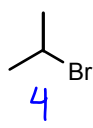
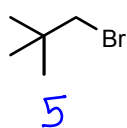
d. water 15.7

i. cyclohexane 51

e. 2-propanol 16.5

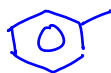
j. hydrogen cyanide 9

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



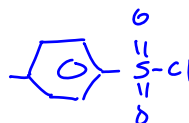
d. DMF



b. THF



e. para-toluenesulfonyl chloride



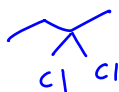
c. DMSO



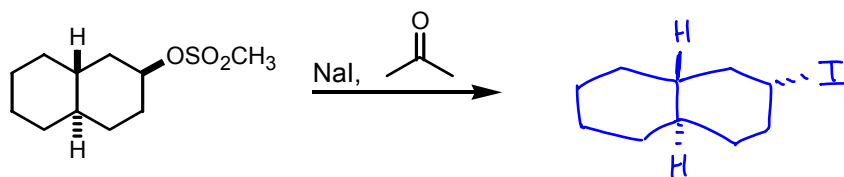
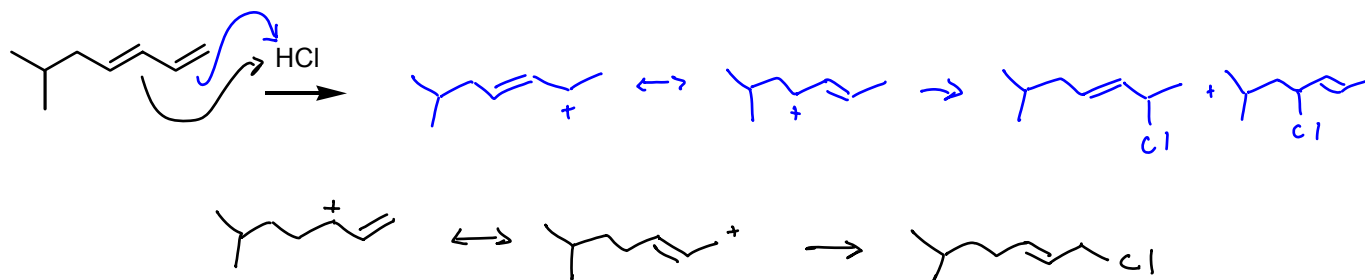
What, according to the instructor, the most important question in Chemistry?

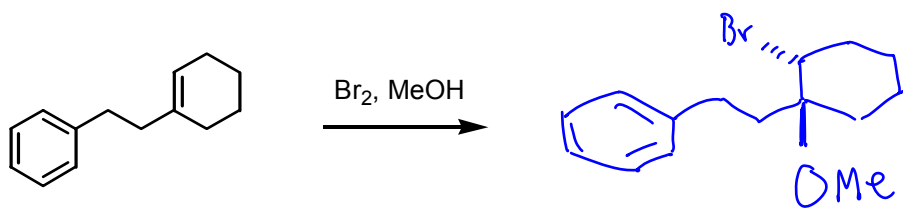
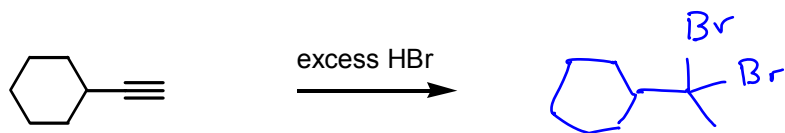
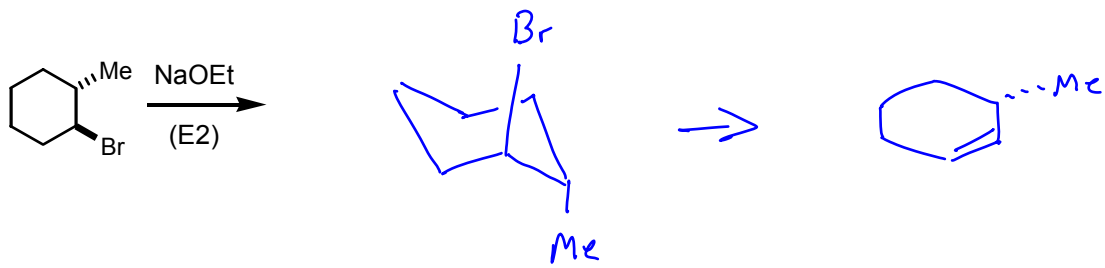
Where are the electrons? (Where are they going?)

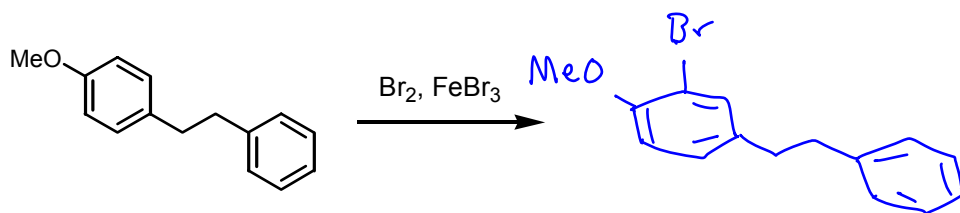
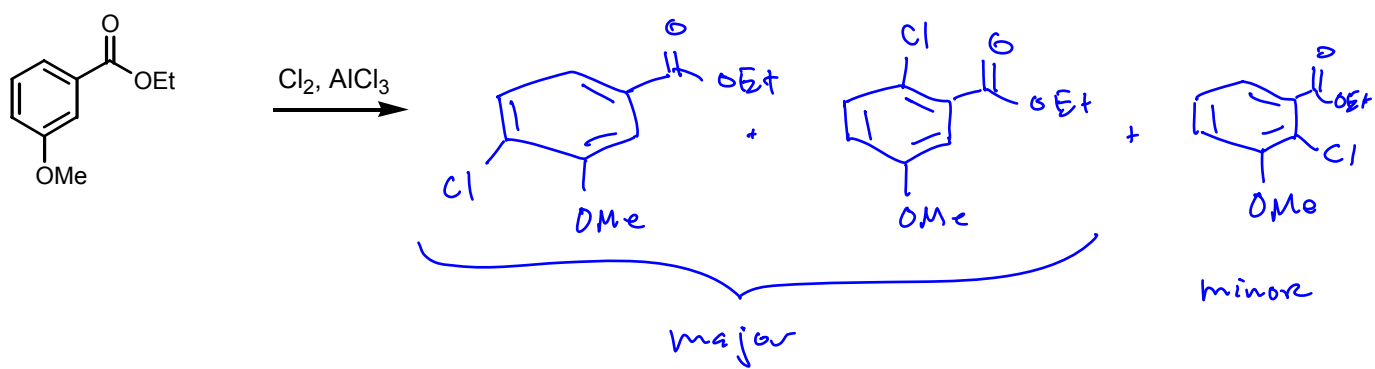
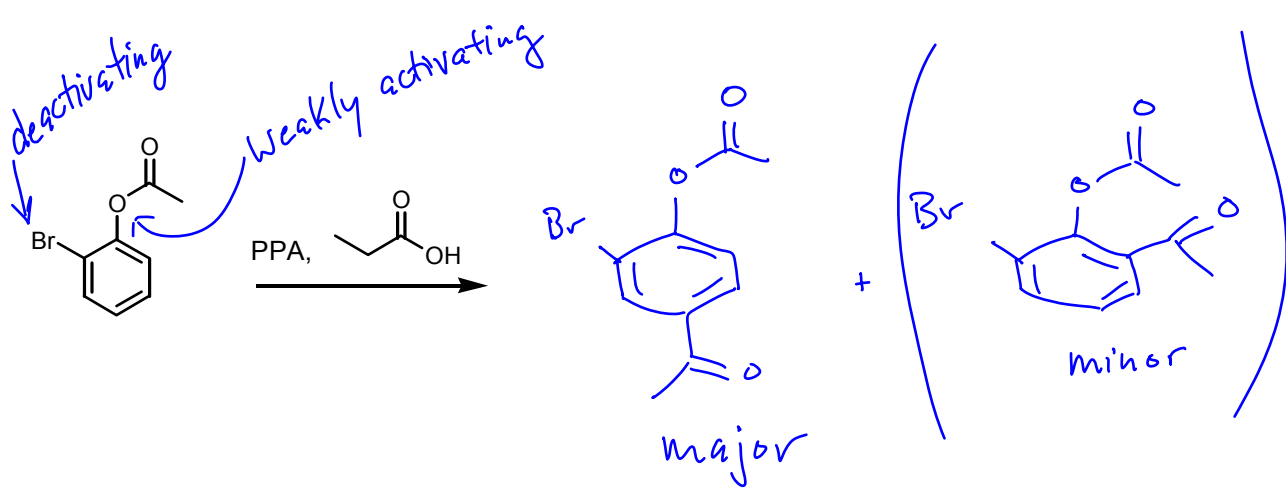
Give an example of a geminal dihalide.



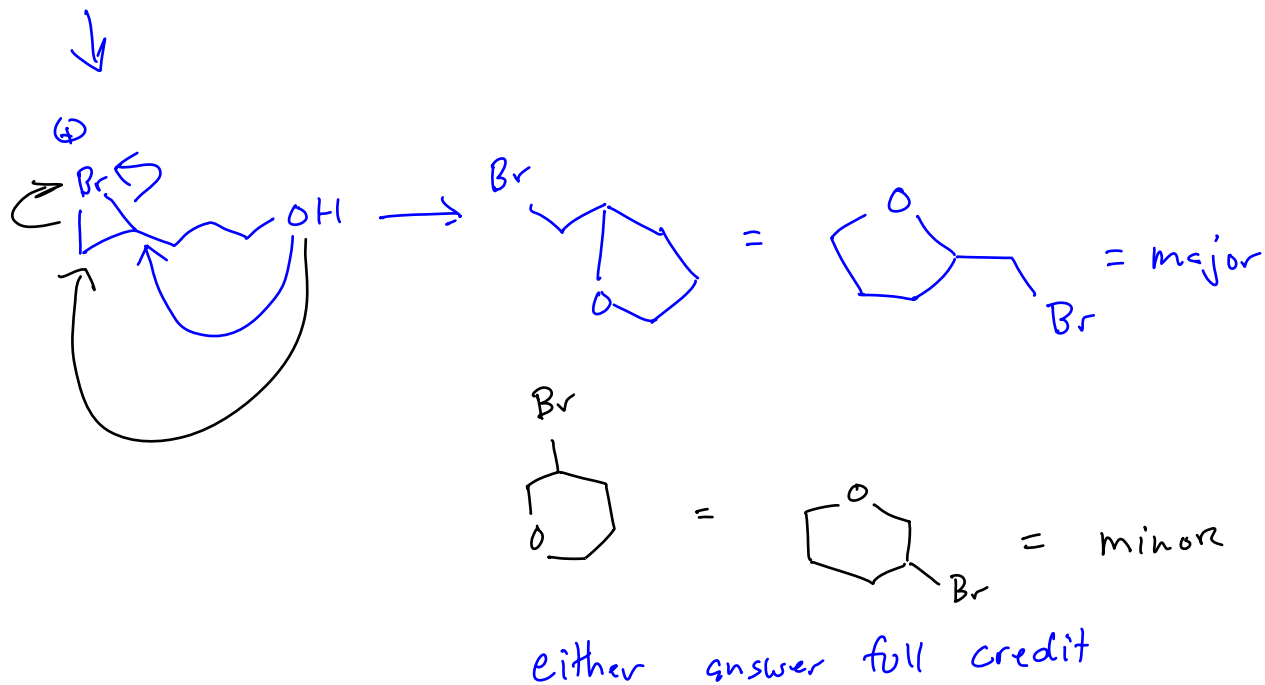
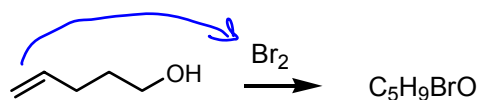
Show the products from the following reactions, including stereochemistry where possible. If more than one product is expected, indicate which is the major. 4 marks each



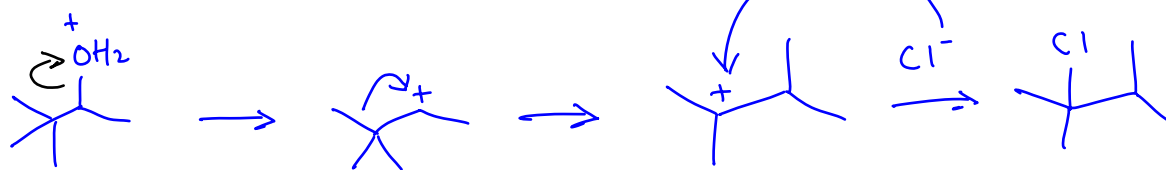
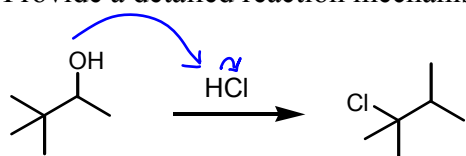




Show the product and a mechanism on how it is formed.



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.

