

Student ID \_\_\_\_\_

Name \_\_\_\_\_

Recitation Date/Time \_\_\_\_\_ TA Name \_\_\_\_\_

Page

Points:

2 \_\_\_\_\_ (28)

3 \_\_\_\_\_ (28)

4 \_\_\_\_\_ (32)

5 \_\_\_\_\_ (12)

Total \_\_\_\_\_ (100)

## Periodic Table

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Ha	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac															

**Please sit with an empty seat between you and your neighbors.**

**Please silence your cell phones and keep them in your bags during exam.**

**You may use molecular models. Please bring them in transparent bags.**

**Feel free to ask questions about the questions, but please don't ask questions about your answers, it distracts your neighbors.**

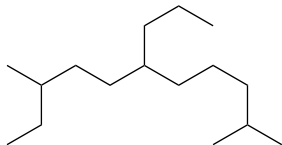
1. Draw the best Lewis structure for each species shown below. Formal charges must be included. Provide the shape of each species. (4 pts each) The central atoms are in bold.



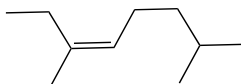
2. Provide all constitutional isomers for  $\text{C}_4\text{H}_7\text{F}$  using bond-line formulas (12 pts)

3. Provide the IUPAC name for each of the following structure (5 pts each).

a)

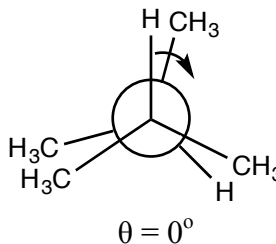
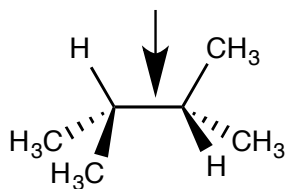


b)



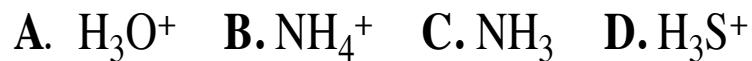
4. Draw the energy diagram as the dihedral angle ( $\theta$ ) of the indicated carbon-carbon bond of the following molecule varies from  $0^\circ$  (as shown) to  $360^\circ$ . Draw appropriate Newman projections for conformations whose dihedral angles are  $60^\circ$ ,  $120^\circ$ ,  $180^\circ$ ,  $240^\circ$ ,  $300^\circ$ , and  $360^\circ$  (18 pts). Please rotate the carbon in the front clockwise as the arrow indicates.

X:



5. Identify the most and least acidic or basic species in each of the following series of molecules (3 pts each).

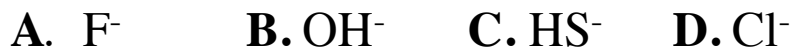
a)



Most acidic: \_\_\_\_\_

Least acidic: \_\_\_\_\_

b)

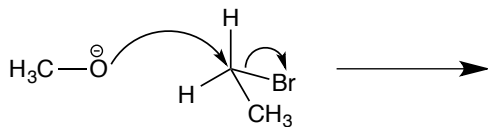


Most basic: \_\_\_\_\_

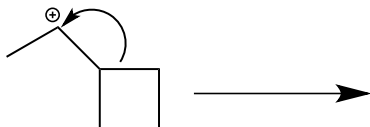
Least basic: \_\_\_\_\_

6. Provide the products of each of the following reactions based on the curved arrow notations (4 pts).

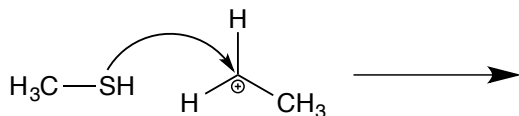
a)



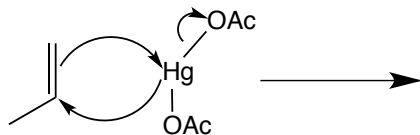
b)



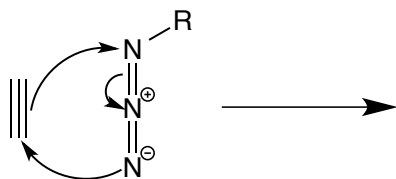
c)



d)

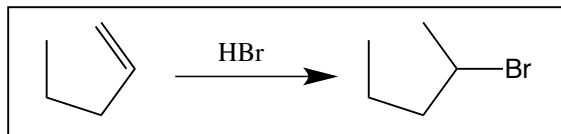


e)

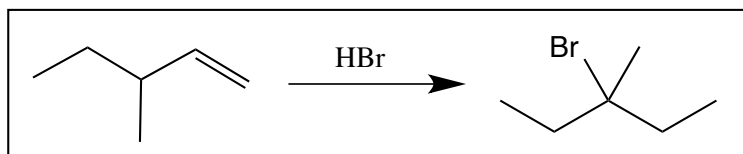


7. Use the curved arrow notation to draw the mechanism of the following reactions (6 pts each). DO NOT draw in the boxes.

A.



B.



Scratch paper (DO NOT detach this page from the others)

(DO NOT detach this page from the others)