

CHEM 3311

HARRINGTON

Exam 7:00 – 8:30 PM October 18, 2016 in MATH 100

Instructions. No notes, books, laptops, phones, or calculators.
Periodic Table and electronegativity chart are provided.

NAME: KEY

	Points Possible	Score
1	15	
2	15	
3	15	
4	15	
5	16	
6	10	
7	14	
Exam 2 Total Raw Score	100	
Curve		
Exam 1 Curved Score		
Exam 1 Letter Grade		

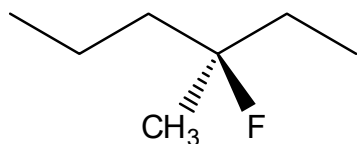
NAME OF YOUR TA:

1(15 points) Draw a **structure** corresponding to each of the following IUPAC names.

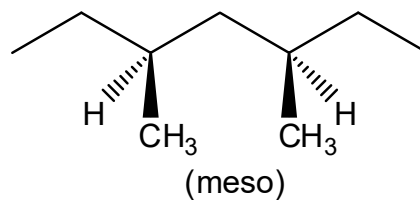
3 points each /partial credit on c only

TYPO on 1a corrected during exam. This name should be (R)-3-fluoro-3-methylhexane.

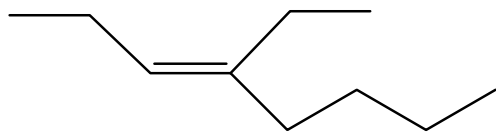
a. (R)-fluoro-3-methylhexane



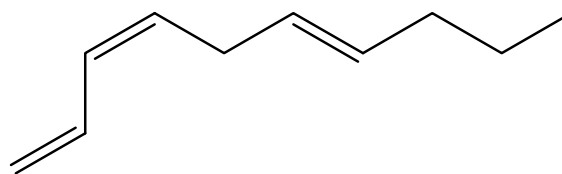
d. (3R,5S)-3,5-dimethylheptane



b. (E)-4-ethyl-3-octene

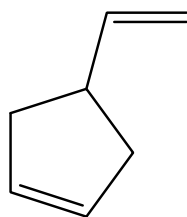


e. (3Z,6E)-1,3,6-decatriene



c. 4-vinylcyclopentene

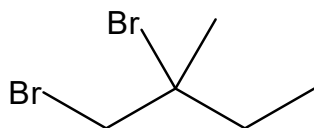
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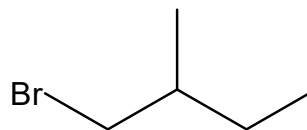
2. (15 points) Draw a structure for **the major product** formed when 2-methyl-1-butene reacts with each of the following reagents.

3 points each/**no partial credit**

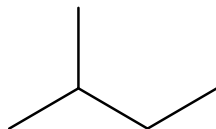
a. Br₂ in CH₂Cl₂ solvent



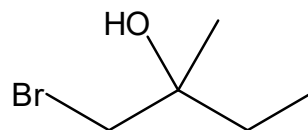
d. HBr, ROOR, light (R = *tert*-butyl)



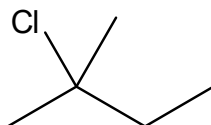
b. H₂, Pt/C



e. Br₂ in H₂O solvent



c. HCl



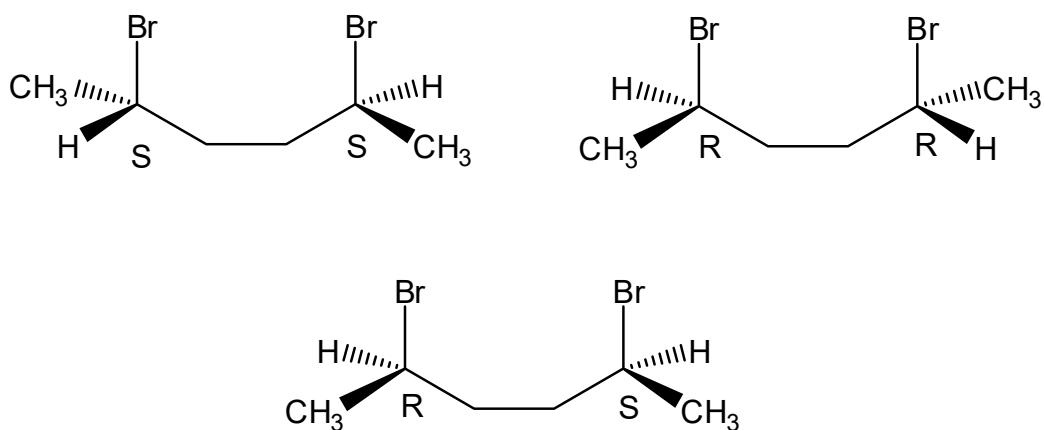
3. (15 points) Draw clear 3-dimensional structures for each of the stereoisomers of 2,5-dibromohexane. For each stereoisomer structure: 1) assign each chiral carbon in the structure as **R** or **S** and 2) label each stereoisomer structure as **chiral** or **achiral**.

3 points for each correct structure with chiral carbons unambiguously drawn

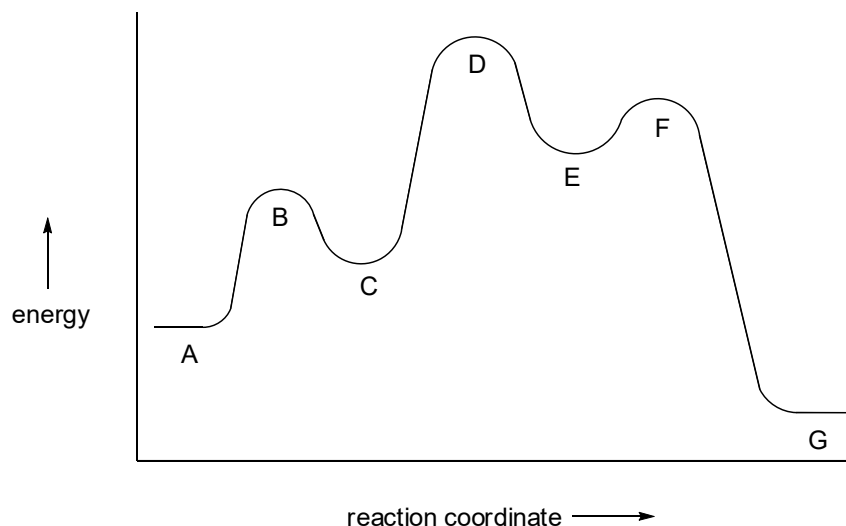
1 point for correct R/S on both chiral carbons of the structure

1 point for correct chiral/achiral molecule assignment

-2 points if student does not recognize that there are only 3 stereoisomers



4. (15 points) A reaction coordinate-energy diagram for the reaction $A \rightarrow G$ is shown.



How many steps are there in the mechanism?

3 2 points

Which of the labeled positions on the diagram correspond to intermediates?

C, E 2 points each

Which of the labeled positions on the diagram correspond to transition states?

B, D, F 2 points each

Which step is the slow (rate-determining) step in the mechanism?

Step 2 or $C \rightarrow E$ 2 points

Is the overall reaction $A \rightarrow G$ endothermic or exothermic?

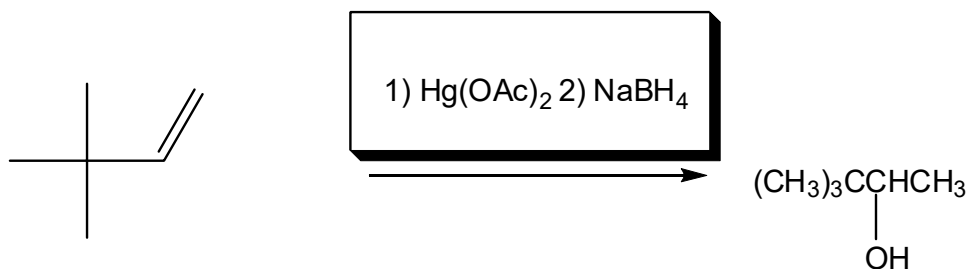
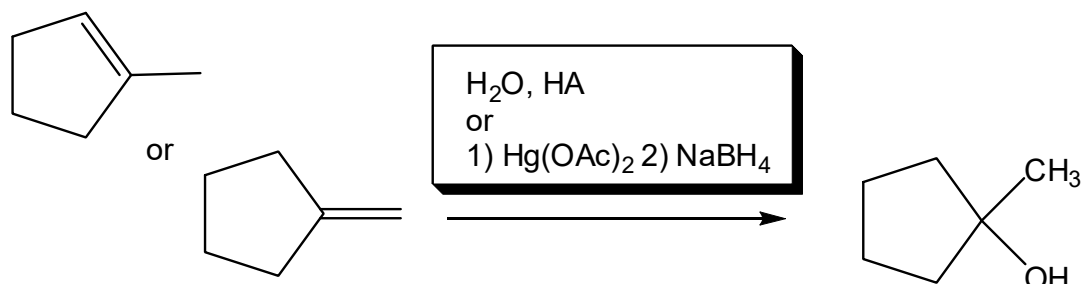
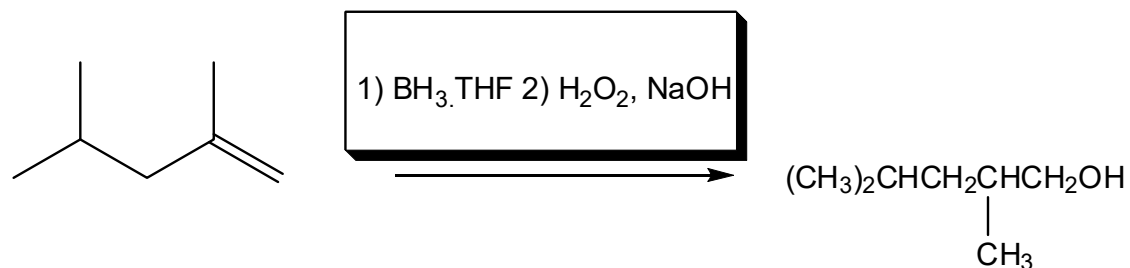
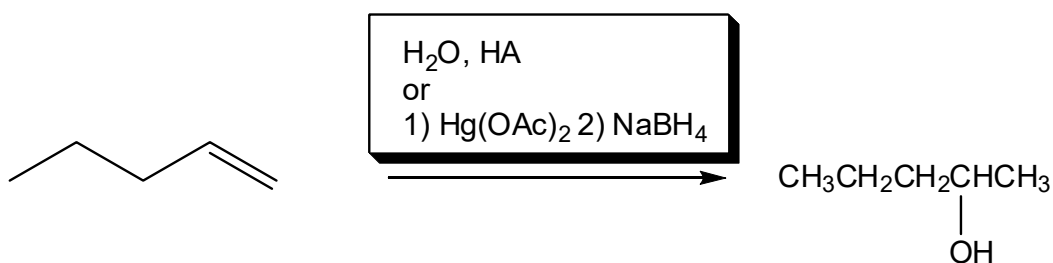
exothermic 1 point

5. (16 points) You have access to a stockroom containing many alkenes and the reagents commonly used to make alcohols from alkenes. Propose one synthesis for each alcohol (draw a structure for the alkene you will start with and fill in the necessary reagents). Your synthesis must be efficient (the desired alcohol must be **the major product**).

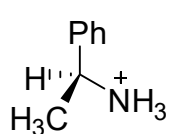
Synthesis as written would not give target alcohol as major product? No credit.

Student provides only 1 of the 2 reagents required? - 1 point

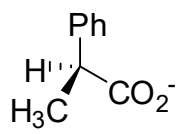
Student does not specify 1) and 2)? - 1 point



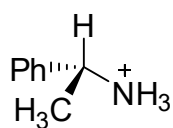
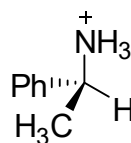
6. (10 points) Which of the salts shown below should have the **same solubility** in methanol? Explain your answer.



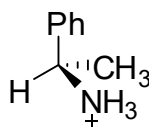
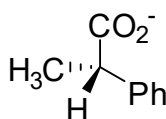
A
SS



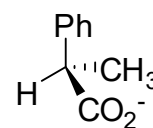
B
SR



C
RS



D
RR



This was a homework problem ([Suggested Practice Problem 6.49](#)). No partial credit.

Answer: A and D 2

B and C 2

Explanation (twenty words or less):

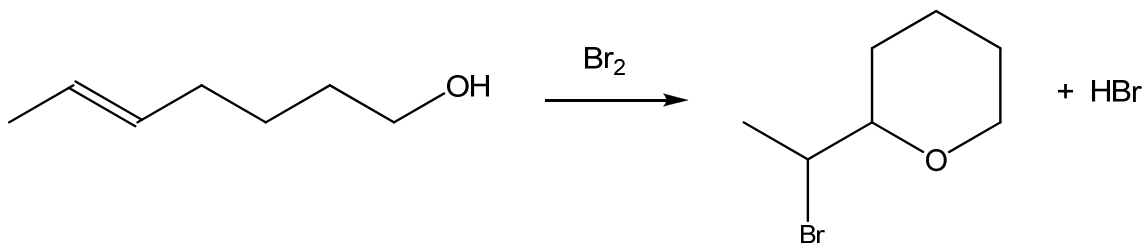
A and D are enantiomers 3

B and C are enantiomers 3

Enantiomers have the same physical properties (including solubility).

-2 for each wrong match

7. (14 points) Using your knowledge of the mechanisms of reactions studied in Chapters 4 and 5, propose a detailed mechanism for the reaction below (remember to track the movement of electrons using curved arrows as part of your mechanism).



1st intermediate 4 points
 2nd intermediate 3 points
 7 arrows 1 point each

Mechanism:

