

NAME (Print): _____

SIGNATURE: _____

**Chemistry 310N
Dr. Brent Iverson
3rd Homework
February 1, 2008**

**Please print the
first three letters
of your last name
in the three boxes**

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Score: _____

(1 pt each) Fill in each blank with the word that best completes the following descriptions of FT-NMR and MRI.

In the FT NMR method, the FT stands for _____.

The basic idea is that a short pulse using a range of radio frequencies are used to flip the spins of all of the hydrogen _____ at once. Then, the nuclear spins _____ back to the $+1/2$ spin state and when they do, they _____ electromagnetic radiation at the precise frequency at which they absorb. The _____

_____ (FT) analysis of the signals is used to derive the original frequencies characteristic of the resonance of each type of H atom in the molecule. The important advantage of the FT NMR method is that many spectra can be acquired in a short period of time. The data is averaged, greatly increasing the _____ to _____ ratio of the spectra.

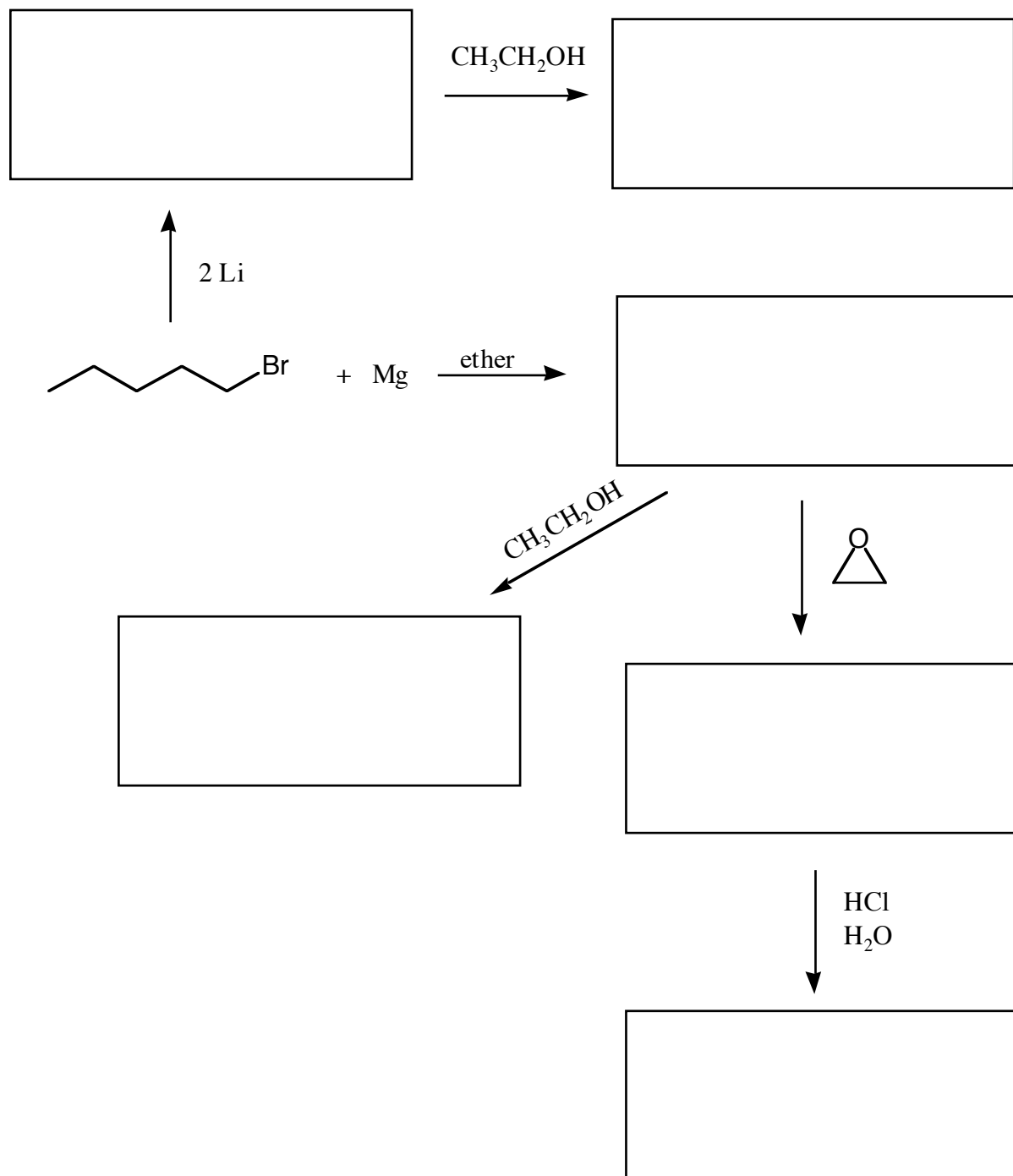
MRI stands for _____.

MRI is based on the same principles as NMR, namely the _____ (i.e. resonance) of _____ of protons by radio frequency irradiation when a patient is placed in a strong _____ field.

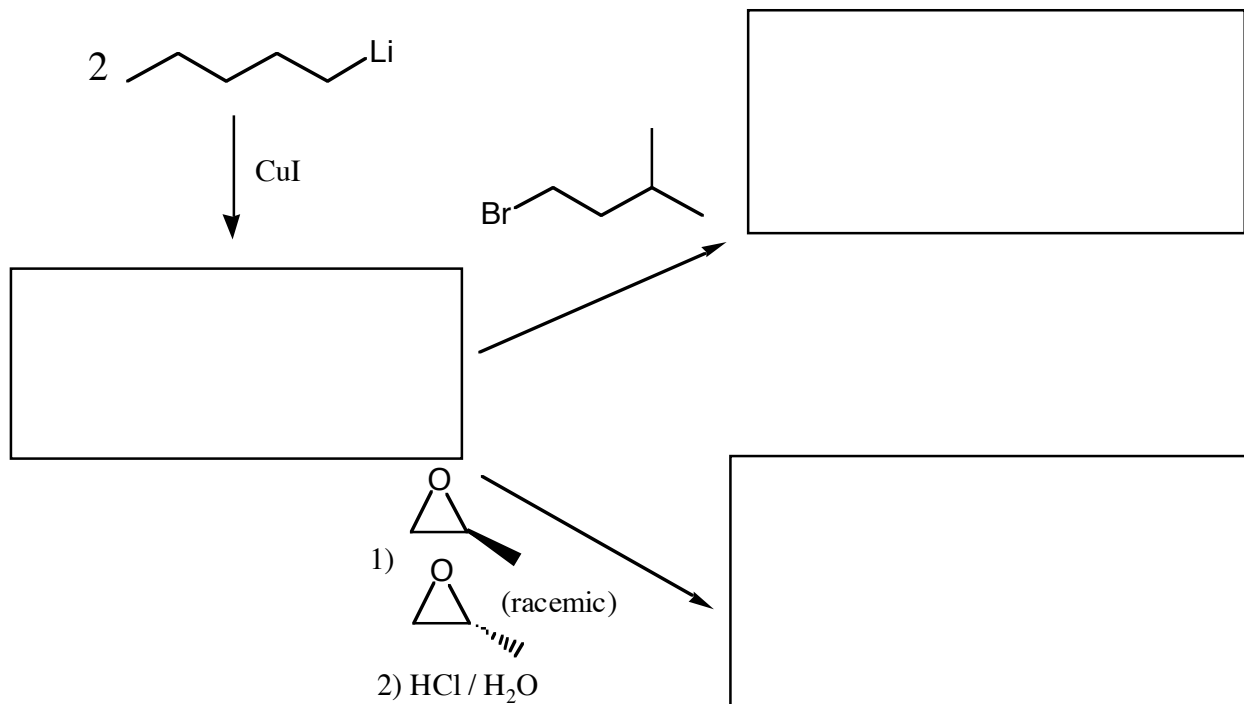
_____ gradients are used to gain imaging information, and rotation of the gradient around the _____ of the object gives imaging in an entire plane (i.e. slice inside patient).

In an MRI image, you are looking at individual _____ that when stacked make up the three-dimensional image of relative amounts of _____, especially those from _____ and _____, in the different tissues.

(3 or 5 pts each) Fill in the boxes with the structures that complete the reactions. Use wedges and dashes to indicate stereochemistry when appropriate. If a racemic mixture is formed, you must draw both enantiomers and write "racemic" next to the two structures.



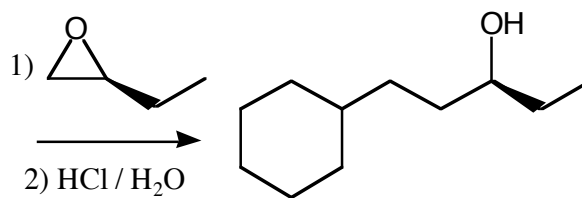
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Or



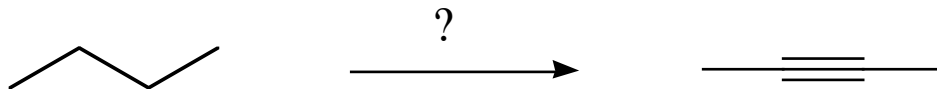
Or



These are synthesis questions. You need to show how the starting material can be converted into the product(s) shown. You may use any reactions we have learned. Show all the reagents you need. Show each molecule synthesized along the way and be sure to pay attention to the regiochemistry and stereochemistry preferences for each reaction.

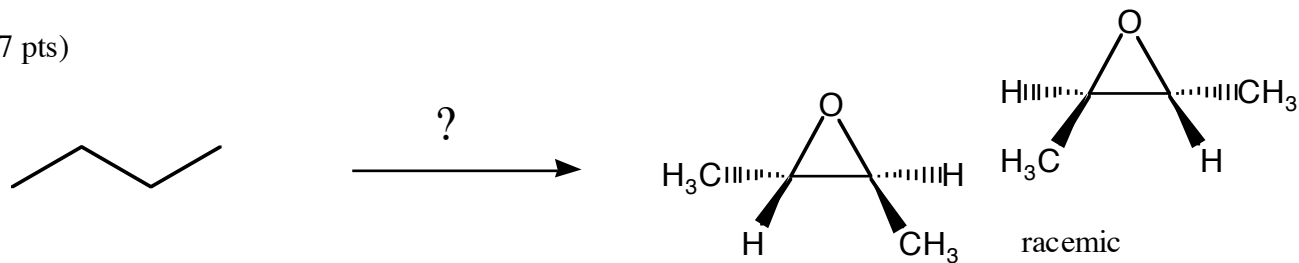
Remember, when doing synthesis problems you should 1) count carbon atoms in the product and starting material(s), 2) work backwards and 3) RECOGNIZE key features of a molecule that help you predict the reaction used to construct it.

(10 pts)



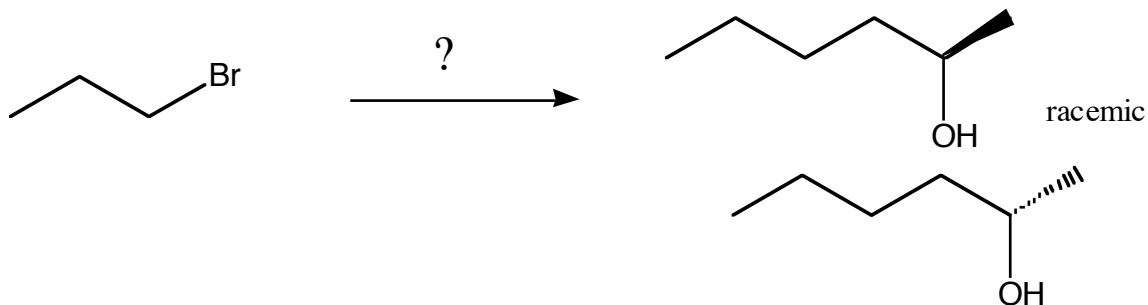
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(7 pts)



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(10 pts) **All of the carbon atoms of the products must come from the starting material for this one!**



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(12 pts) **All of the carbon atoms of the products must come from the starting materials for this one!**

