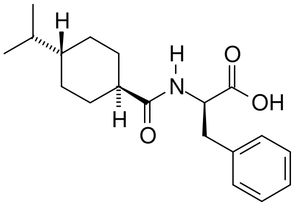
Chem 201, 2009
HW #NC2, DO NOT TURN IN, answers will be posted W, Oct 14

ANSWERS

#1. *Nateglinide* is an amino acid derivative that was marketed in Japan in 1998 as a treatment for type-2 diabetes mellitus (the compound stimulates insulin secretion from beta-cells in the pancreas).



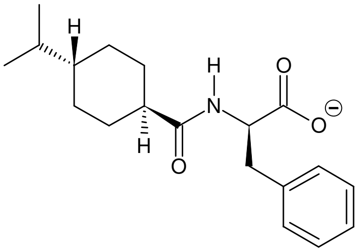
Nateglinide

a. *(6 pts)* What is the molecular formula of nateglinide?

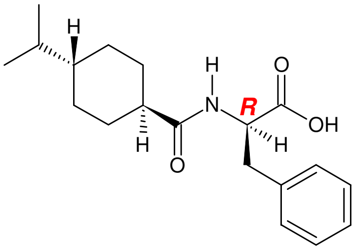
$C_{19}H_{27}NO_3$

b. *(4 pts)* Draw the form of nateglinide present in the blood stream.

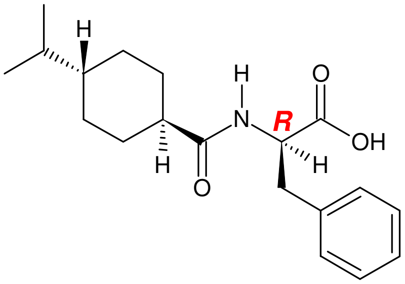
Blood pH ~7



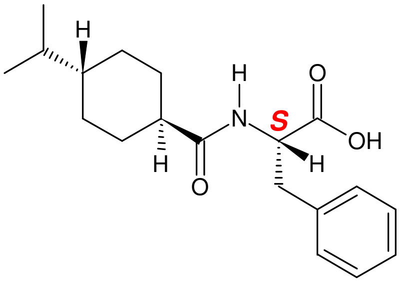
c. *(6 pts)* Label the configuration of each chirality center. How many stereoisomers of nateglinide are possible?



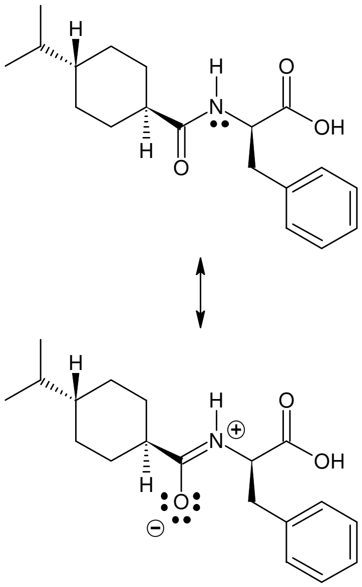
d. *(6 pts)* Nateglinide is marketed as a *racemic mixture*. Draw the compounds in this mixture

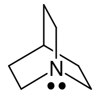


plus

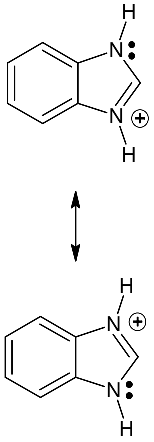


#2.



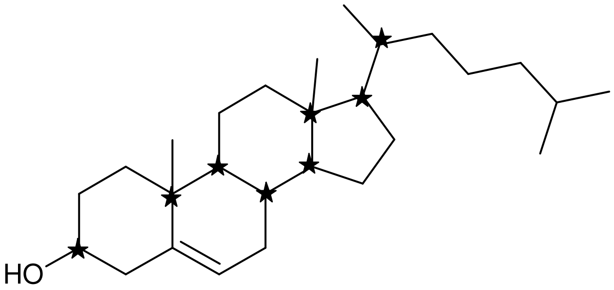


$C_7H_{13}N$
(a model might help)



#3. Loudon problems from chapter 6: 30G, 32, 38, 40, 44, 47B

30G



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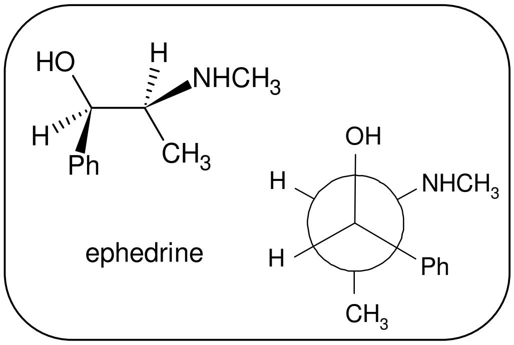
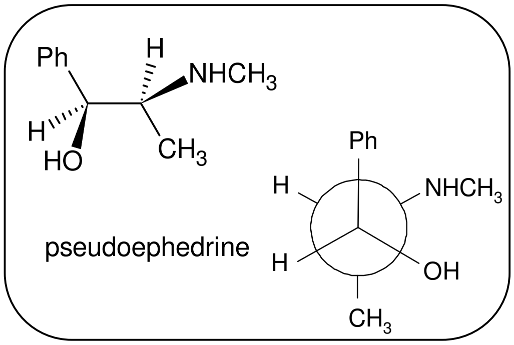
Ephedrine (*1R,2S*) and pseudoephedrine (*1S,2S*) are *diastereomers*. They cannot be enantiomers because the enantiomer of (*1R,2S*) is the (*1S,2R*) stereoisomer. Since they are diastereomers, they should have different melting points. Both will be optically active, but their specific rotations cannot be predicted.





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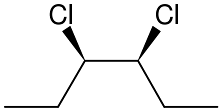
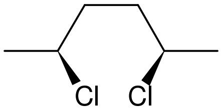
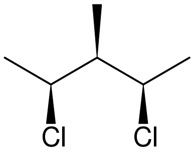
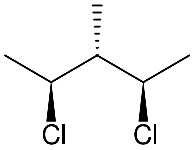
To be *meso*, at least 2 asymmetric carbons are required and the molecule must be achiral. (*I only came up with 4 isomers. Maybe you found more?*)









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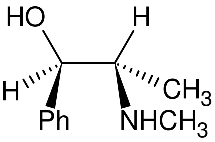
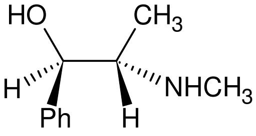
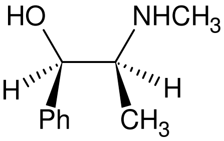
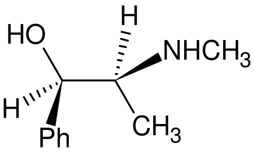
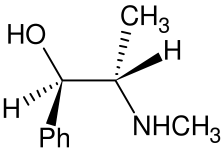
Ephedrine is a chiral molecule. Therefore, all of its conformers, staggered and eclipsed, must be chiral.

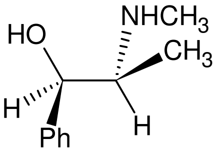












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If this sample was pure α stereoisomer, its specific rotation would be 112^{o}. If this sample was pure β stereoisomer, 18.7^{o}. The measured specific rotation is 52.7^{o} so this is a mixture of α and β stereoisomers. You can figure out the amounts of each in two ways:

- By interpolation
- By solving two equations in two unknowns, namely
    - 1 = fraction α + fraction β
    - 52.7 = 112 (fraction α) + 18.7 (fraction β)

Both approaches yield the same answer: 36.4% α + 63.6% β

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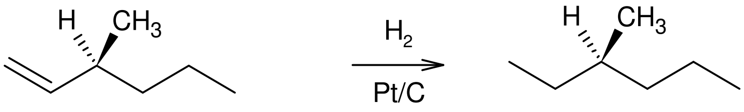
47B

The problem gives you the information shown below with one slight difference. It describes the product as the (-) enantiomer, but you can infer it is (*S*) by correlating the configuration of the asymmetric carbon from reactant to product (the asymmetric carbon doesn't participate in the reaction so its configuration is preserved).



(S)-(+)-3-methyl-1-hexene

(S)-(-)-3-methyl-1-hexane

The problem asks for the configuration of the (+) enantiomer of the product. This must be (*R*).