

ORGANIC CHEMISTRY 1 LECTURE GUIDE 2019

BY RHETT C. SMITH

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# Organic Chemistry 1 Lecture Guide 2019

By Rhett C. Smith, Ph.D.

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Companion Books from the Proton Guru:

*Organic Chemistry 1 Reactions and Practice Problems 2019*

by Rhett C. Smith

*Organic Chemistry 1 Primer 2019,*

by Rhett C. Smith, Andrew G. Tennyson, and Tania Houjeiry

## Lecture Topic III.1: Nomenclature of Alkenes

### Naming Simple Alkenes

Nomenclature of alkenes is related to that for alkanes, with modifications:

1. always designate the longest chain having

**A**  as the parent chain.

2. Number the parent chain such that the double bond

**B**

4. change the 'ane' ending of the name you would use if it were an alkane

**C**

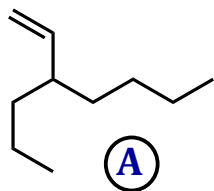
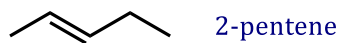
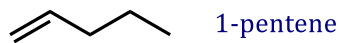
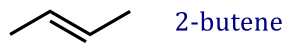
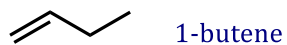
5. Tell where the double bond starts:

**D**

Notes

## Lecture Topic III.1: Nomenclature of Alkenes

### Naming Simple Alkenes

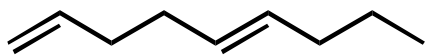


Notes

## Lecture Topic III.1: Nomenclature of Alkenes

### Alkenes with Multiple C=C or OH Units

6. If there is more than one double bond, use a “-diene”, “-triene”, etc. at the end of the name in place of the “ene”, with multiple numbers indicating where the double bonds are:

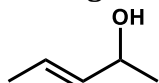


A

B

1,4,8-nonatriene

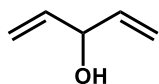
7. If an alcohol is present, it has higher priority than the, and the molecule has an “-ol” ending (with a number to tell you where the OH is!) after the “ene” suffix (change “ene” to “en”), and the **alcohol is given the lowest number**:



3-penten-2-ol

C

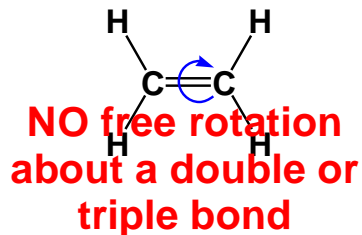
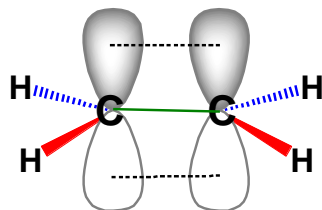
4-penten-1-ol



D

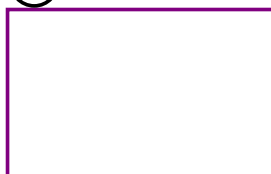
Notes

Lecture Topic III.1: Nomenclature of Alkenes  
Configurational Isomerism in Disubstituted Alkenes



(A)

(B)



**cis-alkene**

(C)

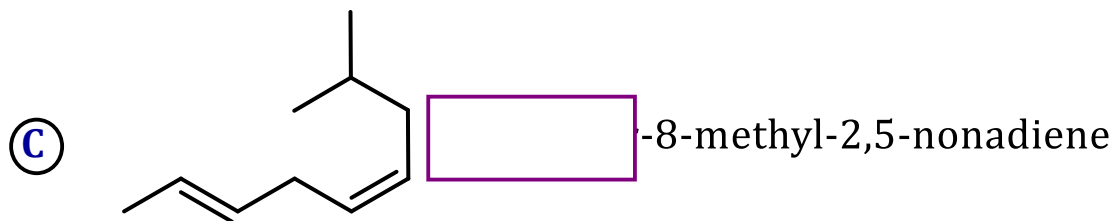
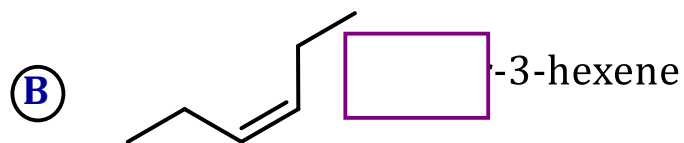
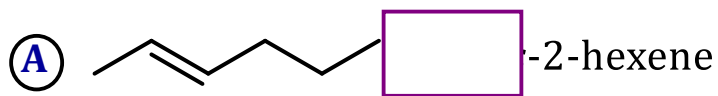


**trans-alkene**

As we saw for cycloalkanes, when we have two configurational isomers, the one with two substituents on the same side is the *cis* isomer; the one with substituents on opposite sides is the *trans* isomer. The same holds for alkenes which have **TWO** non-hydrogen substituents.

Notes

Lecture Topic III.1: Nomenclature of Alkenes  
Configurational Isomerism in Disubstituted Alkenes



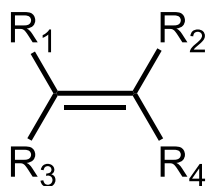
(D)

Notes

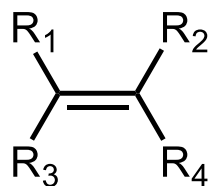
## Lecture Topic III.1: Nomenclature of Alkenes

### What about Trisubstituted and Tetrasubstituted Alkenes?

Cis?



Trans?



(A)

We must decide which is the “higher priority” substituent on each C of the C=C unit:

(B)

(C)

Notes



## Lecture Topic III.1: Nomenclature of Alkenes

### E- and Z- Labels of Configuration

For tri- or tetra-substituted alkenes we use *E*- (from German 'entgegen', opposite) or *Z*- (from German 'zusammen', together) notation. We prioritize units using CIP conventions (See **Topic I.20**)

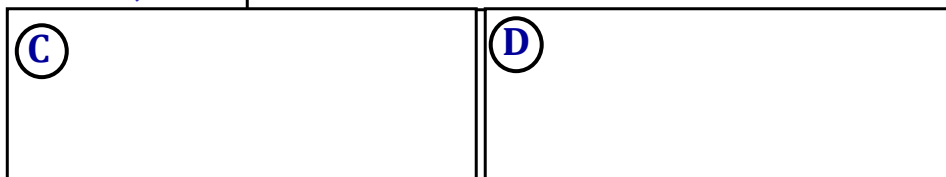
If the two **highest priority groups** (are

on same side, then

(A)

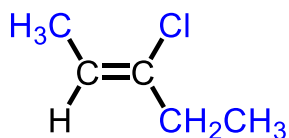
opposite sides, then

(B)



Z-isomer

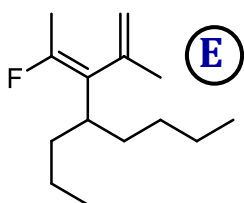
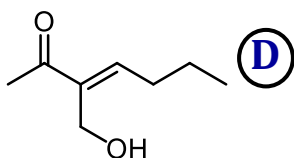
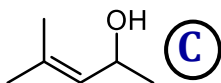
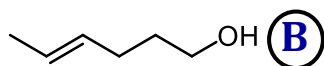
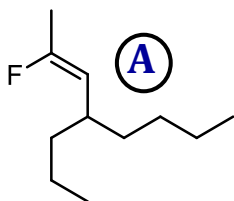
E-isomer



(E)

Notes

**Example.** Designate each double bond as *E*- or *Z*-.



Notes