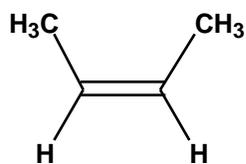
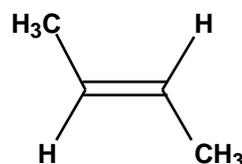


Text Related to Segment 7.08 ©2002 Claude E. Wintner

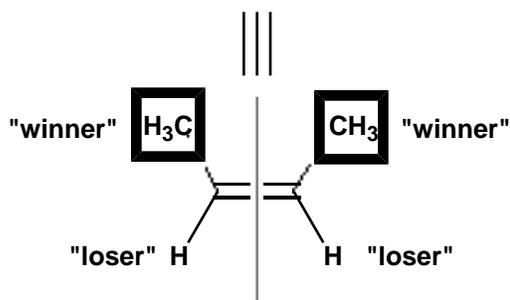
In *cis*- and *trans*-1,2-dideuterioethylene we have seen already that properly substituted ethenes can exist in distinct isomeric forms, separated by an energy barrier of some 65 kcal/mole. These *cis* and *trans* isomers, sharing the same constitution, are by our previous definitions configurational (separated by a *high* energy barrier) diastereoisomers, that is, configurational stereoisomers that are *not* enantiomeric. Similarly, 1,2-dimethylethene, properly named 2-butene, exists in *cis* and *trans* forms, as in the figure below. The many instances of ambiguity inherent in the *cis*, *trans* nomenclature as soon as the structures become somewhat more complex are easily resolved by use of the C-I-P sequence rules developed previously. One simply writes out the groups of a 1,2-disubstituted ethene and, using the sequence rules, finds a "winner" at each carbon atom of the double bond (that is, on each side of the dotted line, as shown in the figure). If the two "winners" appear on the same side, the double bond is described *Z* (*German: zusammen* = "together"); if the "winners" appear on opposite sides, the double bond is described *E* (*German: entgegen* = "opposite"). Thus, *cis*-2-butene is *Z*-2-butene and *trans*-2-butene is *E*-2-butene. Of more interest, the next case rendered in the figure is *E*-5-ethyl-4,8-dimethyl-4-nonene, since the propyl group "beats" the methyl group and the isopentyl group "beats" the ethyl group by the sequence rules. (The longest chain is nine carbons, hence a nonene. The double bond runs from position 4 to position 5, counted to keep the numbers lowest, hence a 4-nonene. Ethyl precedes methyl alphabetically.) Note that *Z*, *E* do *not* necessarily coincide with *cis*, *trans*; it is not difficult to find counterexamples. As a case in point, *cis*-2-bromo-2-butene is *E*-2-bromo-2-butene and *trans*-2-bromo-2-butene is *Z*-2-bromo-2-butene. Although the *cis*, *trans* nomenclature continues to enjoy wide current acceptance, the *E*, *Z* usage is unambiguous and preferred.



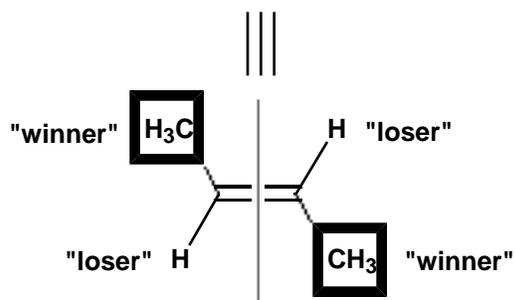
cis-2-butene



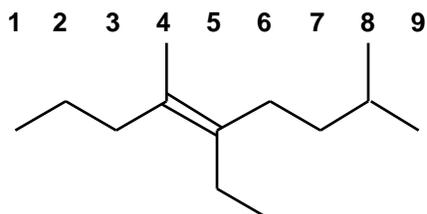
trans-2-butene



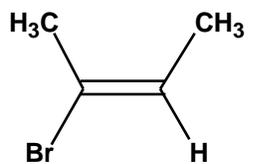
Z-2-butene



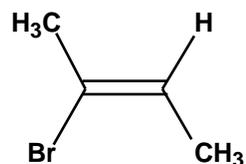
E-2-butene



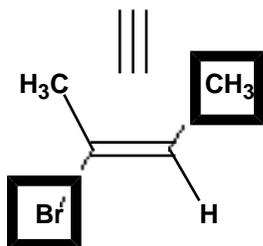
E-5-ethyl-4,8-dimethyl-4-nonene



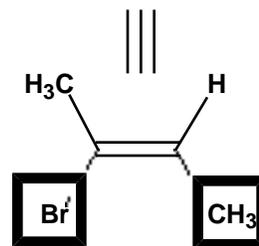
cis-2-bromo-2-butene



trans-2-bromo-2-butene



E-2-bromo-2-butene



Z-2-bromo-2-butene

nomenclature of 1,2-disubstituted ethenes