

Problems discussed in the videos:

Video (2)

44. The isolation of a new form of molecular carbon,  $C_{60}$ , was reported in 1990. The substance has the shape of a soccer ball of carbon atoms and possesses the nickname “buckyball” (you don’t want to know the IUPAC name). Hydrogenation produces a hydrocarbon with the molecular formula  $C_{60}H_{36}$ . How many degrees of unsaturation are present in  $C_{60}$ ? In  $C_{60}H_{36}$ ? Does the hydrogenation result place limits on the numbers of  $\pi$  bonds and rings in “buckyball”?

Videos (2) – (3)

46. Write the structures of as many simple alkenes as you can that, upon catalytic hydrogenation with  $H_2$  over Pt, will give as the product (a) 2-methylbutane; (b) 2,3-dimethylbutane; (c) 3,3-dimethylpentane; (d) 1,1,4-trimethylcyclohexane. In each case in which you have identified more than one alkane as an answer, rank the alkenes in order of stability.

Video (3)

64. What is the empirical formula? (Compound drawn on blackboard in video.)

65. What is the degree of unsaturation in cyclobutane?

Video (4)

66. What is the IUPAC name? (Compound drawn on blackboard in video.)

28. The bicyclic alkene car-3-ene (drawn on blackboard in video), a constituent of turpentine, undergoes catalytic hydrogenation to give only one of the two possible stereoisomeric products, with the methyl group and the cyclopropane ring on the same face of the cyclohexane ring. Suggest an explanation for this stereochemical outcome.

Videos (4) – (5)

29. Give the expected major product of catalytic hydrogenation of each of the following alkenes (drawn on blackboard in videos). Clearly show and explain the stereochemistry of the resulting molecules.

Video (5)

30. Would you expect the catalytic hydrogenation of a small-ring cyclic alkene such as cyclobutene to be more or less exothermic than that of a cyclohexene? (Hint: Which has more bond-angle strain, cyclobutene or cyclobutane?)

Videos (6) – (8)

32. Give the product of addition of  $Br_2$  to each alkene. Pay attention to stereochemistry. (a) 1-hexene; (b) 2-methyl-1-pentene; (c) 2-methyl-2-pentene; (d) (Z)-3-hexene; (e) cyclohexene

Video (9)

34. Give the reagents and conditions necessary for the following transformation:  
cyclohexanol  $\rightarrow$  cyclohexene