

- 6 1. Give the structural formulas for:

*trans*-3,4-dimethyl-3-hexene

(*Z*)-3-chloro-4-methyl-3-hexene

(*S*)-*trans*-4-methyl-2-hexene

- 14 2. Give names and structures for the major product expected from reaction of 2-methylpropene:

H<sub>2</sub>, Pt →

Br<sub>2</sub> →

HBr →

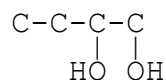
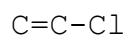
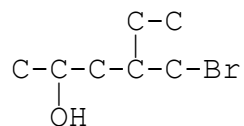
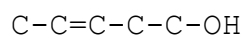
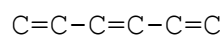
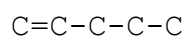
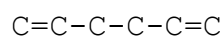
HBr (+peroxides) →

H<sub>2</sub>O, H<sup>+</sup> →

Cl<sub>2</sub> + water →

O<sub>3</sub> →

- 14 3. Name the following compounds using IUPAC (or accepted common names) nomenclature:



- 6 4. Account for the fact that addition of HBr, in the presence of peroxides, takes place faster with 2-ethyl-1-hexene than with 1-octene.
- 6 5. Define *anti* and *syn* addition. Show the reaction mechanism by which Br<sub>2</sub> (in CHCl<sub>3</sub>) adds to propene. Show the bromonium ion reaction intermediate. Explain why this reaction uses the *anti* or the *syn* mechanism. If this reaction were performed in water, instead of the organic solvent above, show the structure of the halohydrin product.

- 6 6. E2 elimination requires strong base, but E1 does not. Show the mechanism by which either type of elimination occurs.
- 8 7. Draw the structure for each product listed below. Then, show the alkene that could be used to produce these products. Show any other reagents necessary for reaction to occur.

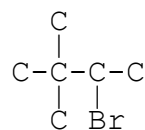
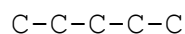
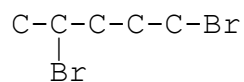
*t*-butyl alcohol

isobutyl bromide

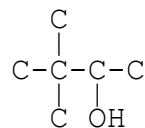
1-chloro-2-methyl-2-butanol

- 6 8. Show how hydroboration is used to produce a primary alcohol from propene. Include all required reactants and reaction mechanism.

- 12 9. Show the major product of E2 or E1 elimination (dehydrohalogenation or dehydration) of:



3-bromo-2-methylpentane



4-bromo-2-methylpentane

- 6 10. (i) Starting with 2-propanol, show the reaction mechanism for the acid-catalyzed formation of a carbocation and formation of propene. (ii) Show the major alkene product of E1 elimination of 3-methyl-2-butanol and of 3,3-dimethyl-2-butanol.
- 6 11. Starting with  $\text{Cl}_2$  and butane, show the reaction mechanism for the free radical halogenation reaction. Show structures of the two isomers possible. Which product is the preferred product, and why?
- 4 12. Give the definition of an acid *and* a base using the Lewis definition.
- 6 13. Starting with 2-butanol, show the different alkene products you can expect. Which of these products is the major product? Then, show the relative stability of these products.