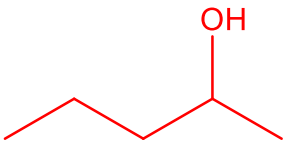
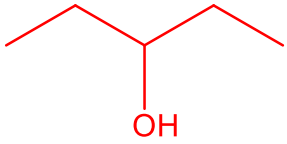
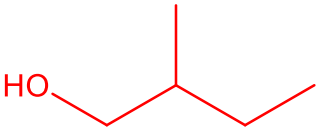
Problem Set 5 – Alcohol synthesis

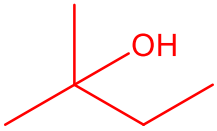
1. There are eight alcohols of formula $C_5H_{11}OH$.

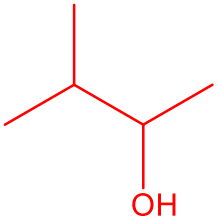
    a. Draw the structures of these alcohols.

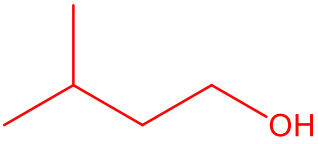


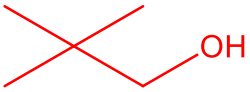




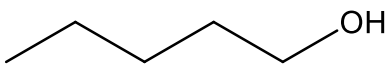




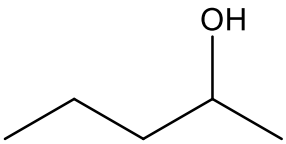




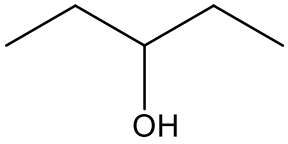
    b. Name them using IUPAC convention.



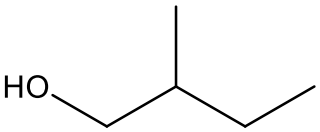
1-pentanol



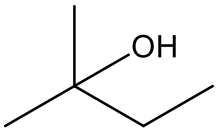
2-pentanol



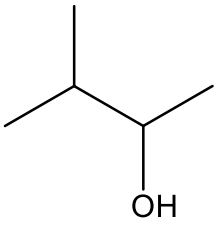
3-pentanol



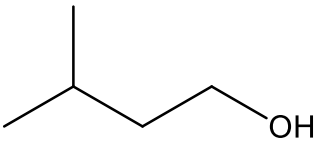
2-methyl-1-butanol



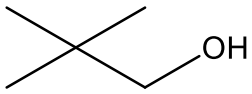
2-methyl-2-butanol



3-methyl-2-butanol

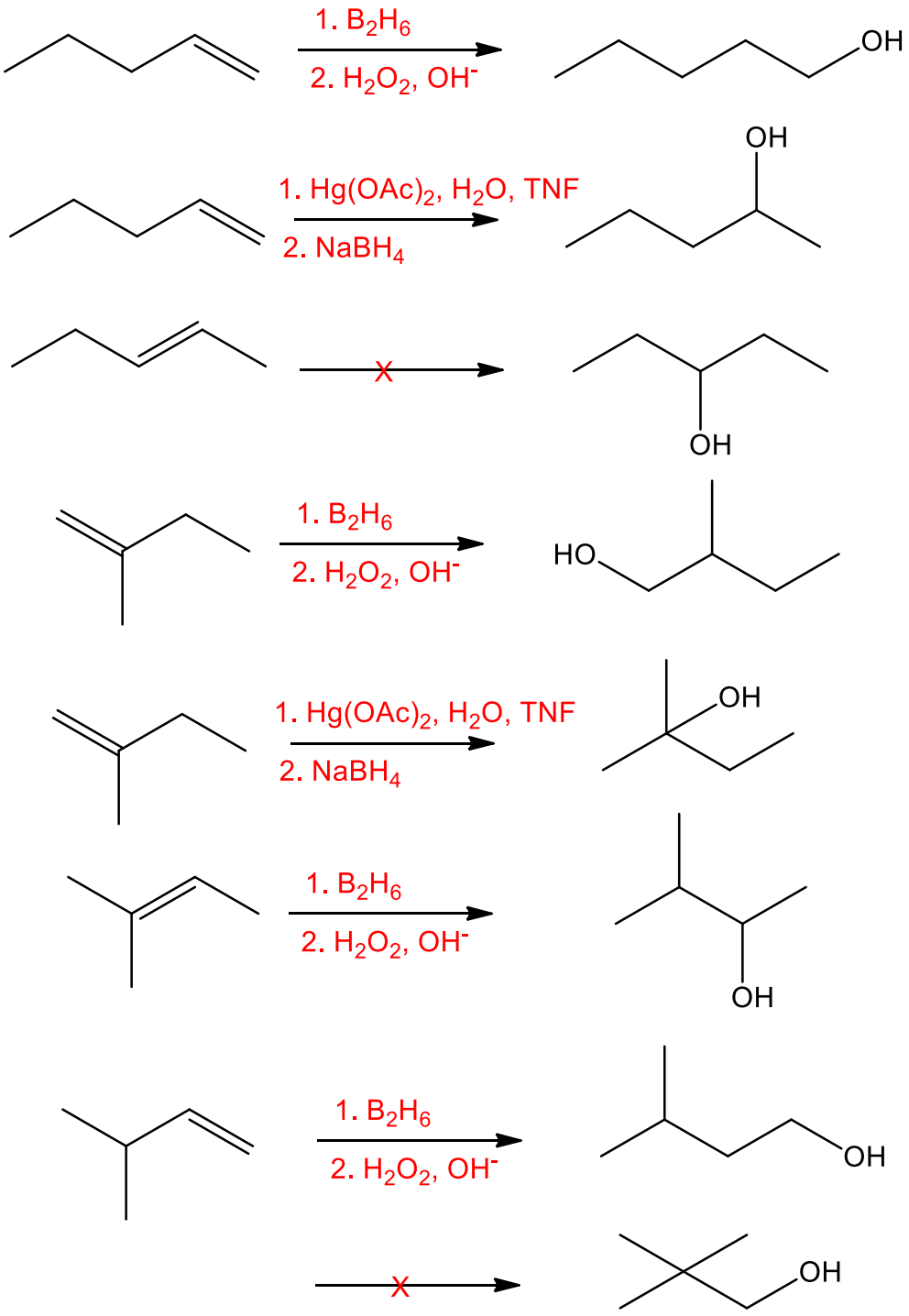


3-methyl-1-butanol

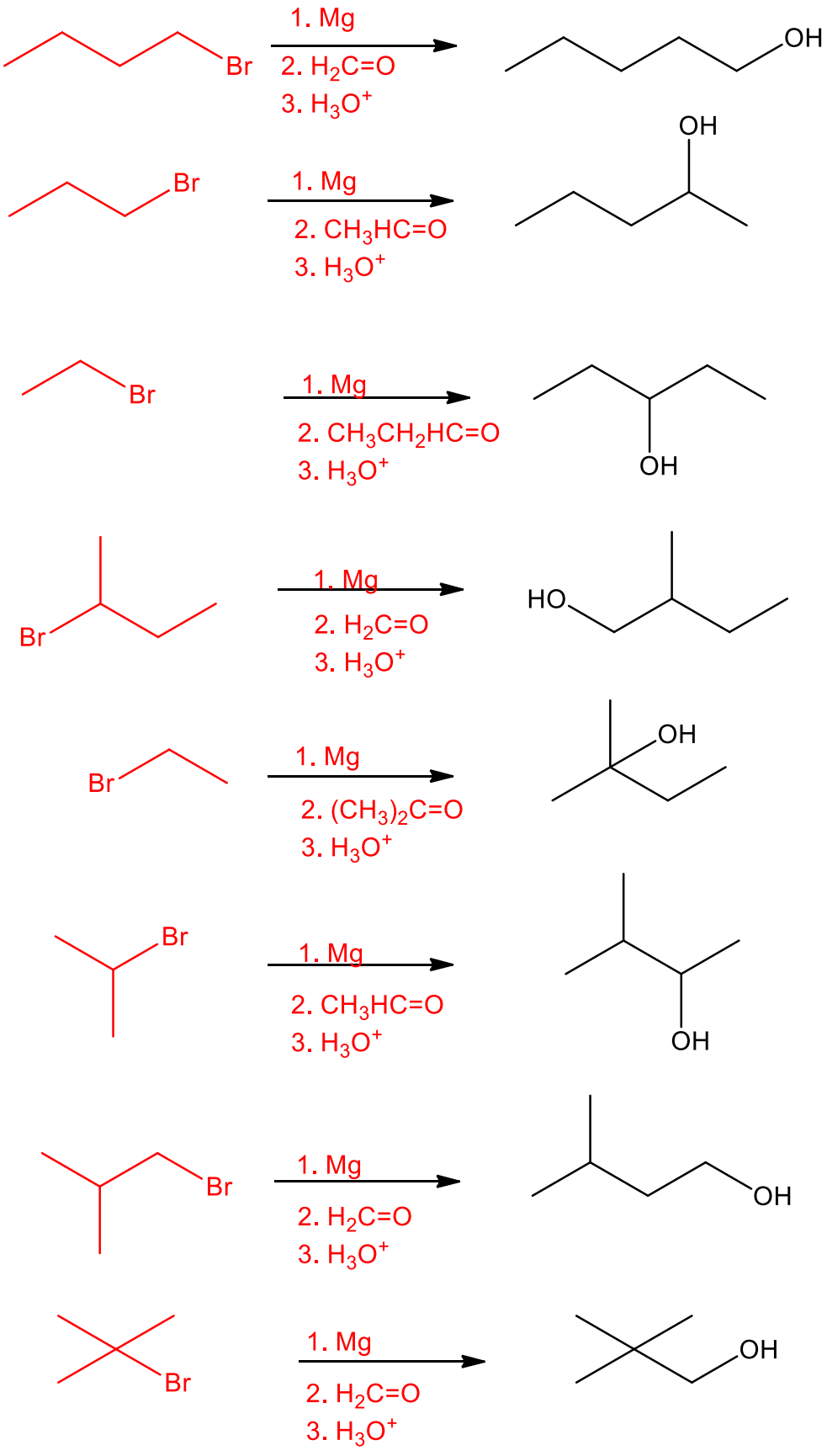


2,2-dimethyl-1-propanol

c. Consider the possible synthesis of the alcohols by oxymercuration-demercuration and hydroboration. If possible for each alcohol select an alkene from which it could be made in pure form and the appropriate synthetic method to convert the alkene into the desired alcohol.

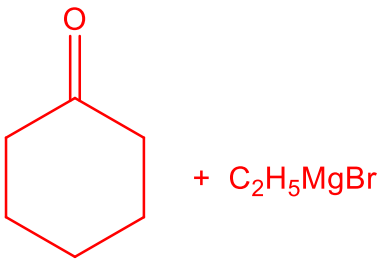


d. Give the structure of a Grignard reagent and of an aldehyde, ketone, or oxacyclopropane that would react to form each of the eight alcohols.

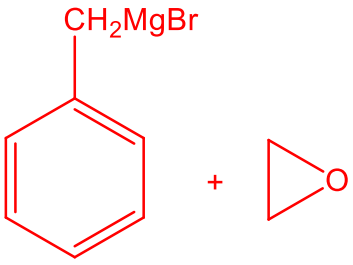

Br
1. Mg
2. H2C=O
3. H3O+
OH
Br
1. Mg
2. CH3HC=O
3. H3O+
OH
Br
1. Mg
2. CH3CH2HC=O
3. H3O+
OH
Br
1. Mg
2. H2C=O
3. H3O+
HO
Br
1. Mg
2. (CH3)2C=O
3. H3O+
OH
Br
1. Mg
2. CH3HC=O
3. H3O+
OH
Br
1. Mg
2. H2C=O
3. H3O+
OH
Br
1. Mg
2. H2C=O
3. H3O+
OH

2. Give the structure of a Grignard reagent and of an aldehyde, ketone, or oxacyclopropane that would react to form the following alcohols:

   a. 1-ethylcyclohexanol



   b. 3-phenyl-1-propanol



   c. 3-phenyl-3-pentanol