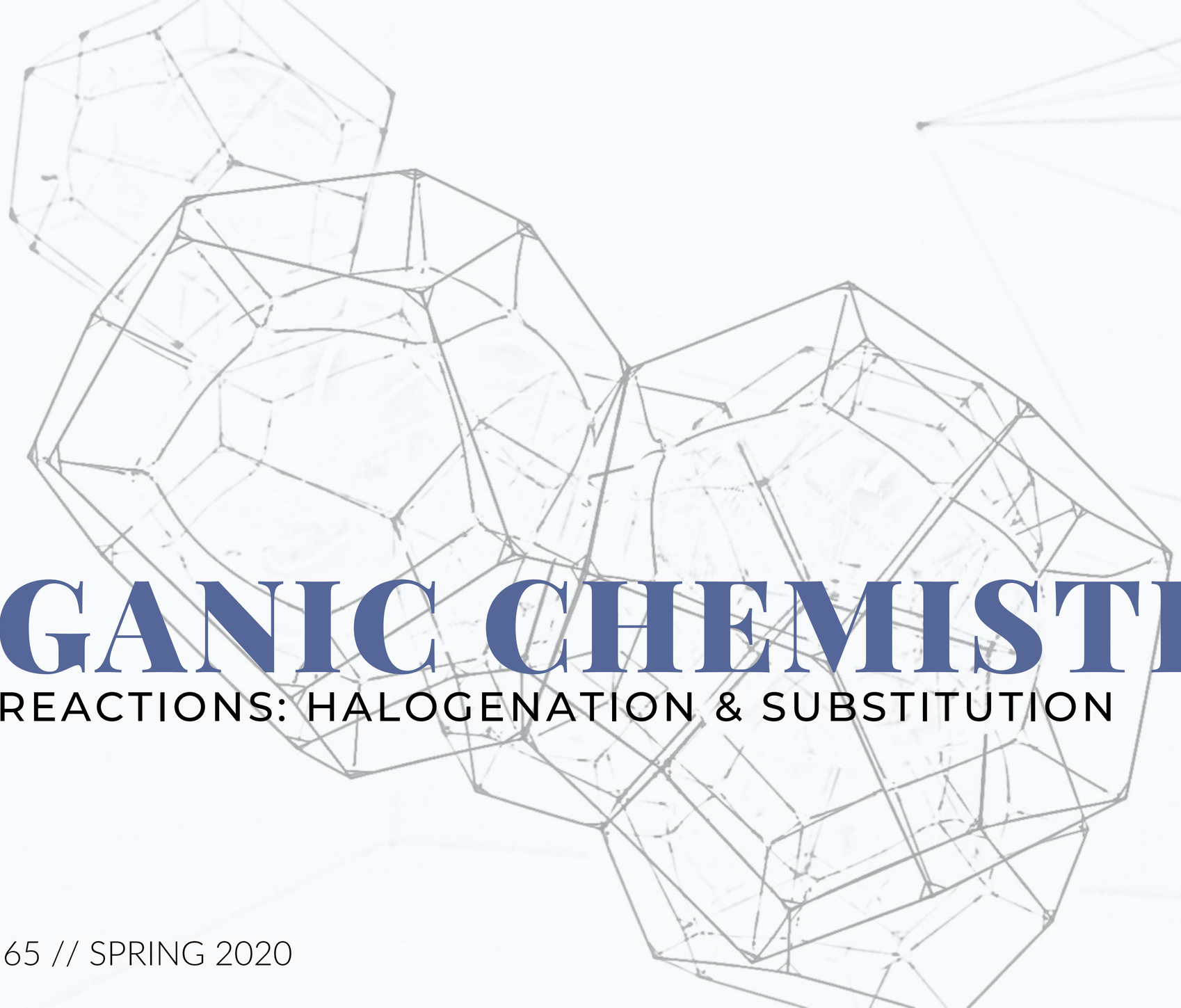


# ORGANIC CHEMISTRY

## ALKANE REACTIONS: HALOGENATION & SUBSTITUTION

CHEMISTRY 165 // SPRING 2020

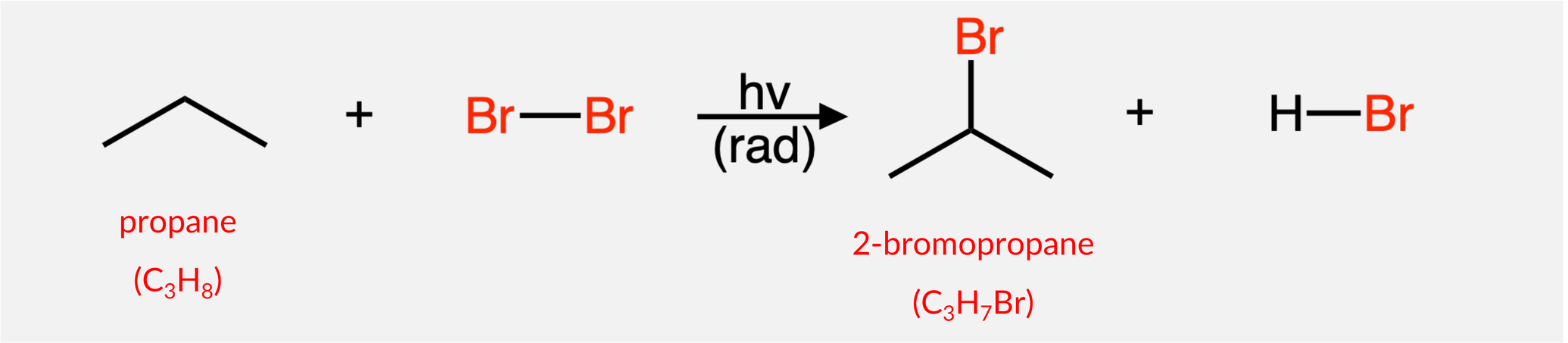
DR. MIOY T. HUYNH | 2020

# Alkane radical halogenation

This reaction requires an alkane, a halogen $X_2$ ($Br_2$, $F_2$, $I_2$, $F_2$), and some radiation/photons (*E* = hv).

Reaction: substitute a hydrogen atom (H) with a halogen atom (X).

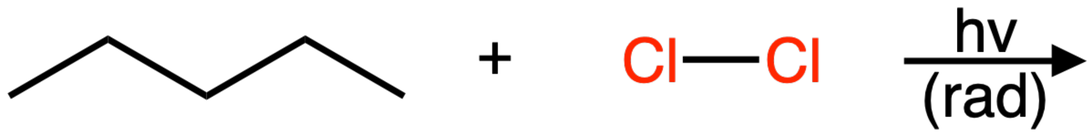
Product: the halogen atom (X) attaches to the most substituted carbon atom.

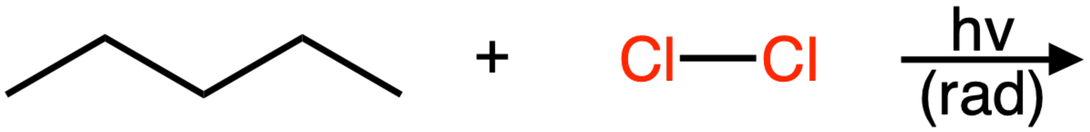


# PRACTICE PROBLEM 1

What are the unique products for the radical halogenation of pentane with $Cl_2$ and UV radiation.

*— answer —*



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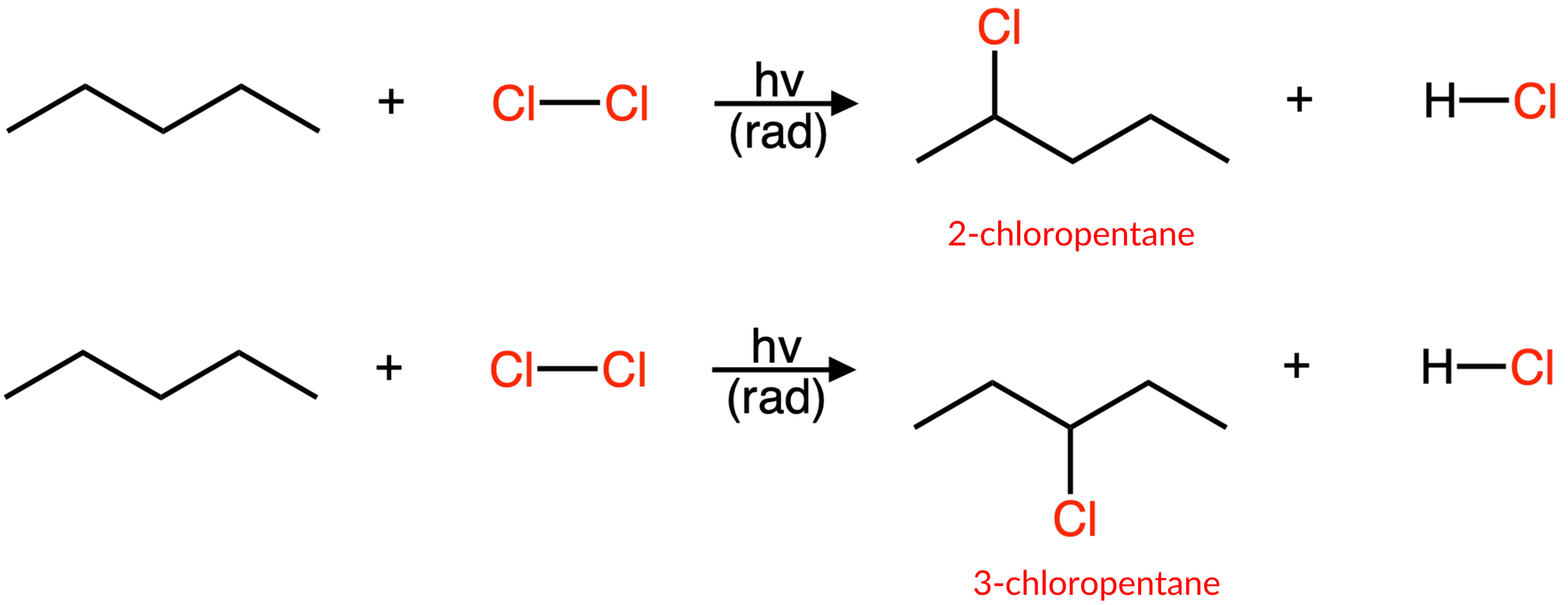


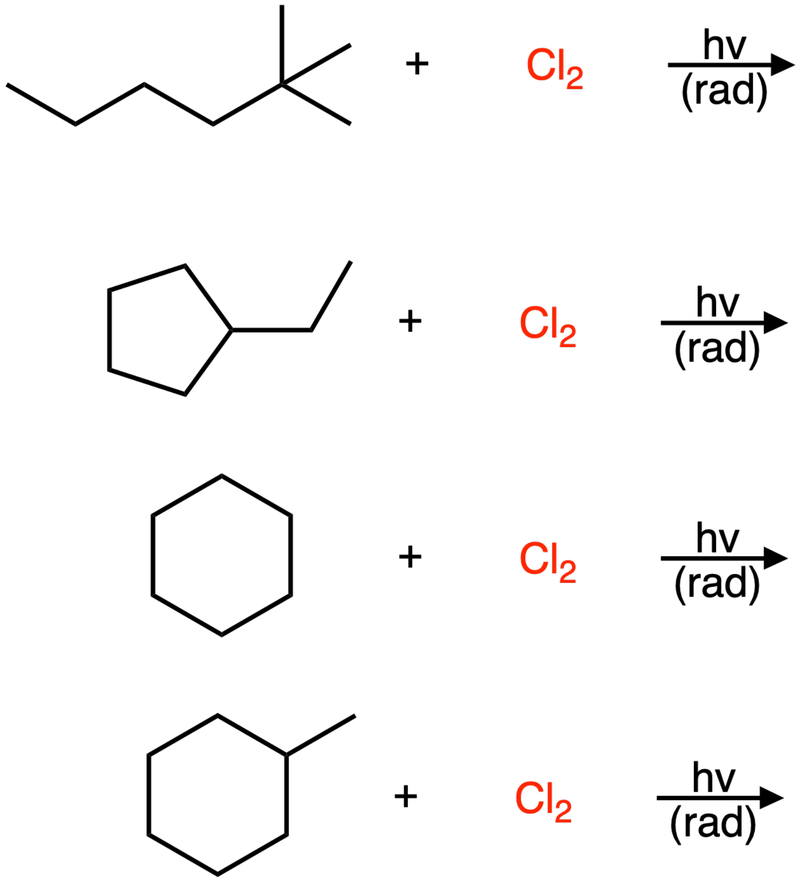

Q: Which of the two products of the reaction above contains a chiral center?

A: 2-chloropentane because C2 is chiral.

# PRACTICE PROBLEM 2

Give the product(s) for the following alkane radical halogenation reactions.

*— answer —*



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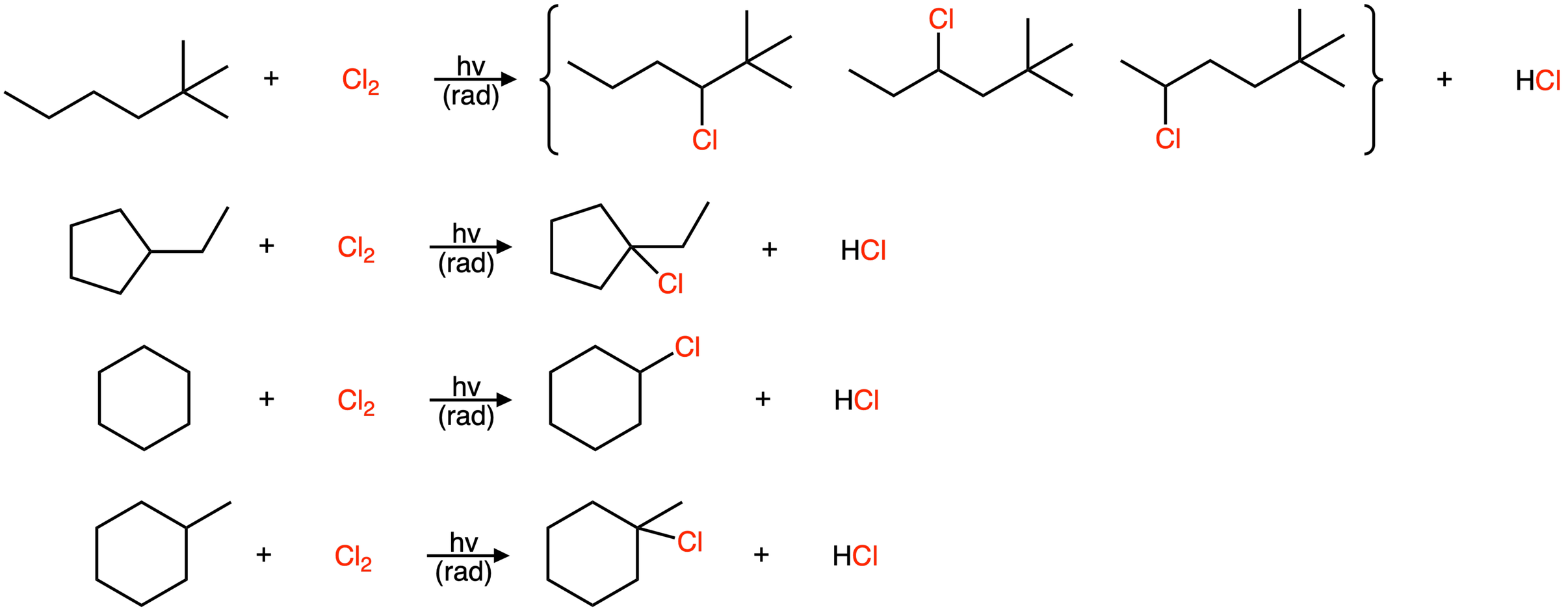


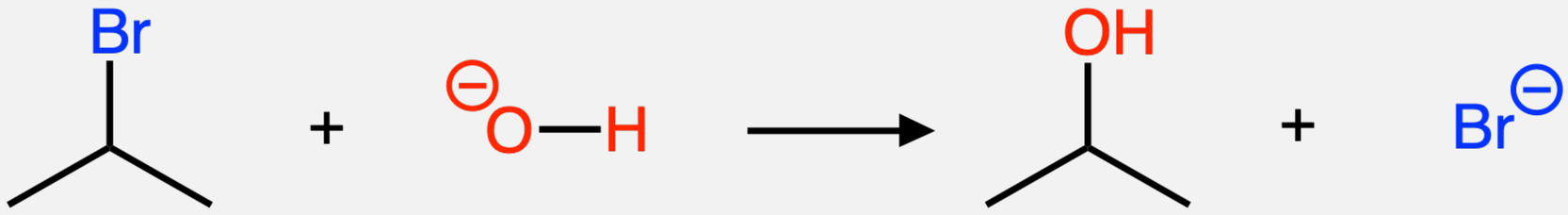
# Nucleophilic substitutions ($S_N$)

This reaction requires an electrophile on the alkylhalide and a nucleophile.

Nucleophile: a group that is electronegative (negatively charged, an anion, a lone pair, etc.)

Electrophile: a group that is electron-deficient (positively charged, a cation, etc.)

Reaction: substitute an electrophile with a nucleophile on an alkylhalide ($C_XH_YX$, where X = F, Cl, Br, I).



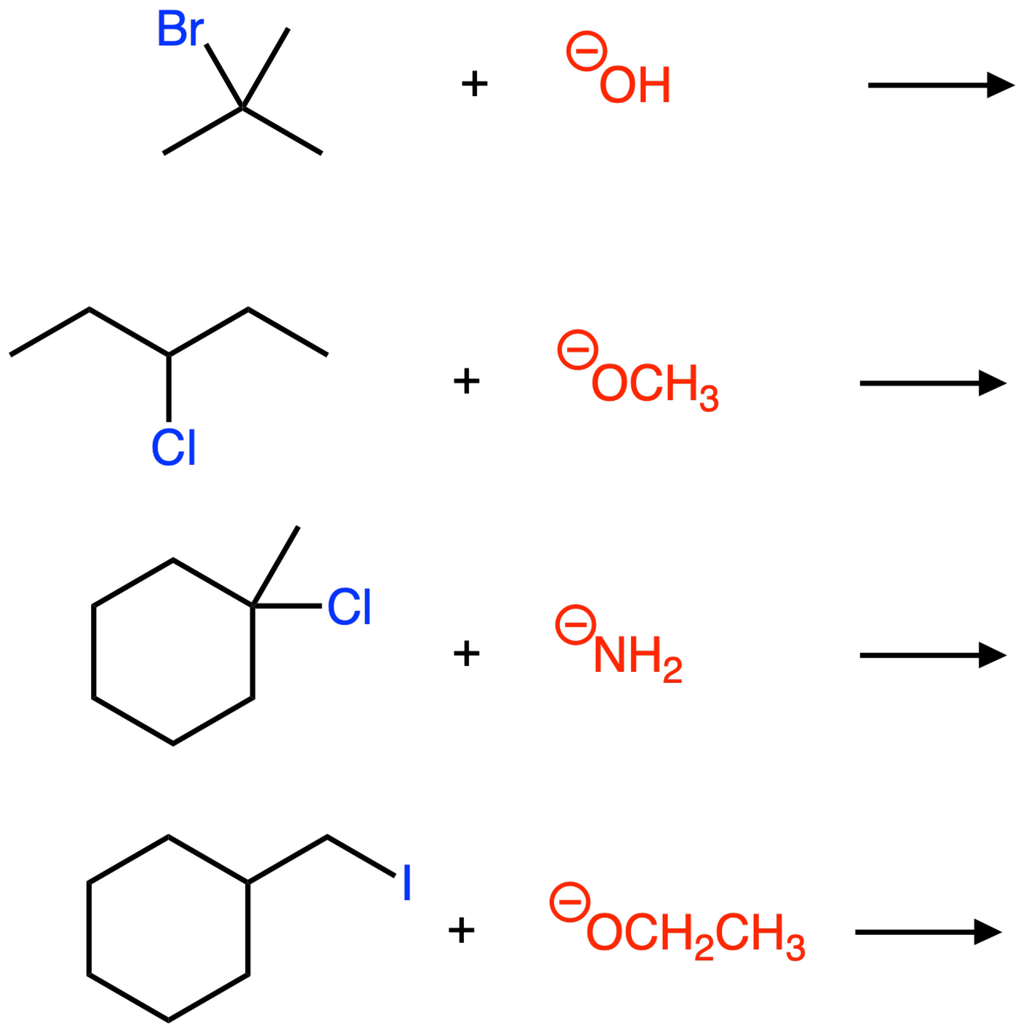

2-bromopropane ($C_3H_7Br$)

2-propanol ($C_3H_7OH$)

# PRACTICE PROBLEM 3

Give the products for the following nucleophilic substitution reactions.

*— answer —*



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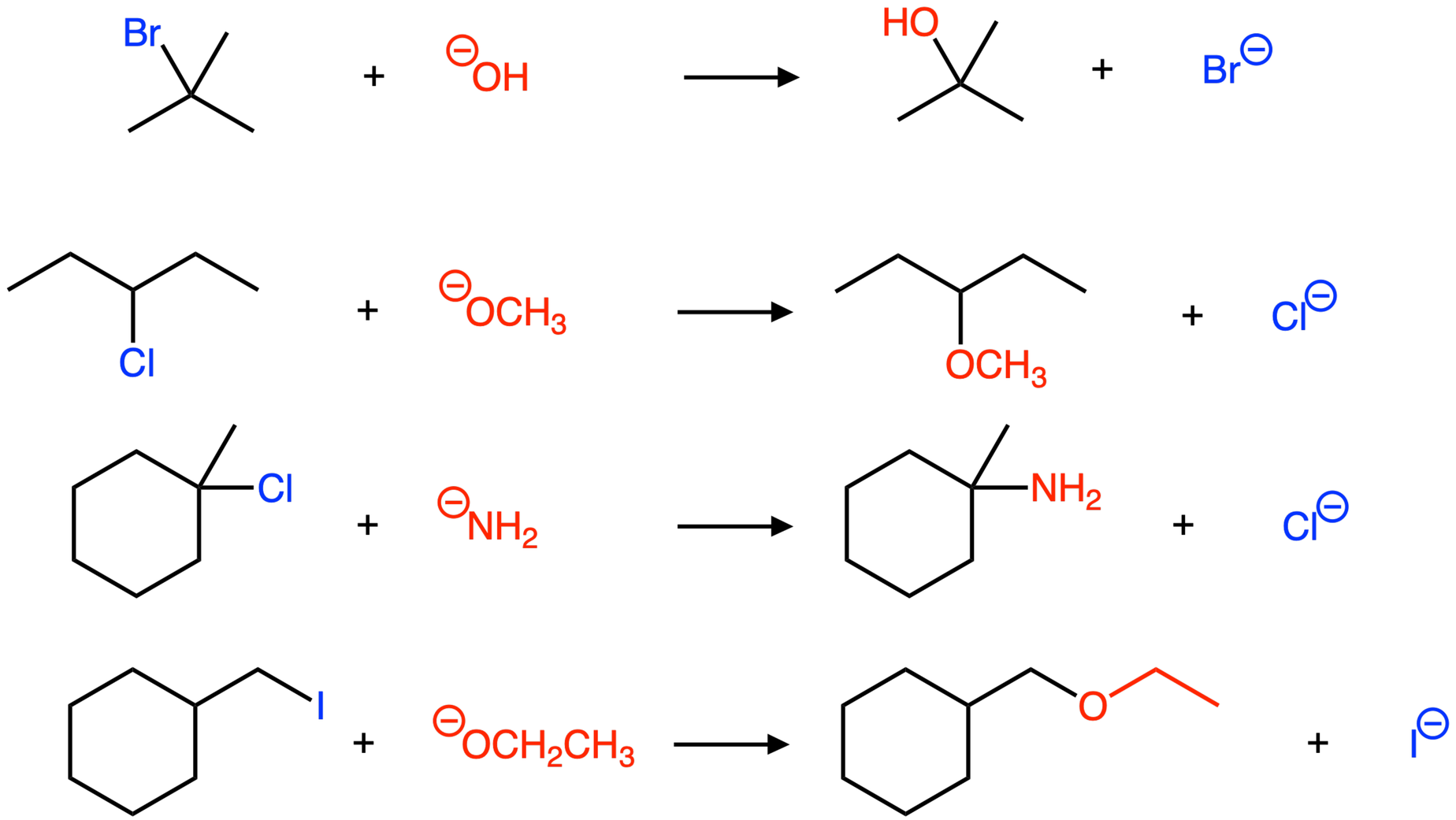

# PRACTICE PROBLEM 4

Fill in the red blank squares with the correct reagents or products to make 2-methylhexan-2-ol from 2-methylhexane.

*— answer —*

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