



Alkanes: Introduction

UCI Chem 51A
Dr. Link

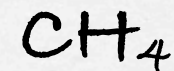
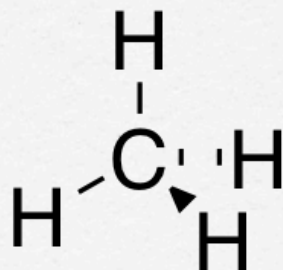
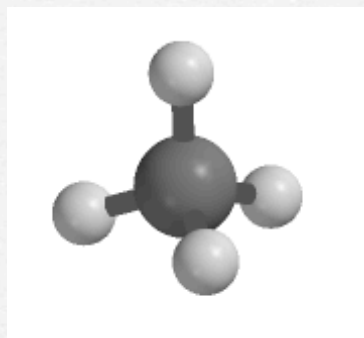
Goals

- After this lesson you should be able to:
 - Identify and name alkanes
 - Predict reactions of alkanes

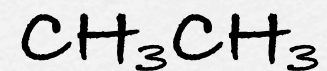
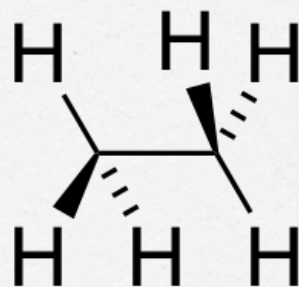
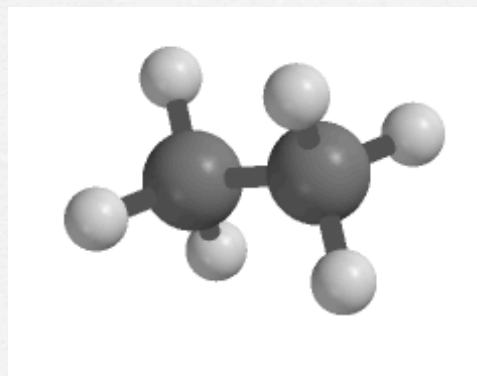
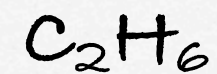
Fundamental Hydrocarbons

- Alkanes: simplest hydrocarbons, all σ bonds
- Acyclic & Cyclic

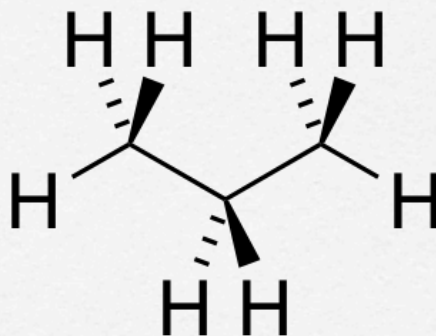
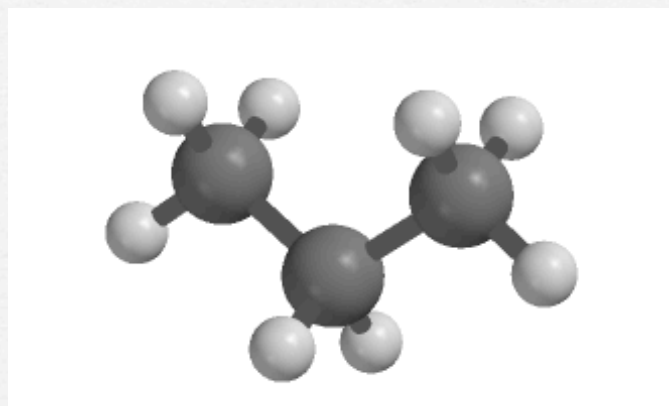
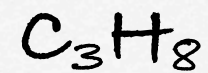
1 Carbon: Methane



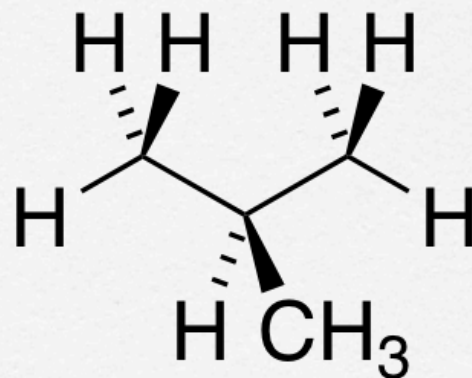
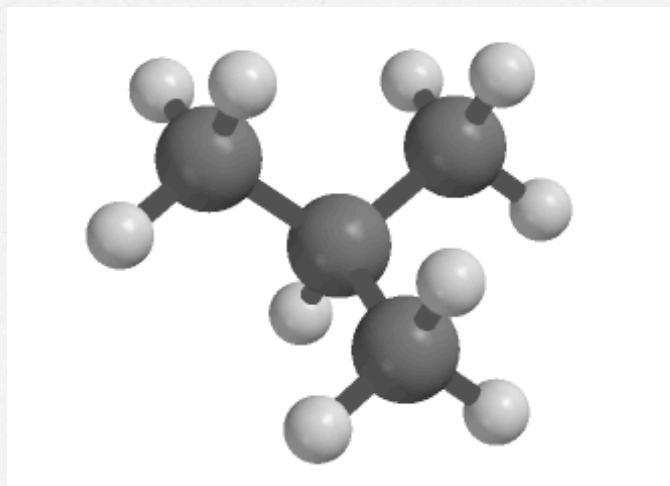
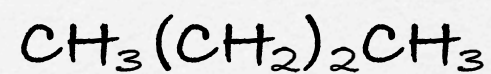
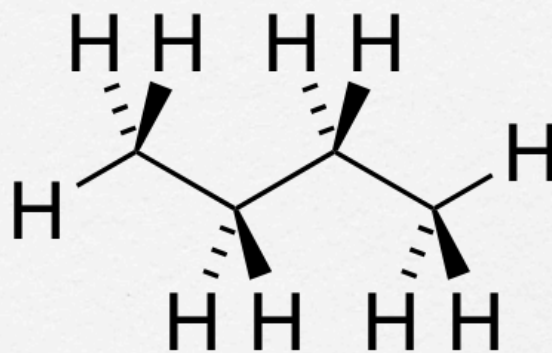
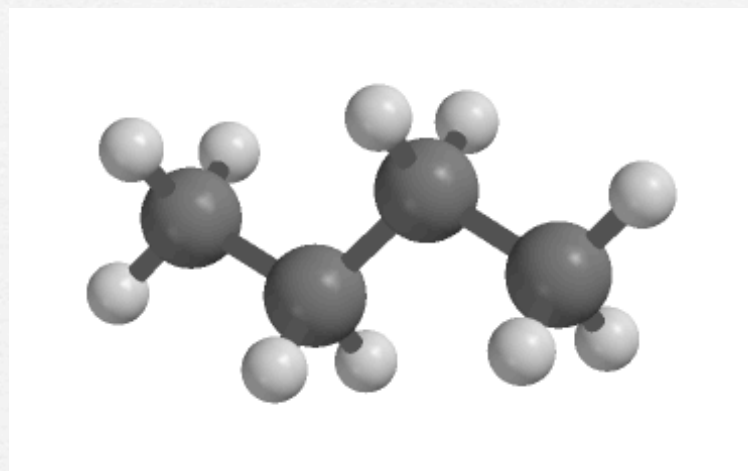
2 Carbons: Ethane



3 Carbons: Propane



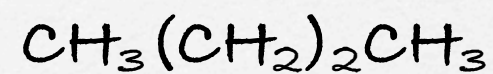
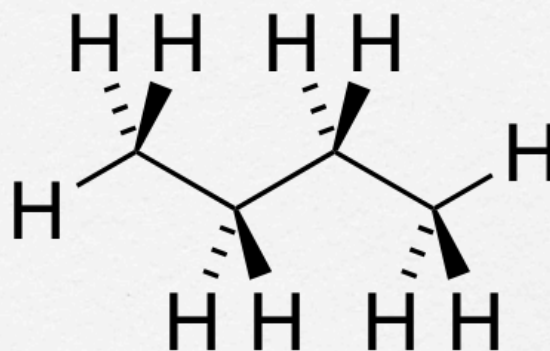
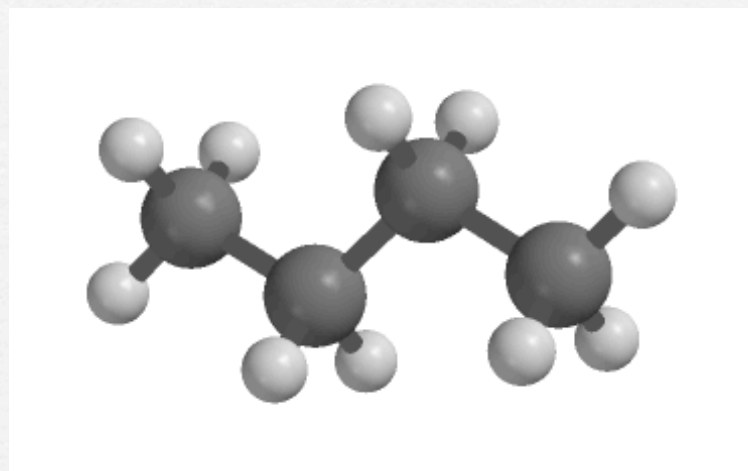
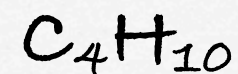
4 Carbons: Butane



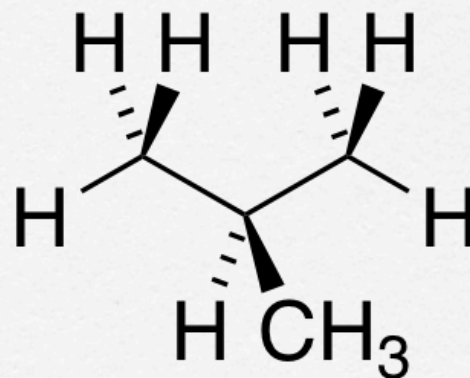
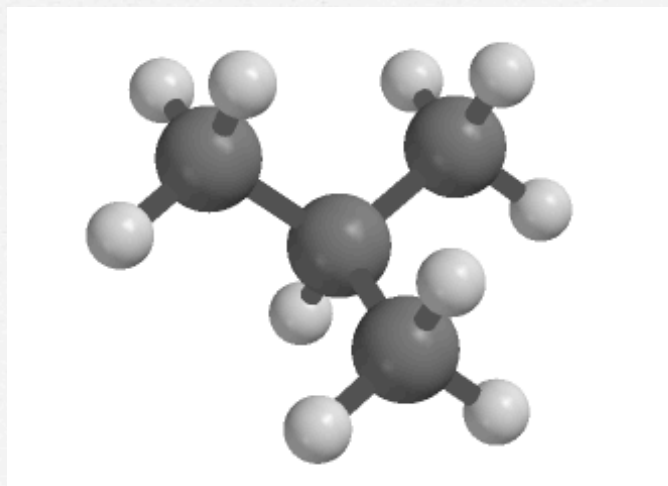
Isomers

- Constitutional Isomers: Compounds with the same molecular formula but different arrangement of atoms and bonds
- Straight-chain
- Branched

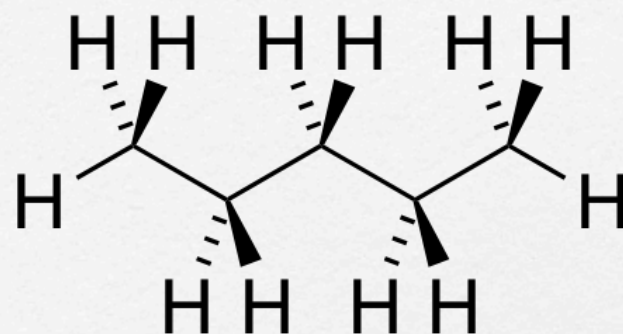
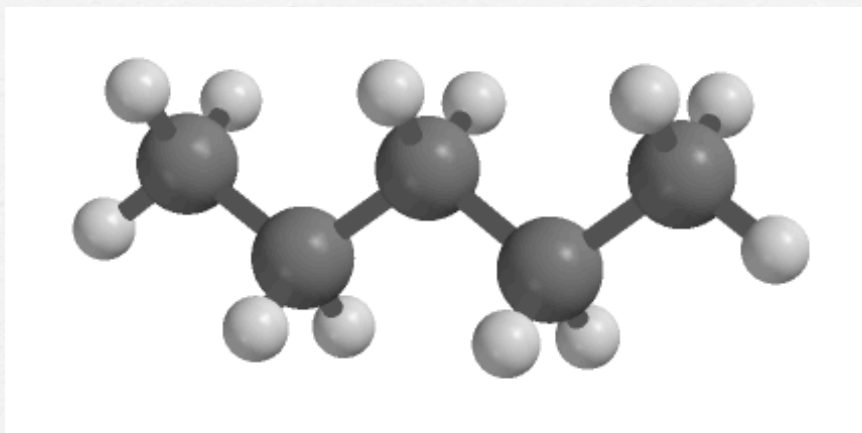
4 Carbons: Butane



n-butane



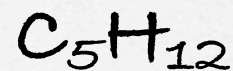
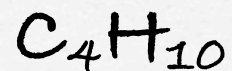
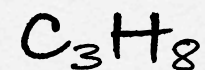
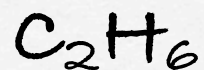
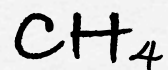
5 Carbons: Pentane C_5H_{12}



What other isomers of pentane can you draw?

Alkane Molecular Formulas

□ Do you see a trend? What's the general formula?

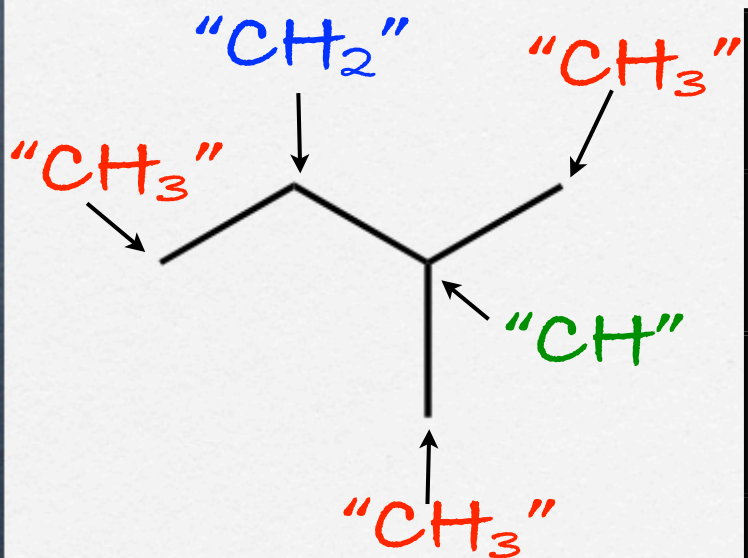


6 Carbons & Up

Formula	Name	C-atoms
C_6H_{14}		6
C_7H_{16}		7
C_8H_{18}		8
C_9H_{20}		9
$C_{10}H_{22}$		10

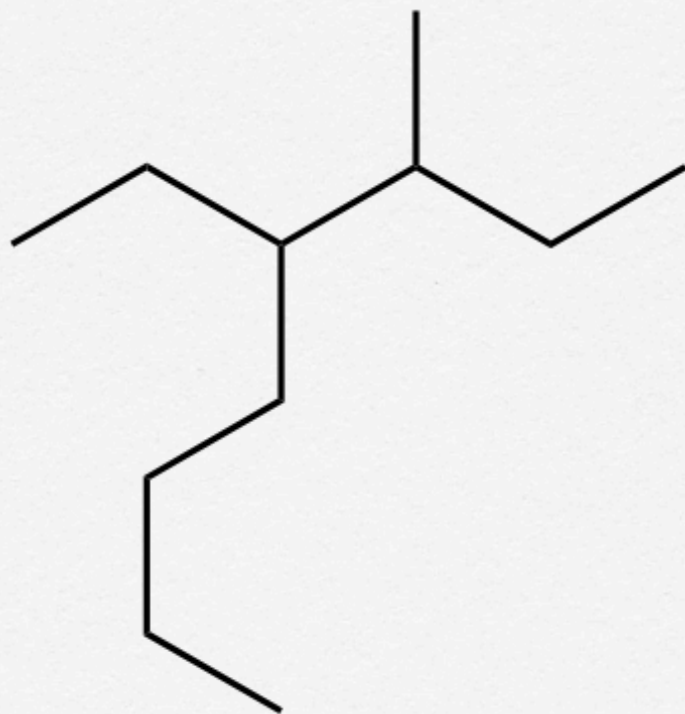
More C =
More isomers!

Types of Carbons



# other C bonded	"Type"	Symbol	Name
1	primary	1°	methyl
2	secondary	2°	methylene
3	tertiary	3°	methine
4	quaternary	4°	NA

Identify the Carbons!



Cycloalkanes

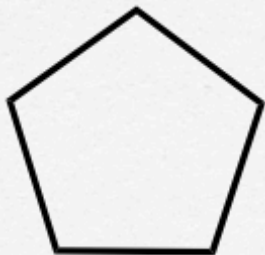
2 less H than acyclic



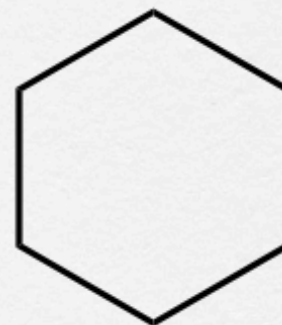
cyclopropane



cyclobutane



cyclopentane

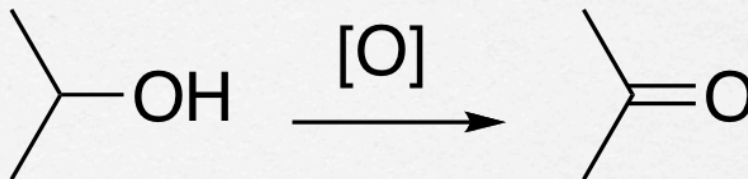


cyclohexane

Reactions of Alkanes

- Oxidation-Reduction Review
 - exchange of electrons
 - oxidation numbers complicated for C!

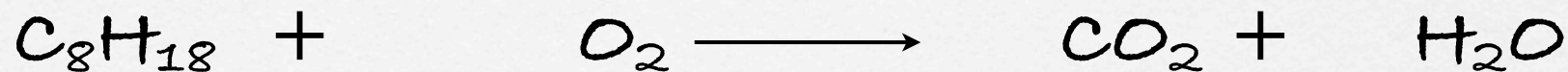
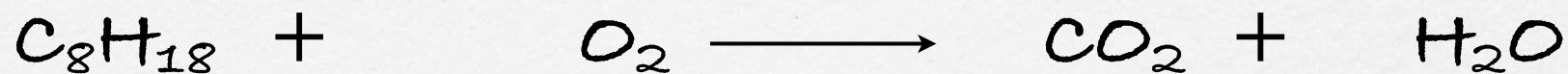
Oxidation:



Reduction:

Alkane Combustion

□ Combustion: Burn in the presence of O_2



Wrapping Up

- Practice naming alkanes
- Practice identifying types of carbons
- Practice identifying reactions as oxidation and reduction