

LEC (5)

CHEM 30A

Oct 11th

(1)

(1) HYBRIDIZATION

Chapter 2

(2) ALKANES

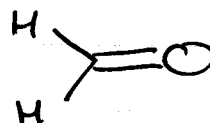
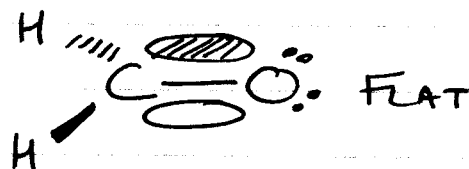
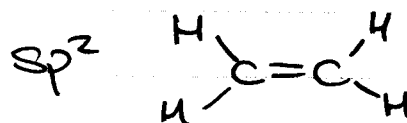
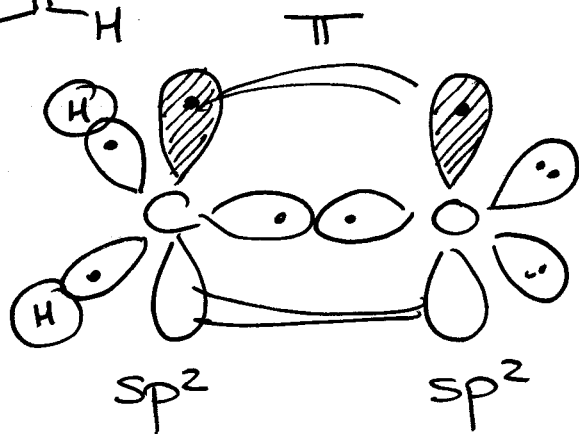
- STRUCTURE
- ISOMERS
- NOMENCLATURE
- CONFORMATION
- PROPERTIES

Hmk: Reading Ch2

Problems: 2.1, 2.2, 2.8, 2.17-2.21, 2.24-2.26

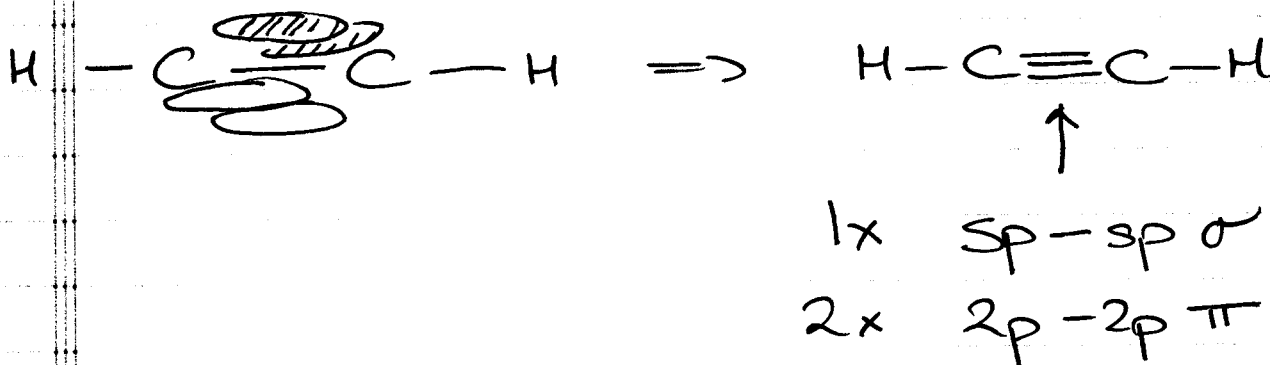
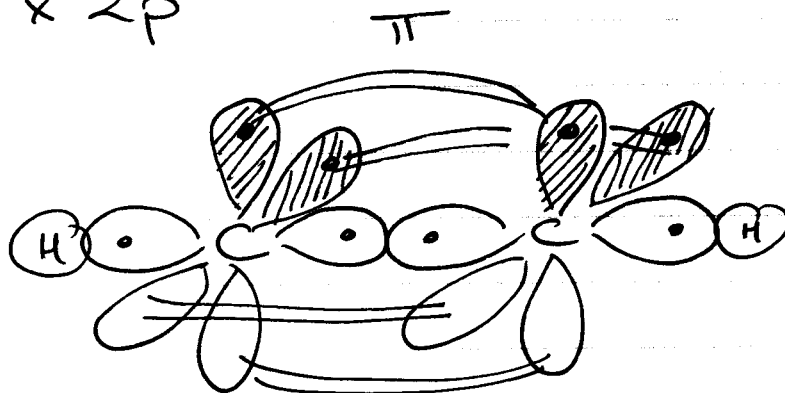
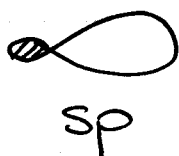
QUIZ ON WEDNESDAY IN CLASS

(1) HYBRIDIZATION cont:

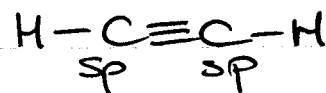
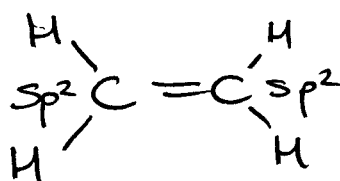
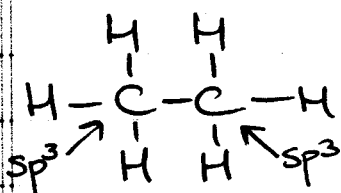


sp HYBRIDIZATION

1 x 2s and 1 x 2p



CONSIDER



C-C

1.53 Å
88 kcal mol⁻¹

not
x 2

1.34 Å
146 kcal mol⁻¹

not x 3

1.21 Å
200 kcal mol⁻¹

$\times 10^{-10} \text{ m}$

σ stronger than π

C-H

1.11 Å
98 kcal/mol

1.10 Å
104 kcal mol⁻¹

1.09 Å
125 kcal mol⁻¹

③

More s character in hybrid orbital

↳ e⁻ closer to nucleus

↳ stronger / shorter bonds

SIMPLE WAY TO DETERMINE HYBRIDIZATION

ADD # BONDED ATOMS TO # LOBE PAIRS

4 → ^{four} sp³

3 → three sp² and one p

2 → two sp and two p

② ALKANES

(i) STRUCTURE

SATURATED HYDROCARBONS

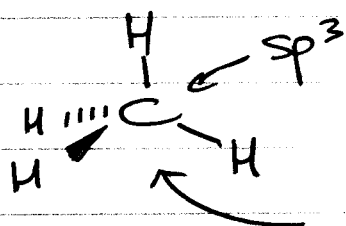


ONLY C & H

EACH C

HAS MAX # H

General formula C_nH_{2n+2} (without rings)



METHANE

109.5°

④

CH_4 methane

CH_4

CH_3-CH_3 ethane

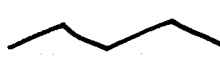
C_2H_6

 propane

C_3H_8

 butane

C_4H_{10}

 pentane

C_5H_{12}

 hexane

etc, etc C_6H_{14}

$\text{CH}_3(\text{CH}_2)_n\text{CH}_3$

(ii) ISOMERS

- same molecular formula, different attachment of atoms

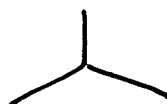
CONSTITUTIONAL ISOMERS

CH_4 , C_2H_6 , C_3H_8
each has only ONE possible arrangement

How ABOUT C_4H_{10}



butane



2-methylpropane

Do C_6H_{14} Br IUPAC (5 structures)

5

(iii) NOMENCLATURE

International Union of Pure and Applied Chemistry (IUPAC)

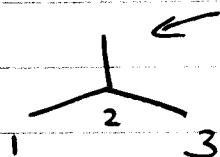
SYSTEMATIC NAMING

- STRAIGHT CHAINS (DONE) ✓

- BRANCHED STRUCTURES

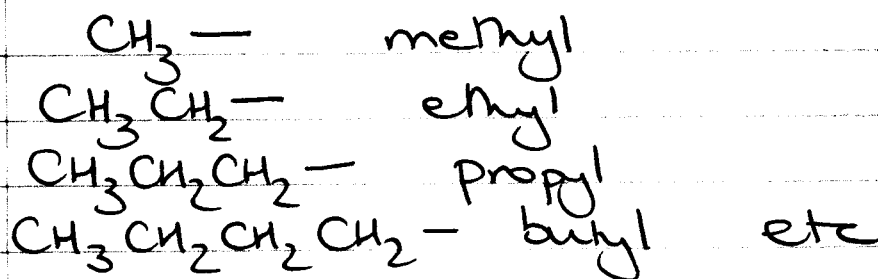
① IDENTIFY LONGEST CHAIN

② EACH SUBSTITUENT GETS A NAME AND NUMBER



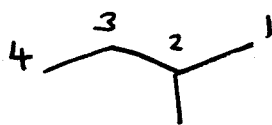
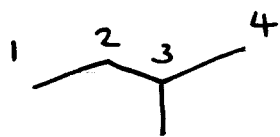
2-METHYL
PROPANE

ALKYL GROUPS



6

③ MINIMIZE SUBSTITUENT NUMBER



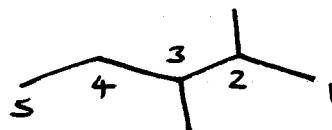
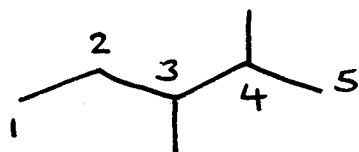
3 METHYL BUTANE

2 METHYL BUTANE

X

✓

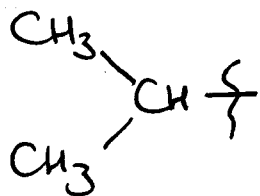
④ SAME SUBSTITUENT MORE THAN ONCE



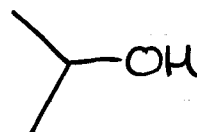
2,3-DIMETHYL PENTANE

After this, it gets SILLY.

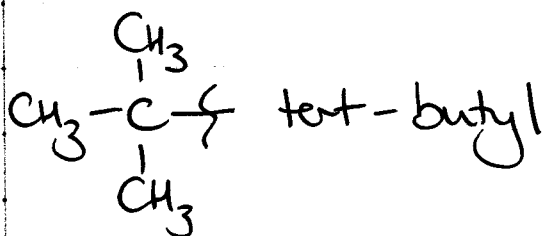
Common names



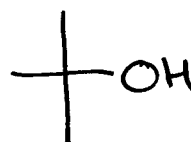
isopropyl



isopropyl alcohol

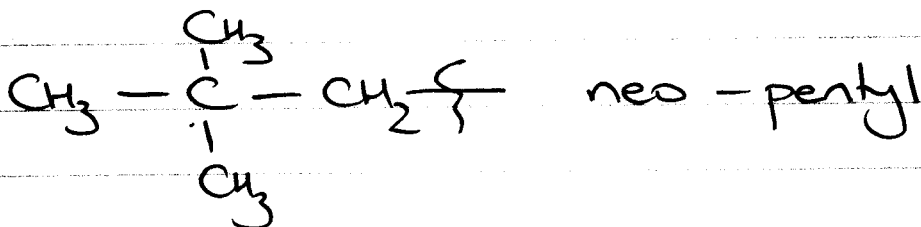
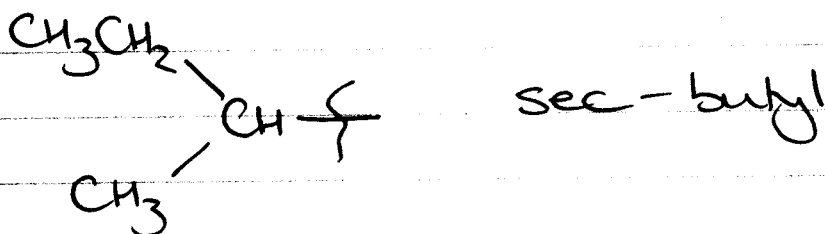
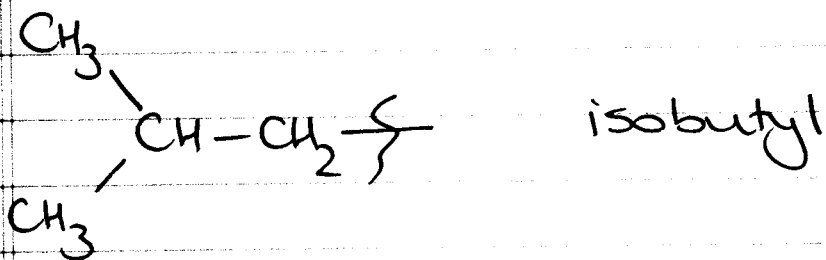


tert-butyl



t-butyl alcohol

(7)

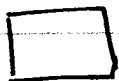


CYCLOALKANES



CYCLOPROPANE

C_3H_6



CYCLOBUTANE

C_4H_8



CYCLOPENTANE

C_5H_{10}



CYCLOHEXANE

C_6H_{12}

BICYCLOALKANES - FORGET IT!

8

PREFIX - INFIX - SUFFIX

PROP
3Cs

AN
single bonds

E
hydrocarbon

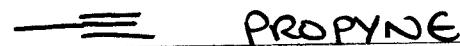
INFIX - AN-



(double) - EN-



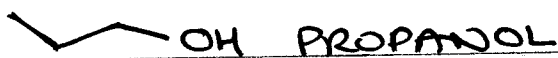
(triple) - YN-



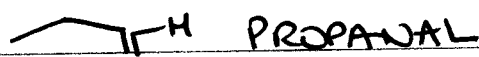
SUFFIX - E



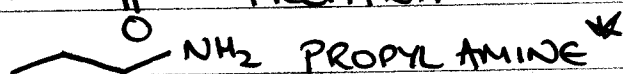
- OL



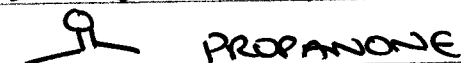
- AL



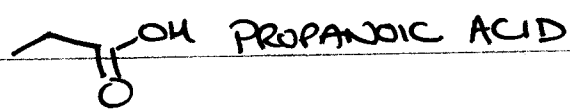
(- AMINE) *



- ONE



- OIC ACID



COMMON STRUCTURES / NAMES / ACRONYMS (keep a notebook)



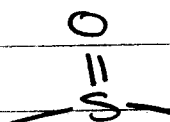
acetone



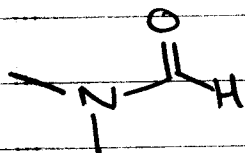
pyridine



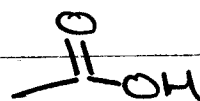
tetrahydrofuran
(THF)



dimethyl
sulfoxide
(DMSO)



dimethylformamide
(DMF)



acetic
acid
AcOH