

Group learning

If you can help your friends learn and understand well Organic Chemistry. I will reward you some bonus marks for your expertise and positive attitude. You get 1 additional point for each person you help.

What do you think?

“Học thầy không tày học bạn”

Organic Chemistry

CHE 203

Lecture 10: Organohalides

Le Quoc Chon – Duy Tan University

Dẫn xuất halogens

Volcano eruption
Mount Pinatubo
12 June 1991
Philippine





Volcanic gas
Augustine 2008
(Alaska, US)

Keywords

Alkyl halides

Nucleophilic substitution reaction

(phản ứng thế ái nhân)

Elimination reaction

(phản ứng tách)

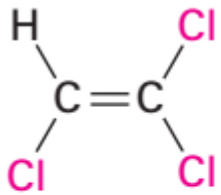
Dẫn xuất halogens

Organohalides

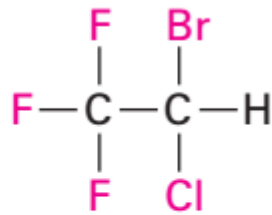
Contain one or more halogen atoms (chứa halogens)

Released by algae (tảo), marine organism (vi sinh vật ở biển)

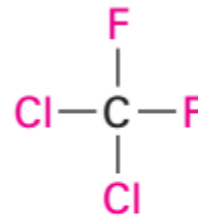
Used as solvents, inhaled anesthetics, pesticides



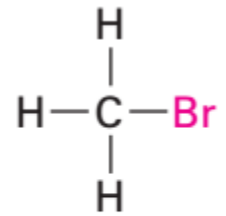
Trichloroethylene
(a solvent)



Halothane
(an inhaled anesthetic)



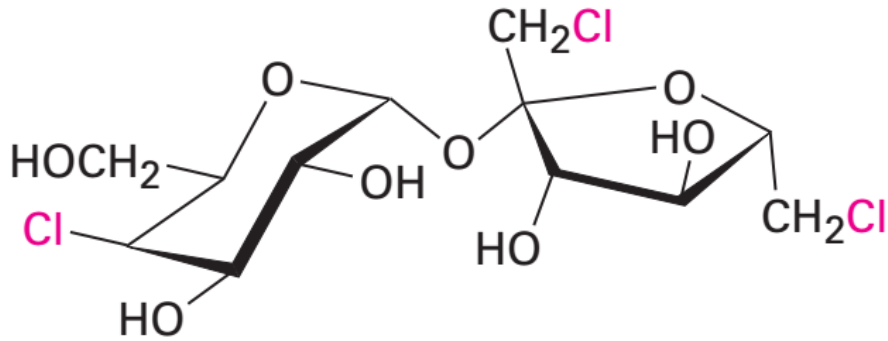
Dichlorodifluoromethane
(a refrigerant)



Bromomethane
(a fumigant)

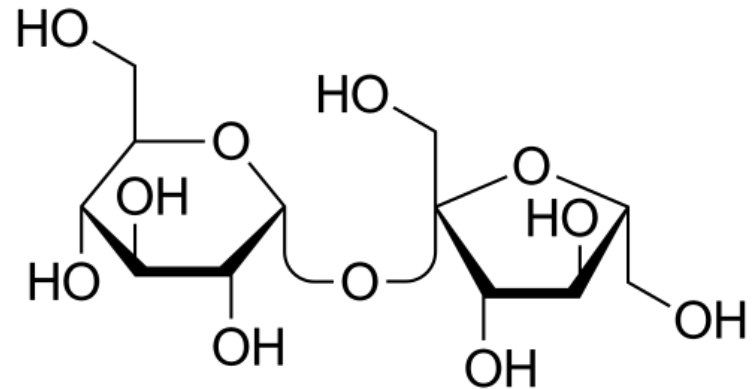
Applications

(ứng dụng)



Sucralose

(sweetener, 600 times as sweet as sucrose)

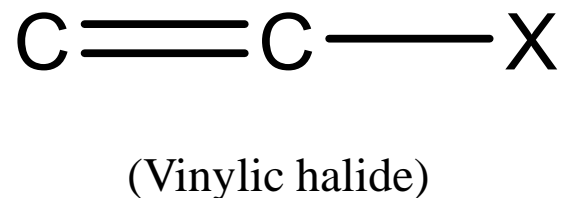
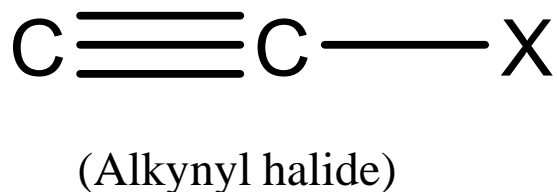


Sucrose

173 MT/year 2013

Organohalides

X is halogens (F, Cl, Br, I)



Naming alkyl halide

(đọc tên dẫn xuất halogen)

STEP 1

Find the longest chain, and name it as the parent. If a double or triple bond is present, the parent chain must contain it.

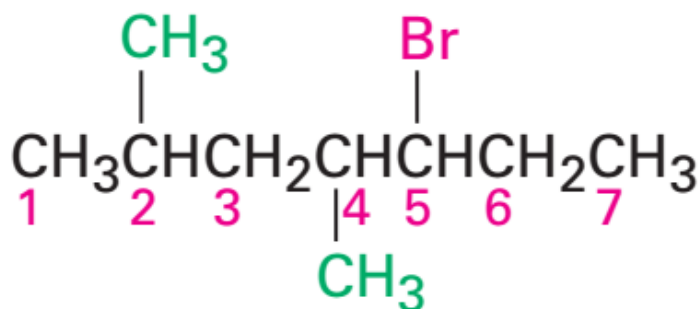
STEP 2

Number the carbons of the parent chain beginning at the end nearer the first substituent, whether alkyl or halo. Assign each substituent a number according to its position on the chain.

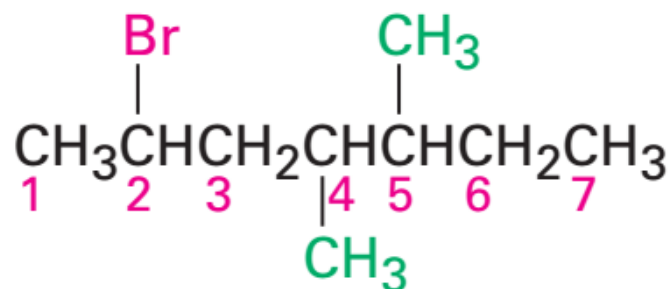
STEP 3

If the parent chain can be properly numbered from either end by step 2, begin at the end nearer the substituent that has alphabetical precedence.

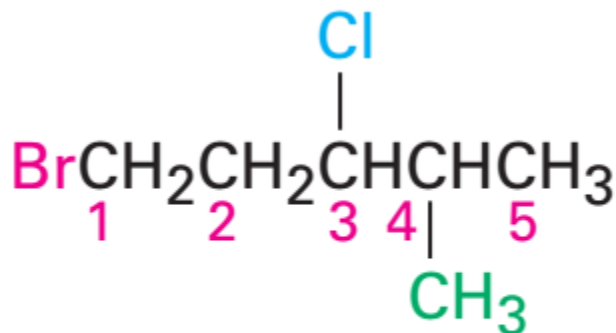
Examples



5-Bromo-2,4-dimethylheptane



2-Bromo-4,5-dimethylheptane



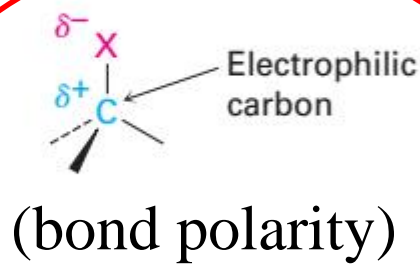
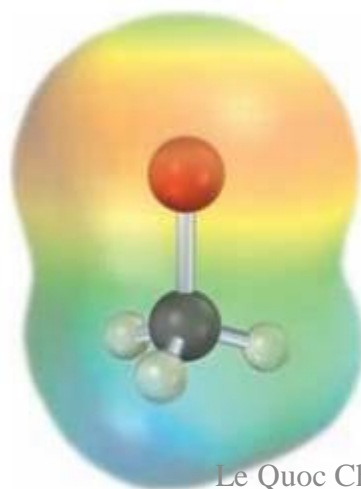
1-Bromo-3-chloro-4-methylpentane

TABLE 10-1 A Comparison of the Halomethanes

Độ dài của liên kết

Halomethane	Bond length (pm)	Bond strength		Dipole moment (<i>D</i>)
		(kJ/mol)	(kcal/mol)	
CH ₃ F	139	460	110	1.85
CH ₃ Cl	178	350	84	1.87
CH ₃ Br	193	294	70	1.81
CH ₃ I	214	239	57	1.62

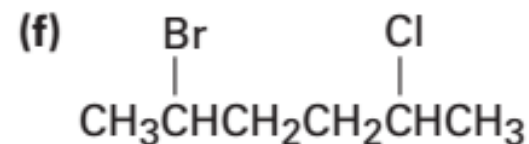
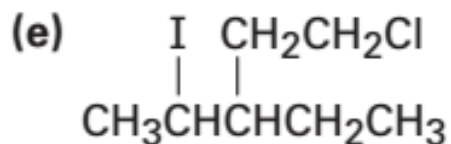
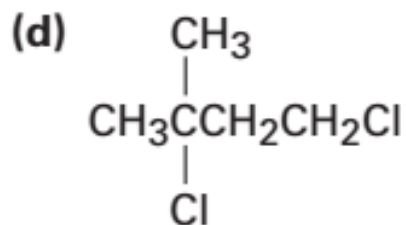
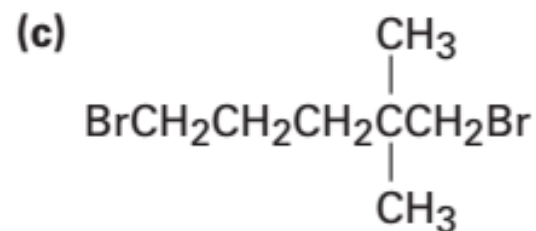
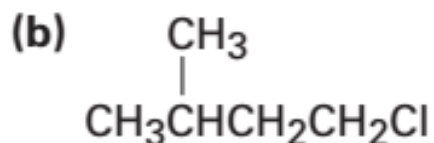
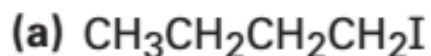
Độ bền của liên kết



Problem

PROBLEM 10-1

Give IUPAC names for the following alkyl halides:



Problem

PROBLEM 10-2

Draw structures corresponding to the following IUPAC names:

- (a) 2-Chloro-3,3-dimethylhexane (b) 3,3-Dichloro-2-methylhexane
(c) 3-Bromo-3-ethylpentane (d) 1,1-Dibromo-4-isopropylcyclohexane
(e) 4-*sec*-Butyl-2-chlorononane (f) 1,1-Dibromo-4-*tert*-butylcyclohexane

Tổng hợp từ alkanes

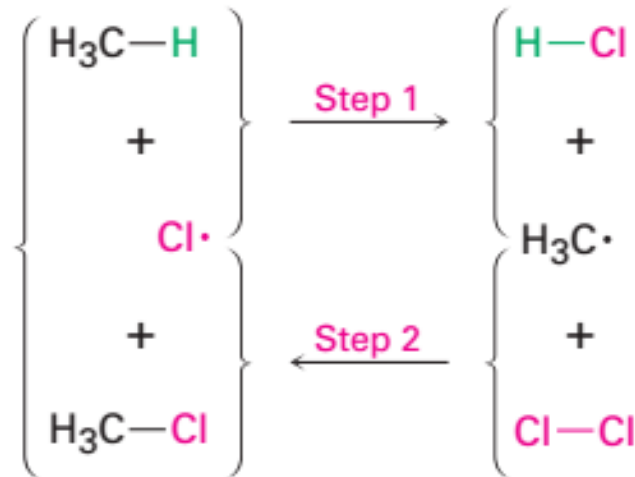
Preparing alkyl halides from alkanes

Initiation step



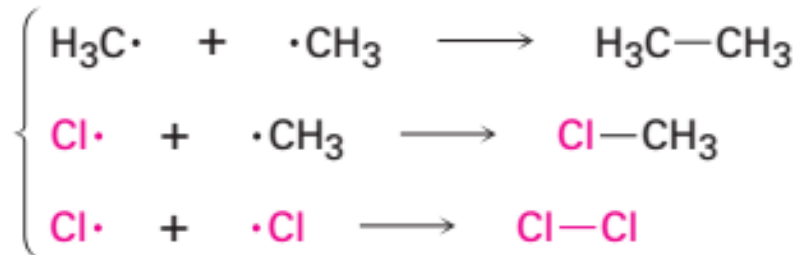
(1) Khởi mào

Propagation steps
(a repeating cycle)



(2) Tiếp diễn

Termination steps

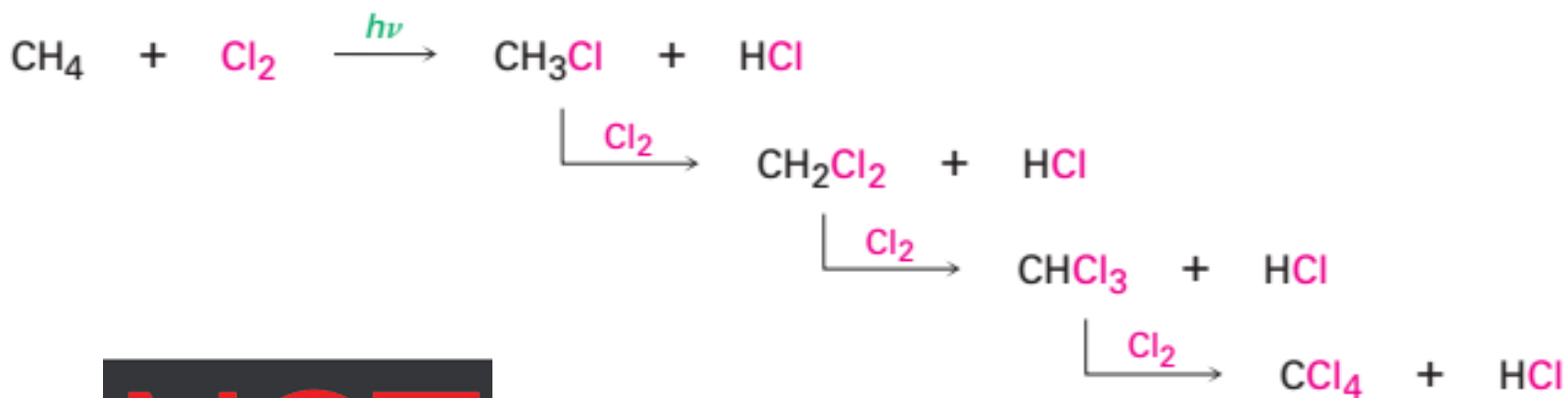


(3) Kết thúc

Overall reaction

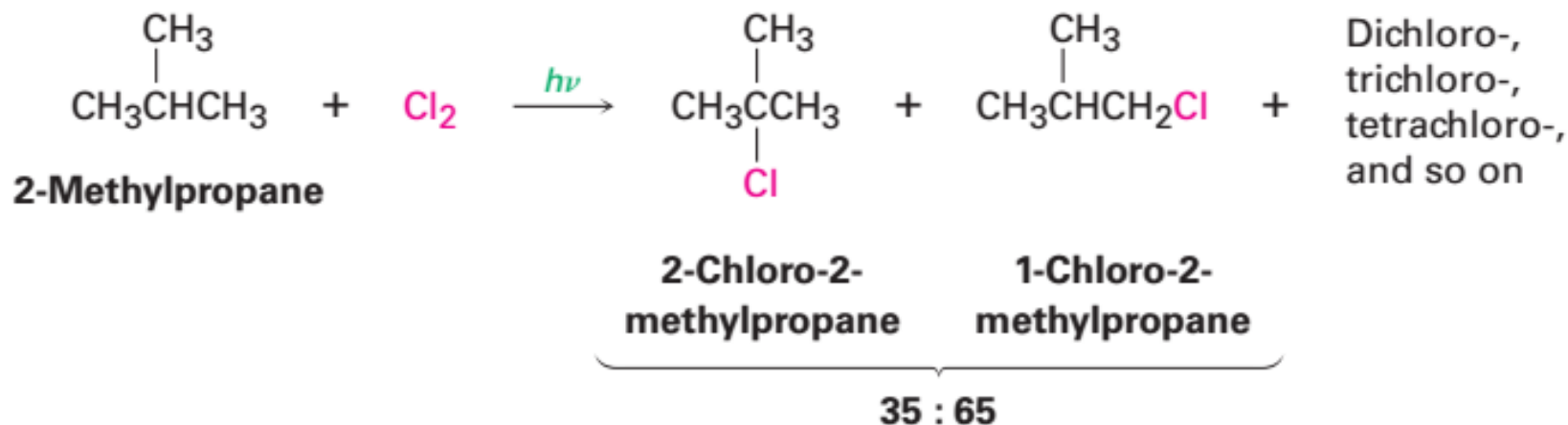
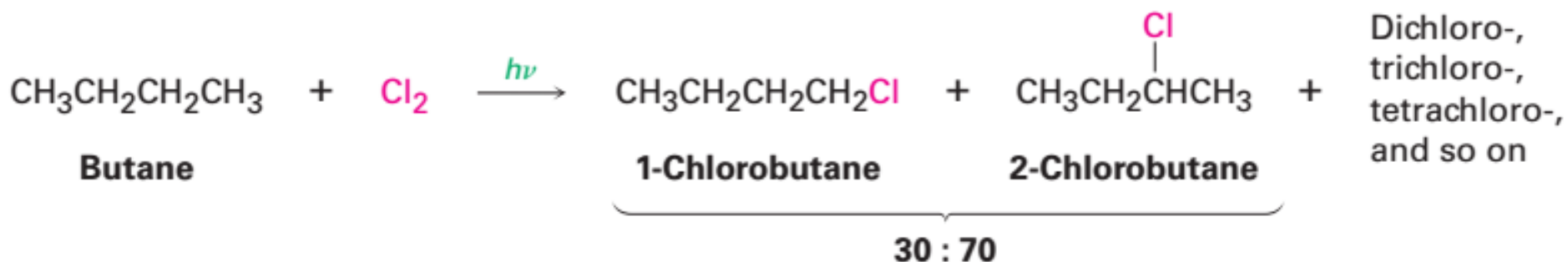


Tổng hợp Alkyl halide từ alkane cho hỗn hợp sản phẩm

The logo consists of the word "NOT" in a bold, red, sans-serif font, positioned above the word "Good" which is written in a white, cursive script font. The entire text is set against a dark grey or black square background.

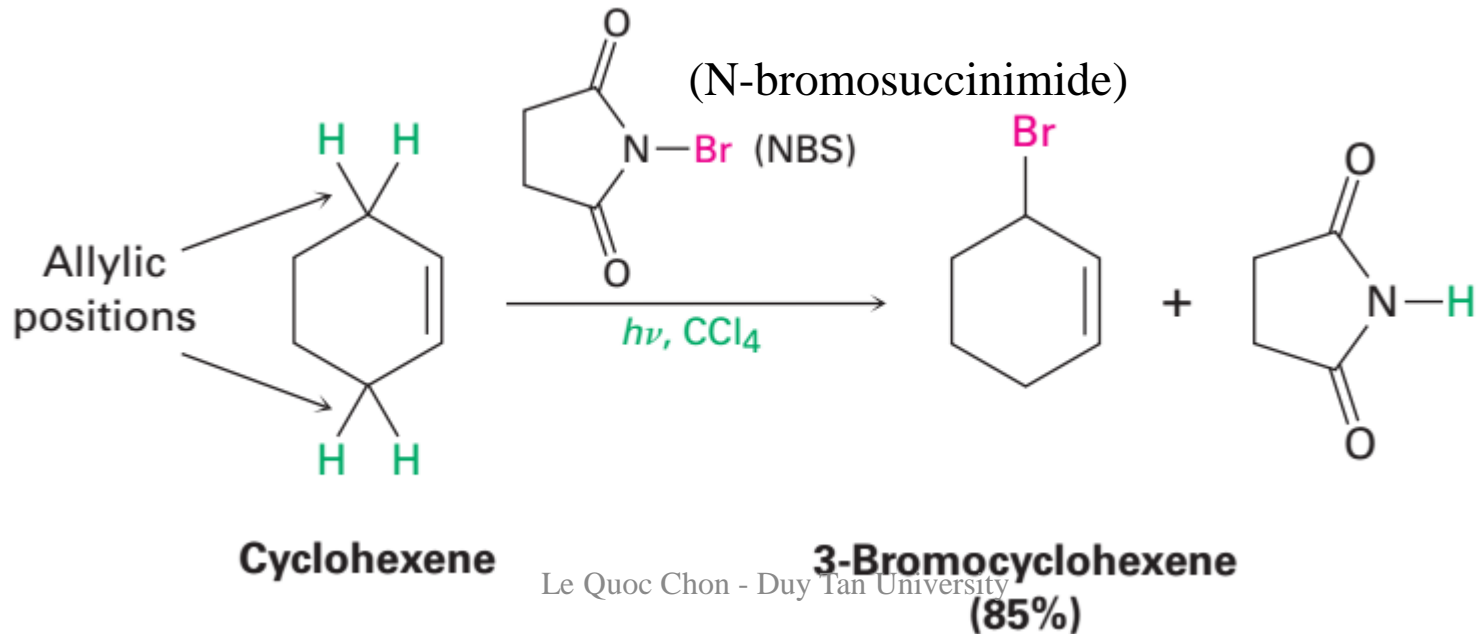
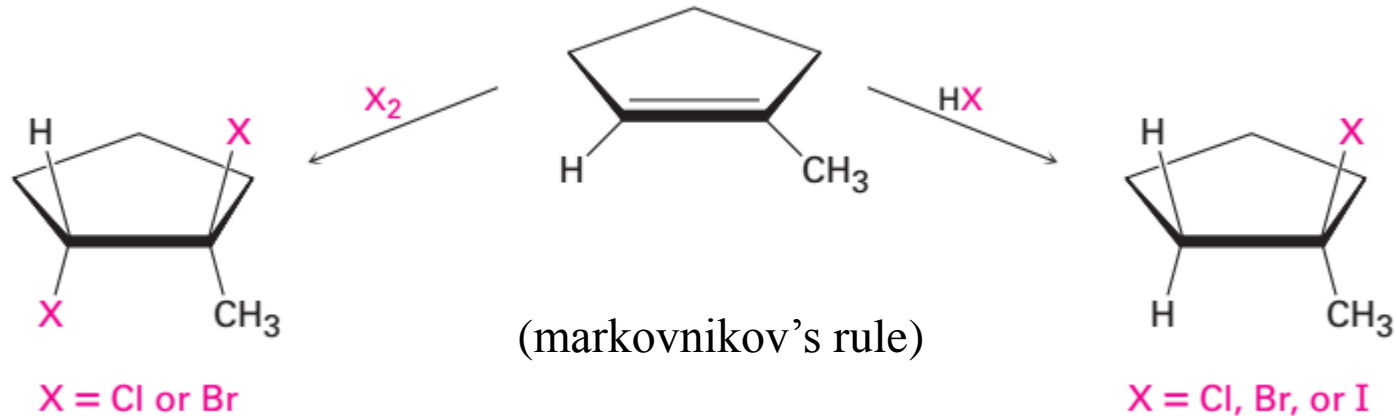
Vì độ tinh khiết của sản phẩm không cao.

Tổng hợp Alkyl halide từ alkane cho hỗn hợp sản phẩm



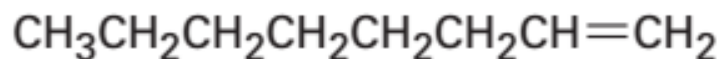
Tổng hợp từ alkenes

Preparing alkyl halides from alkenes

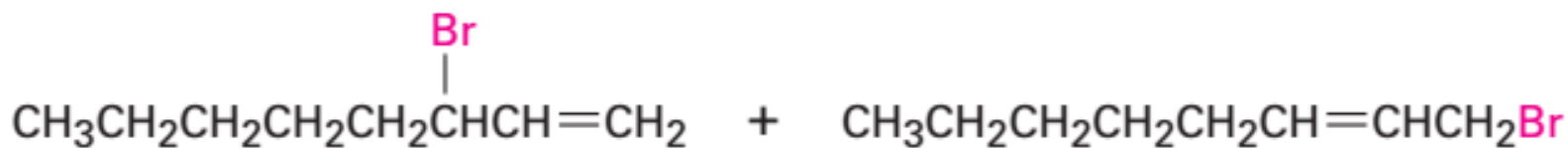


Tổng hợp từ alkenes

Preparing alkyl halides from alkenes



1-Octene

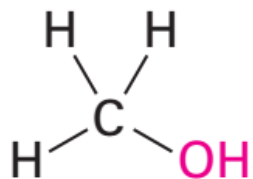
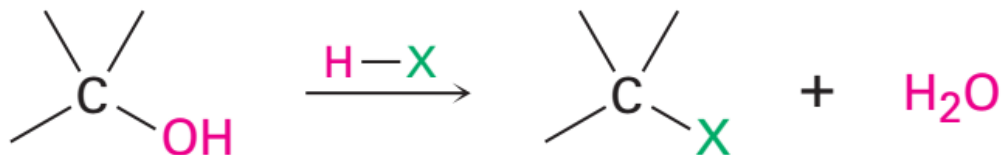


3-Bromo-1-octene (17%)

1-Bromo-2-octene (83%)
(53 : 47 trans : cis)

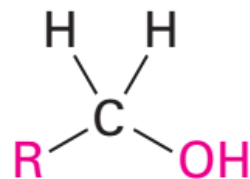
Preparing alkyl halides from alcohols

Tổng hợp từ alcohols



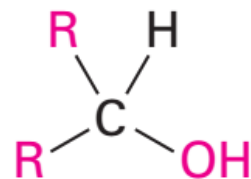
Methyl

<



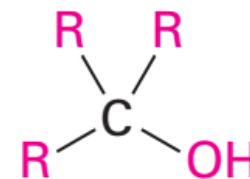
Primary

<



Secondary

<

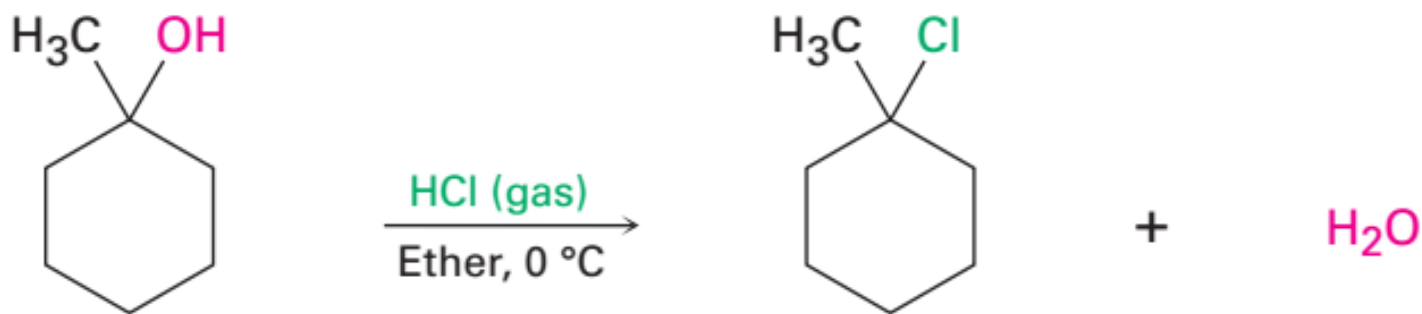


Tertiary

Reactivity

Preparing alkyl halides from alcohols

Tổng hợp từ alcohols

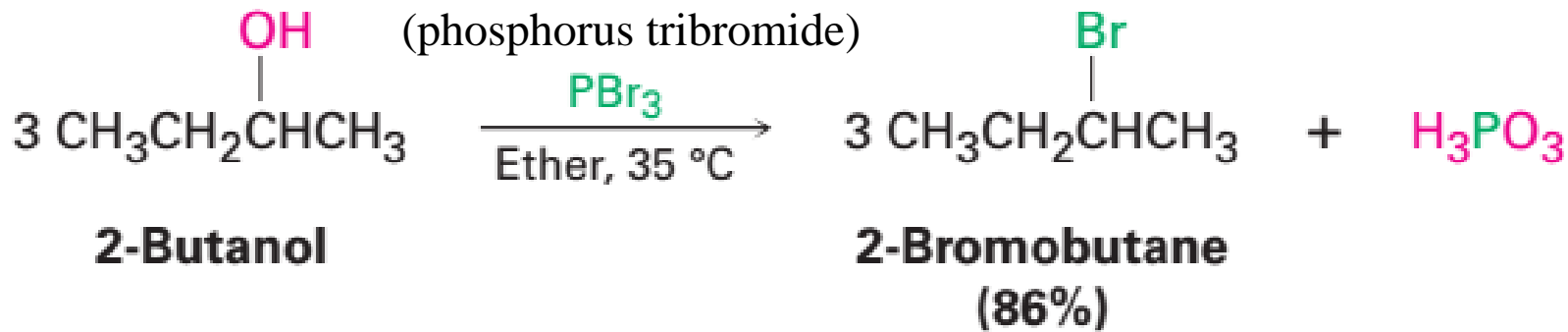
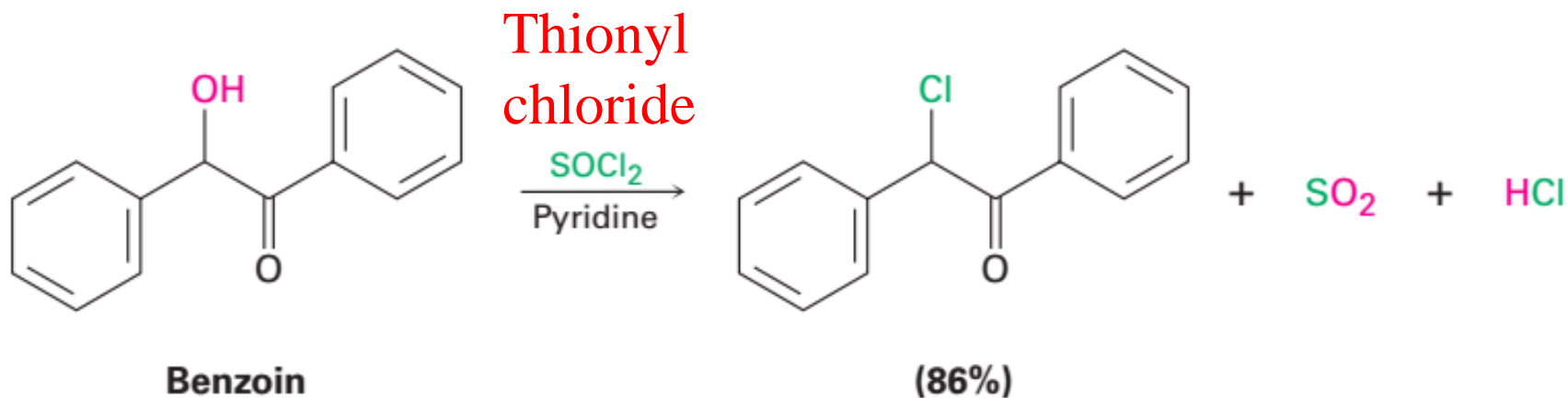


1-Methylcyclohexanol

**1-Chloro-1-methylcyclohexane
(90%)**

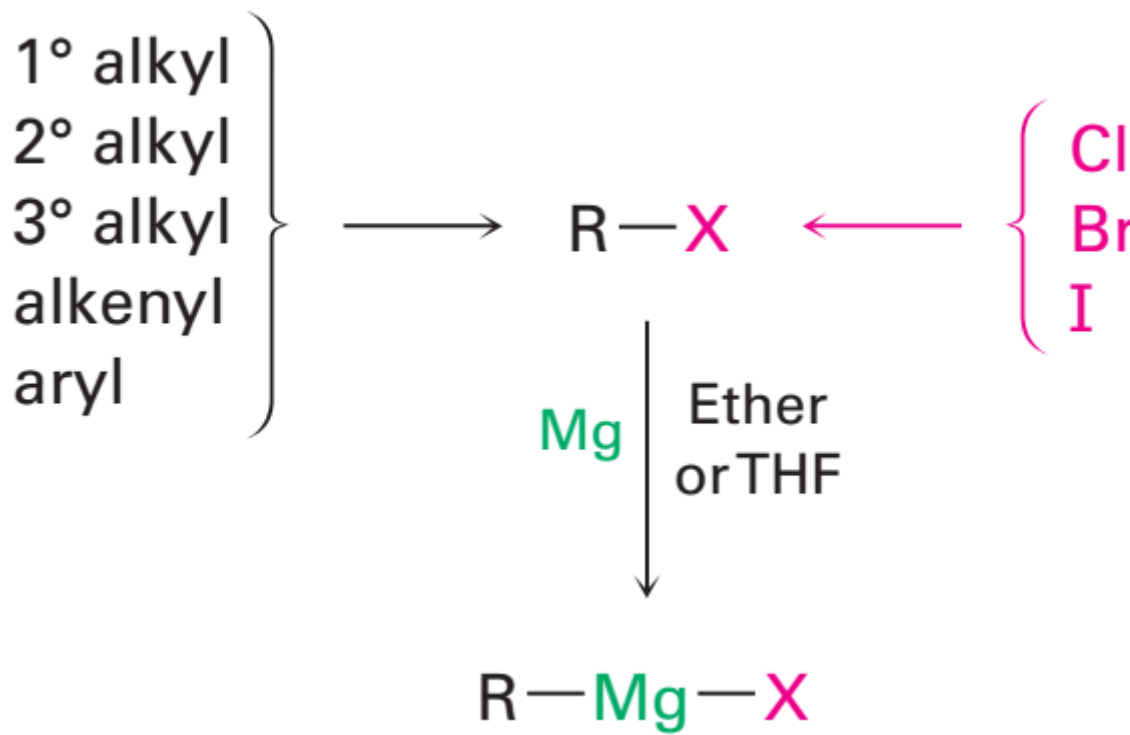
Preparing alkyl halides from alcohols

Tổng hợp từ alcohols

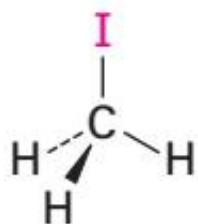


Reactions of alkyl halides: Grignard reagents (RMgX)

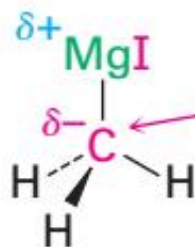
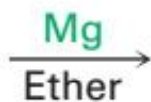
Phản ứng với tác nhân Grignard



Grignard reagents: RMgX

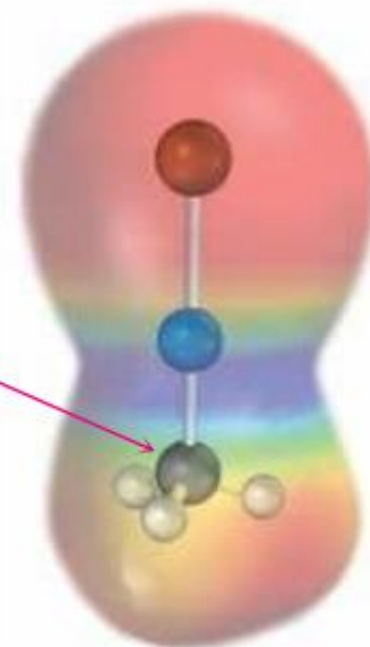


Iodomethane

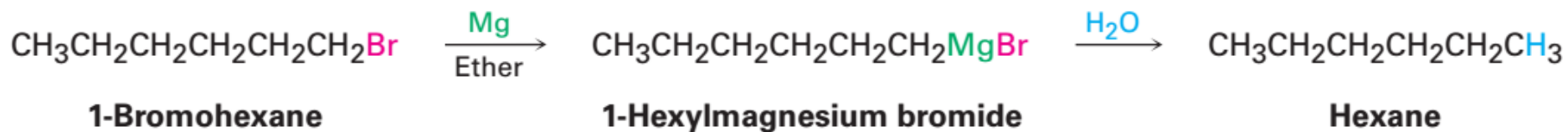


Methylmagnesium iodide

Basic and nucleophilic



Tác nhân RMgX rất nhạy với môi trường



Phản ứng acid-
base này phá hủy
tác nhân RMgX

Problem

PROBLEM 10-9

How strong a base would you expect a Grignard reagent to be? Look at Table 9-1 on page 276, and predict whether the following reactions will occur as written. (The pK_a of NH_3 is 35.)

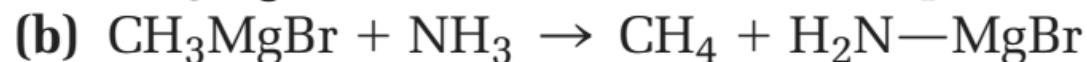



TABLE 9-1 Acidity of Simple Hydrocarbons

Family	Example	K_a	pK_a	
Alkyne	$HC\equiv CH$	10^{-25}	25	Stronger acid  Weaker acid
Alkene	$H_2C=CH_2$	10^{-44}	44	
Alkane	CH_4	10^{-60}	60	

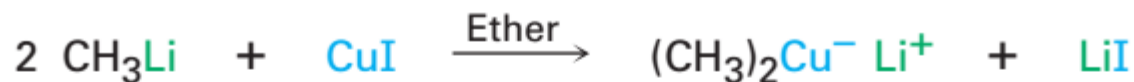
Problem

PROBLEM 10-10

How might you replace a halogen substituent by a deuterium atom if you wanted to prepare a deuterated compound?

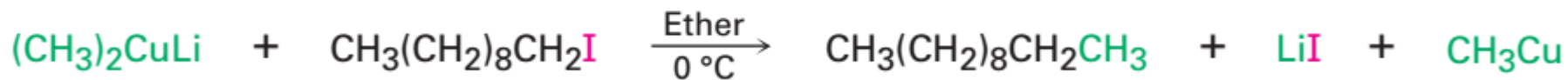


Organometallic coupling reactions



Methyl lithium

Lithium dimethylcopper
(a Gilman reagent)



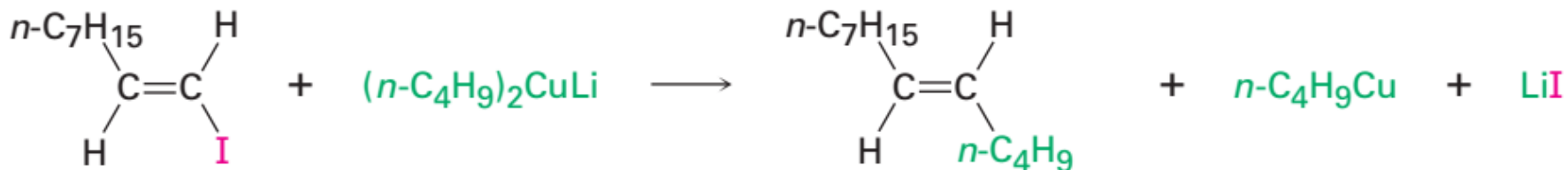
Lithium
dimethylcopper

1-Iododecane

Undecane (90%)

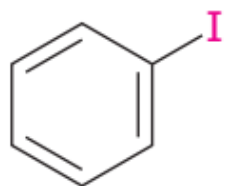
Create C-C bond: prepare large molecules from smaller ones

Organometallic coupling reactions

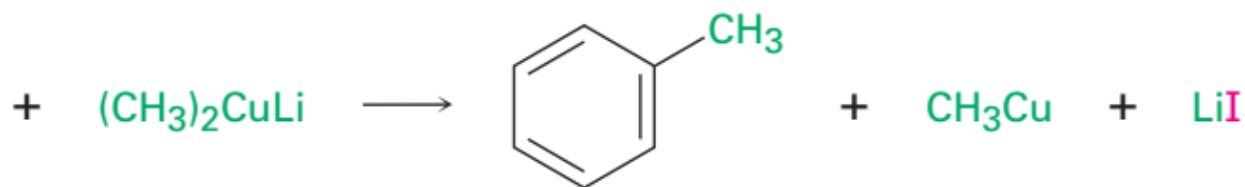


***trans*-1-Iodo-1-nonene**

***trans*-5-Tridecene (71%)**



Iodobenzene



Toluene (91%)

Nối mạch C

Thứ sáu, 17/2/2017 | 09:50 GMT+7



Trùm màn ăn cơm vì ruồi tấn công ở Lạng Sơn

Sau khi bãi rác cách khu dân cư khoảng một km đi vào hoạt động, cả trăm hộ dân phố Tân Long (huyện Văn Quan, Lạng Sơn) sống trong sợ hãi vì ruồi nhiều bất thường.

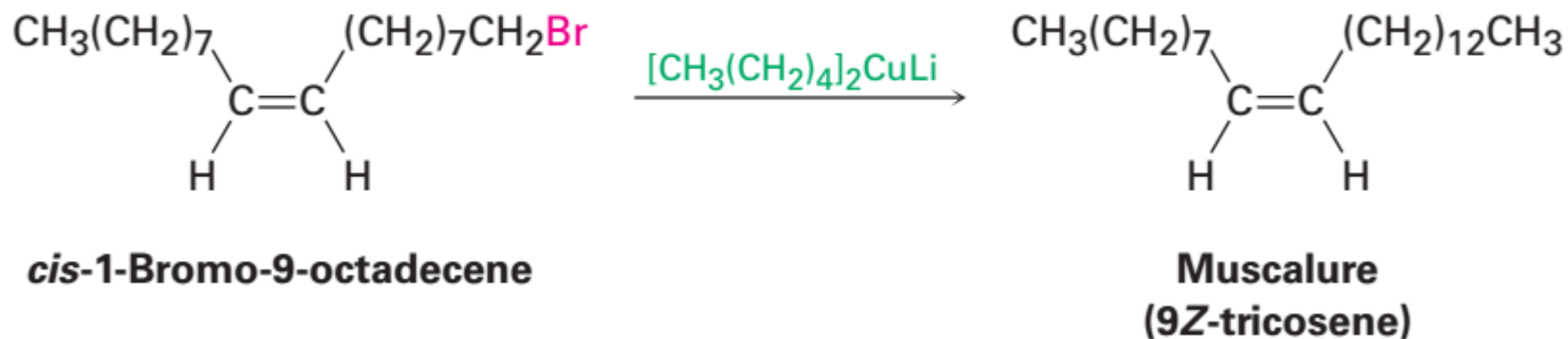
Khoảng hai tháng nay, người dân khu phố Tân Long với 115 hộ dân sinh sống dọc quốc lộ 1B (thị trấn Văn Quan, huyện Văn Quan, Lạng Sơn) hàng ngày đóng cửa im ỉm vì sợ ruồi bay vào nhà.

Số lượng ruồi nhiều lên bất thường khiến cuộc sống người dân ở đây bị đảo lộn. Chỉ tay vào những chiếc keo dán đen kịt ruồi, bà Đàm Thị Cúc thở dài: "Nhà tôi bán hàng tạp hóa nên phải mở cửa liên tục, ngày gió rét còn đỡ, khi thời tiết ấm và ẩm thì chỗ nào cũng có ruồi, bẫy không xuể".



Example

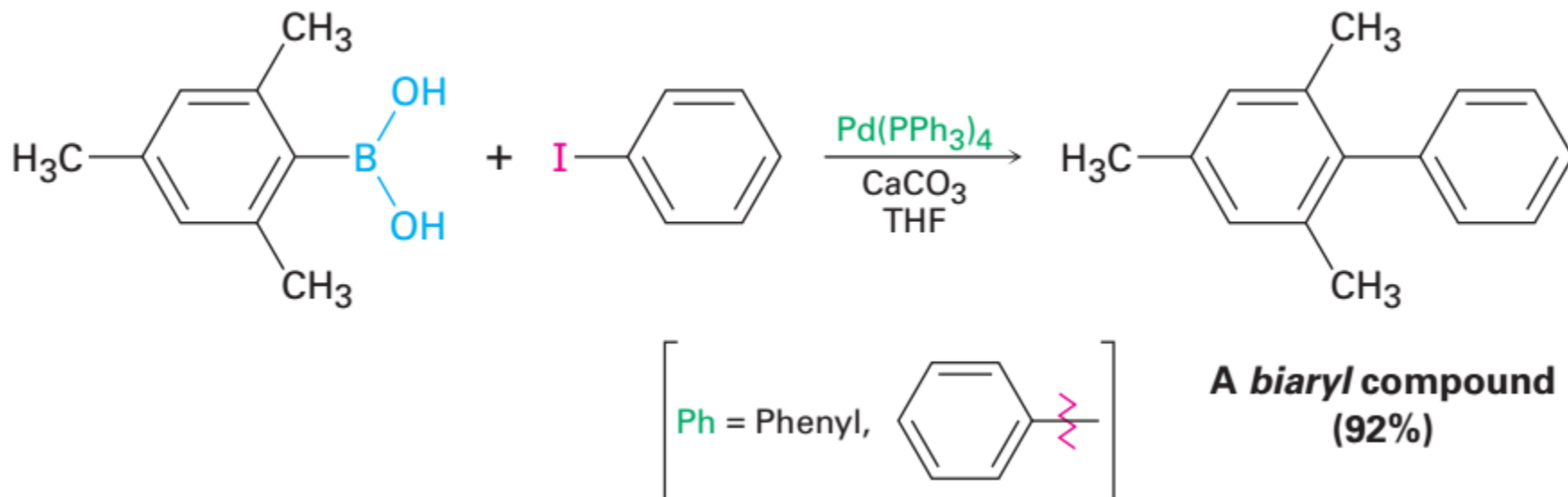
Nối mạch C



Sex attractant: use
for insect control

(sử dụng trong kiểm
soát con trùng)

Example



Suzuki-Miyaura reaction
a must-used in Pharmaceutical industry

(phản ứng này được dùng rộng rãi trong công nghiệp dược)



TIN MỚI

■ Văn khấn rằm tháng Giêng chuẩn nhất Tết Nguyên đán Mậu Tuất 2018

Tỷ lệ người bị tăng huyết áp ở Việt Nam đang ở mức báo động đỏ

SỨC KHỎE | 18:26 Thứ Hai ngày 15/05/2017



(HNMO) - Đó là thông tin được đưa ra tại họp báo truyền thông và giáo dục về phòng chống tăng huyết áp (THA) nhân Ngày thể giới phòng chống THA (17-5) do Quỹ Vì sức khỏe Tim mạch Việt Nam phối hợp với Viện Tim mạch Việt Nam tổ chức chiều 15-5 tại Hà Nội.

ĐỌC NHIỀU

PHẢN HỒI

Trà xanh không hoàn toàn tốt như mọi người vẫn nghĩ

Mỗi năm trên thế giới có 9 triệu người chết vì bệnh tăng huyết áp. Ở Việt Nam, cứ 10 người trưởng thành có 4 người bị mắc bệnh tăng huyết áp.

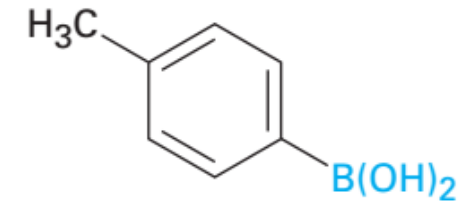
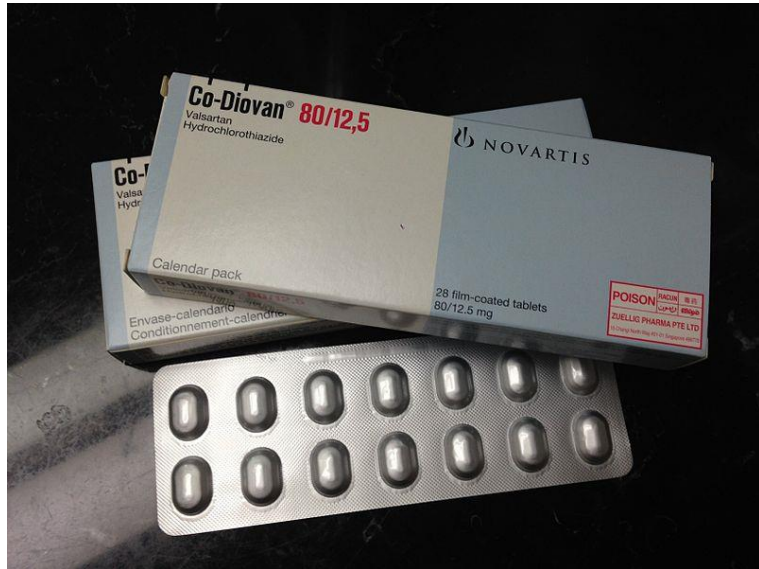
Huyết áp

For most adults, normal blood pressure at rest is within the range of 100–130 millimeters mercury (mmHg) systolic and 60–80 mmHg diastolic.

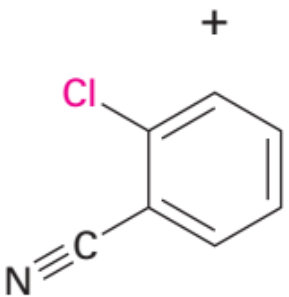
For most adults, **high blood pressure** is present if the resting blood pressure is persistently at or above **130/80 or 140/90 mmHg**

Example in Pharma

(ví dụ tổng hợp thuốc trong công nghiệp dược)

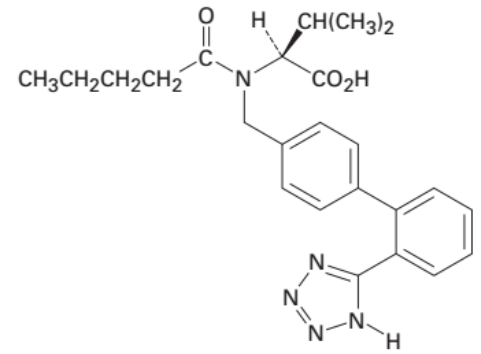
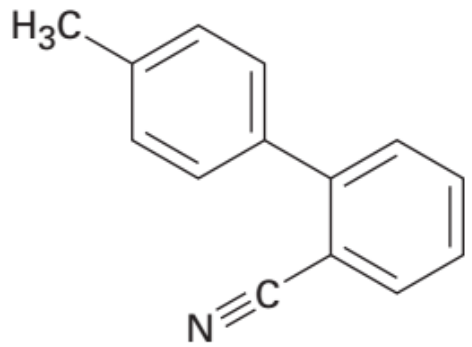


para-Methylbenzeneboronic acid



ortho-Chlorobenzonitrile

Pd catalyst
K₂CO₃



Valsartan (Diovan)

Diovan
antihypertensive agent
(thuốc trị cao huyết áp)

Oxidation and reduction in Organic Chemistry

(sự oxy hóa và khử trong Hóa hữu cơ)

Oxidation

Decreases electron density on carbon by:

- forming one of these: C–O C–N C–X
- or breaking this: C–H

Reduction

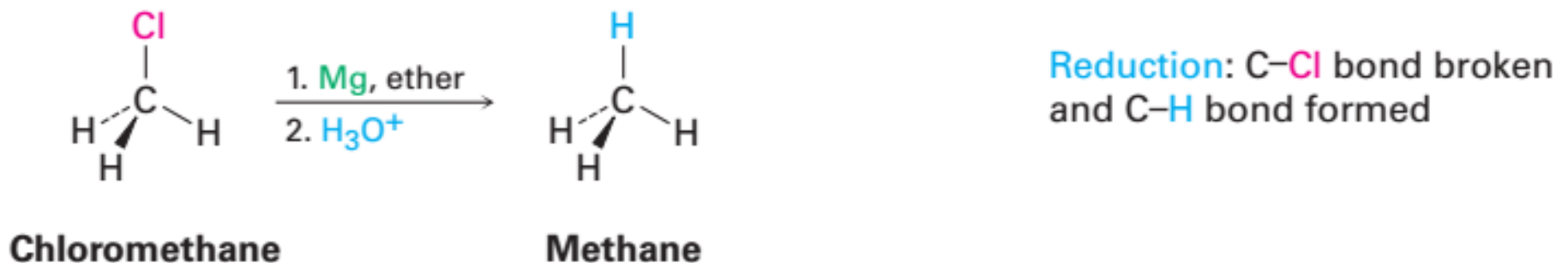
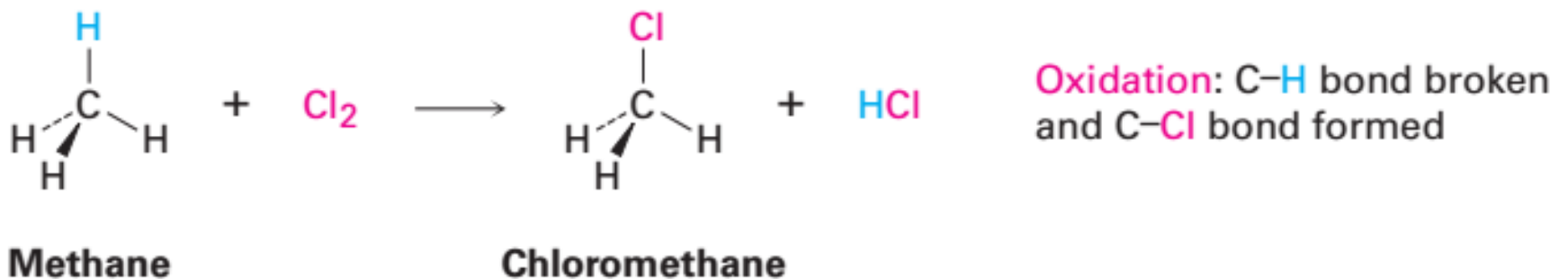
Increases electron density on carbon by:

- forming this: C–H
- or breaking one of these: C–O C–N C–X

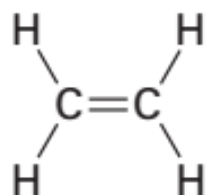
How different it is to normal definition?

Oxidation and reduction in Organic Chemistry

(sự oxy hóa và khử trong Hóa hữu cơ)

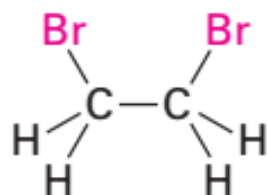


Example



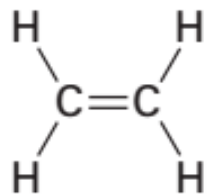
Ethylene

+



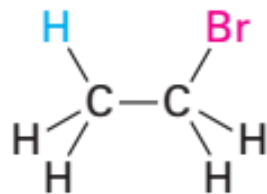
1,2-Dibromoethane

Oxidation: Two new bonds formed between carbon and a more electronegative element



Ethylene

+



Bromoethane

Neither oxidation nor reduction: One new C-H bond and one new C-Br bond formed

Level of Redox

Mức độ oxy hóa khử

