

VEIN BATCH 2027



Sub: Organic المادة:

Lecture: *chapter 3* المحاضرة:

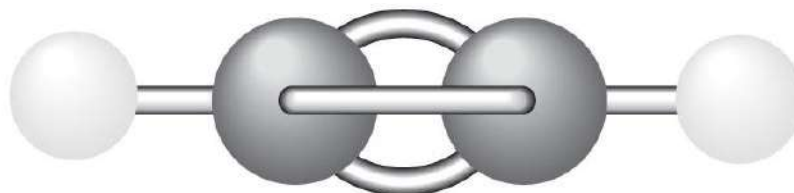
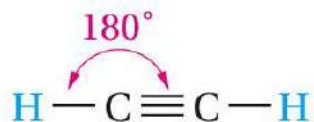
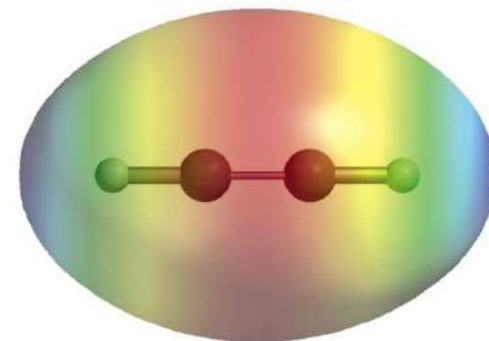
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Edited: تعديل:

Alkynes

من ناحية reactivity قريبة من الألكين

- Alkynes are sp hybridized
- Linear – bond angle 180°
- 2 σ and 2 π bond (or 1 single and 1 triple)
- $C\equiv C$ double bond $\sim 1.21 \text{ \AA}$



Alkynes: Reactions

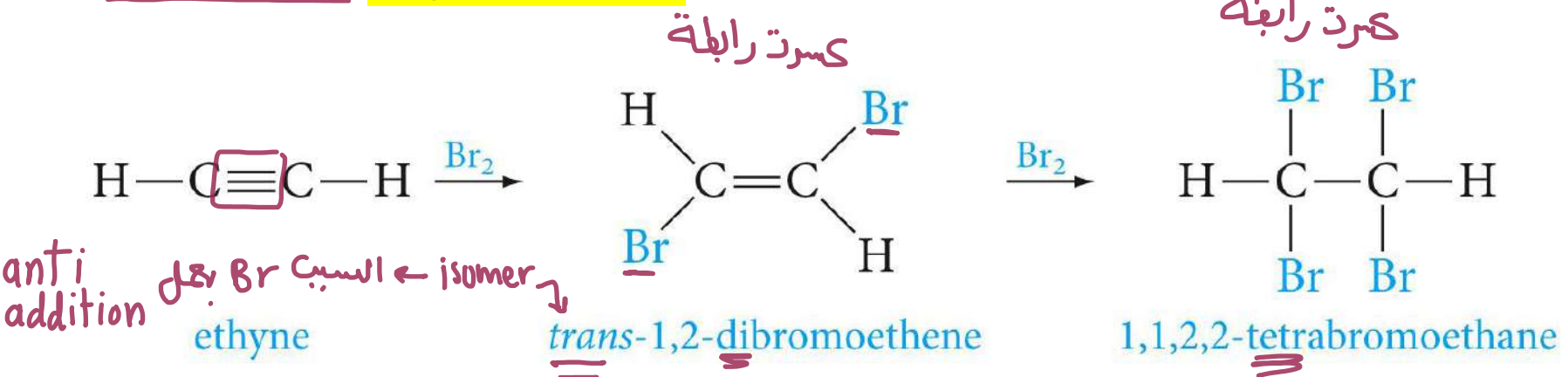
Most ^{*} of the reactions discussed for alkenes also apply to alkynes, although the alkynes usually react slower.

There are a couple of differences.

Alkynes: Reactions

①

Bromination: the first bromine adds trans to the alkyne. It can be stopped at this by controlling the amount of Br₂ present, but a second addition is possible. → Tetrahedral alkane

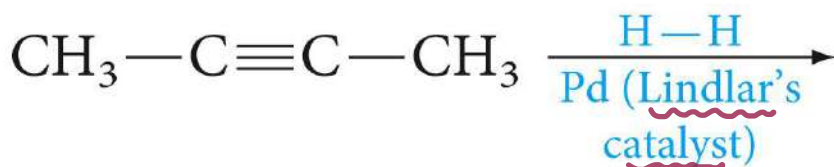


نفس ابي حينا باولکين
بھير

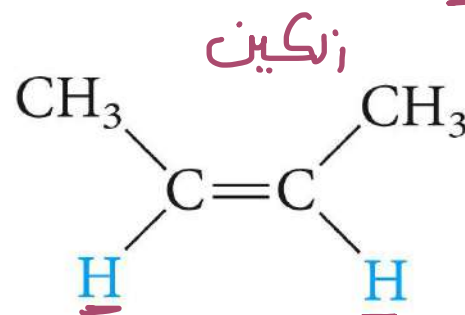
Alkynes: Reactions

②

Hydrogenation: ordinary Pt or Ni catalysts produce alkanes. However a special Pd catalyst called *Lindlar's reagent* causes only 1 H₂ in a syn addition to produce a cis-alkene



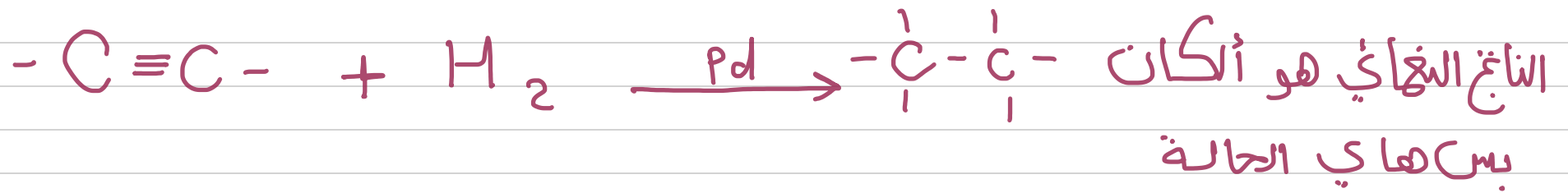
2-butyne
bp 27°C



cis-2-butene
bp 3.7°C

addition ↗
not anti

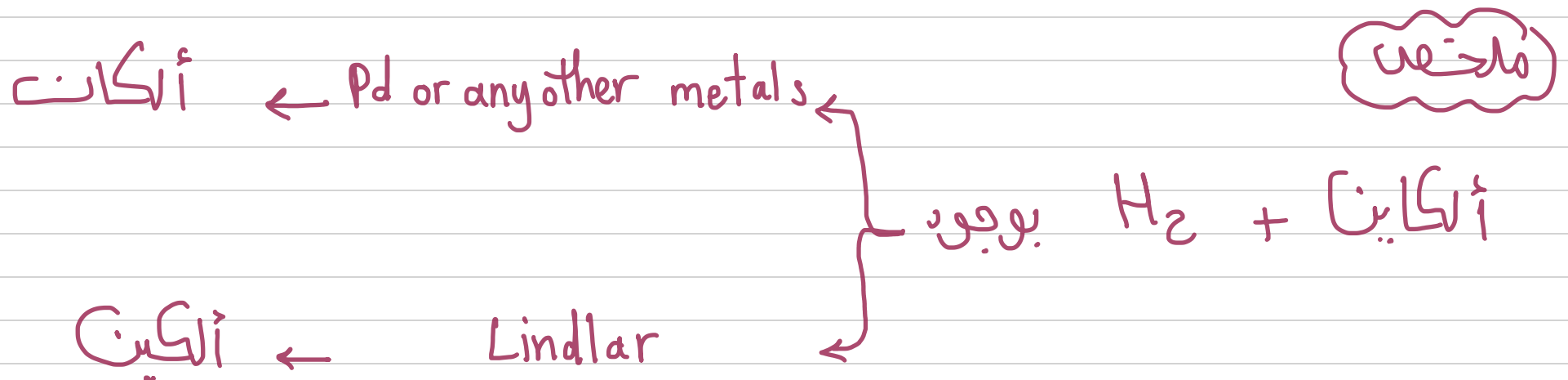
Cis isomer not trans because it is syn addition



وفي عمان طريقة لتحويل الألكاين إلى ألكين:



$$Pd + \text{other materials} \rightarrow \text{Lindlar}$$

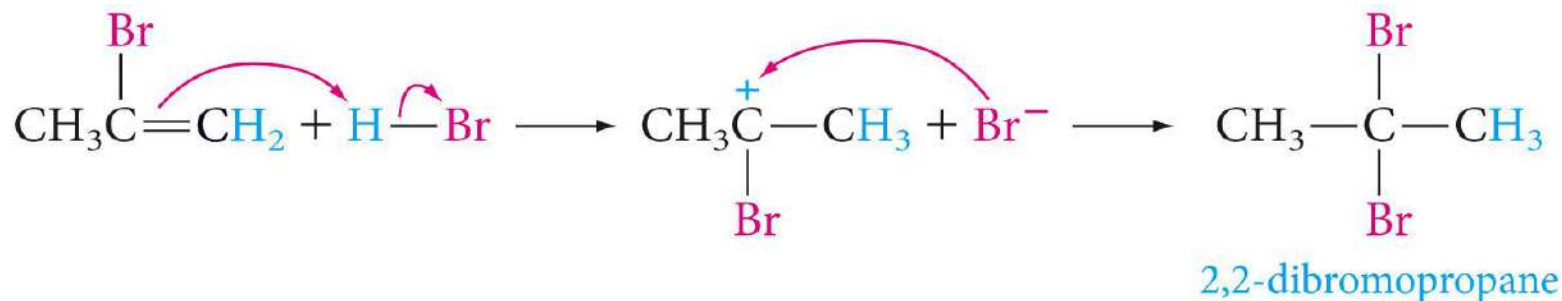
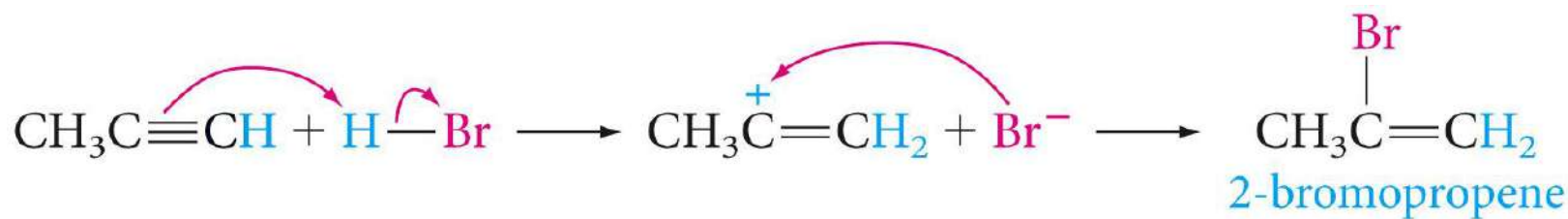


Alkynes: Reactions

③ Adding HX:

Markovnikov's rule is followed for asymmetric alkynes, R-C≡C-H

بحتاج 2 mole من HX



ألكاين

+
1 mole of HX



(ألكين)

+

1 mole of HX



(ألكان)

كله طبعا ماشي

مع ماركو فينكوف

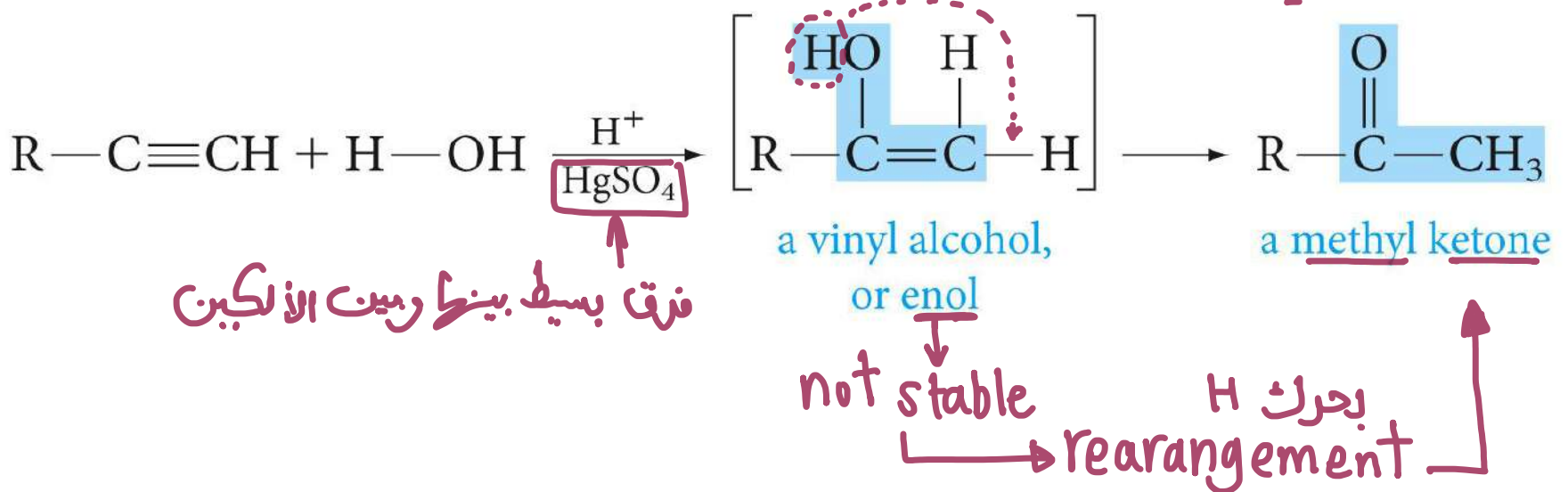


H ← للاكث H

X ← للاقل H

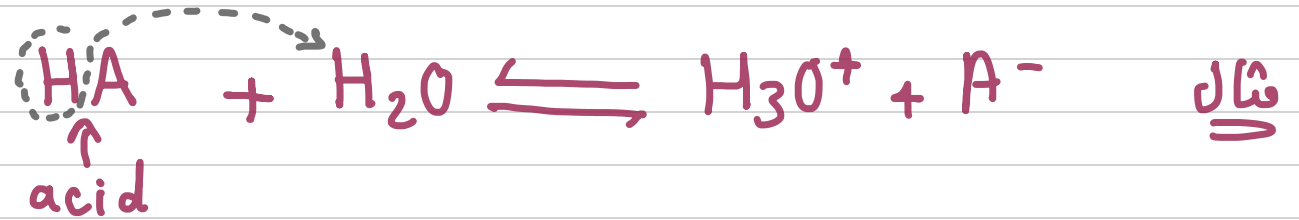
Alkynes: Reactions

④ $+H_2O$
Hydration: requires an additional mercury (Hg^{2+}) catalyst. The initial product, an enol, rearranges rapidly to form a ketone, i.e.



• كيف يوصف المادة انضام acidic ؟

حسب برونستد لوري انها بتقدم وبيعطي H^+ .



إذا acidity هي قدرة المركب (HA) انه يعطيني H^+ .

الدكتور حتى انضام فعلياً بتعتمد على stability و A^- و لكن هاد حنحكي عنه ب Ch 7

الكاين

sp

الكين

sp²

الكان

sp³

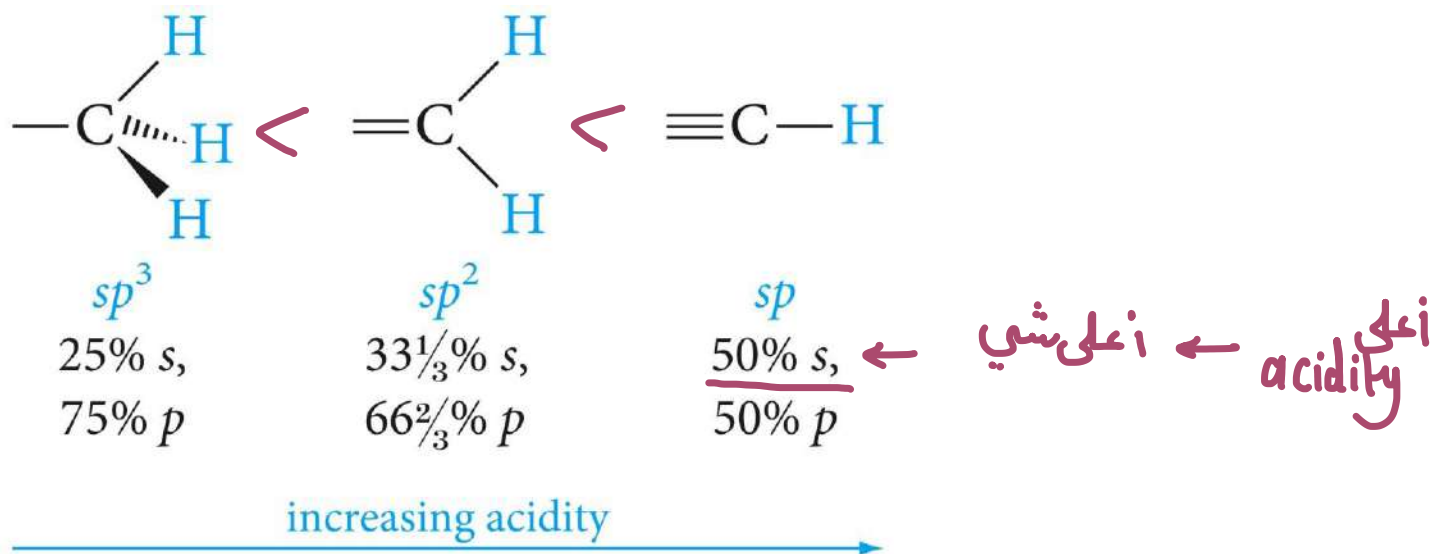
مين اعلى acidity ؟



السبب هو Hybridization نسبة s كلما كانت اعلى ار acidity

Alkynes: Acidity

The reason for the high acidity is the hybridization of the C atom in an alkyne. As the hybridization becomes more s like the acidity increases.



This is very important as it is one of the few ways to generate a carbon nucleophile!

Alkynes: Acidity

إلى شبكية مع sp carbon
أسهل وحدة انظر
تعطيني H^+

The alkyne proton is quite acidic for a hydrocarbon with a pK_a of ~ 25 . This means it can be removed by strong bases such as sodium amide (made by adding metallic sodium to ammonia).

