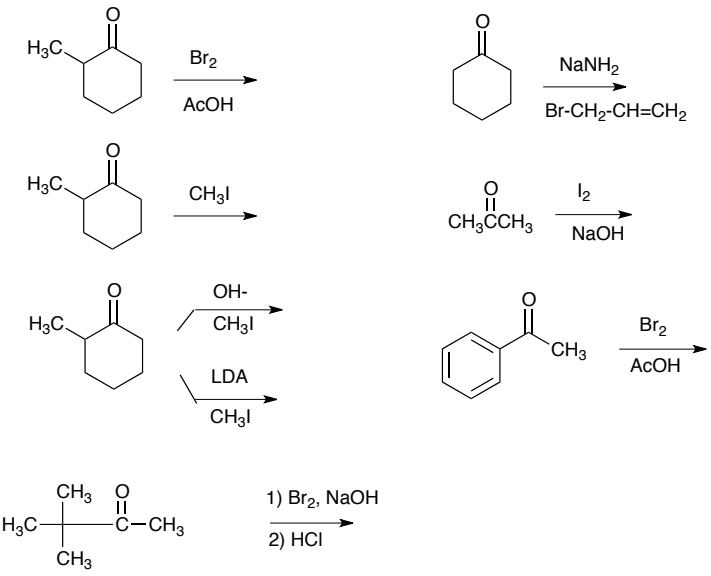
Ćwiczenia nr 2 – CHEMIA ORGANICZNA - semestr letni –
Aldehydy i Ketony, Reakcja Wittiga

1. Dokończ reakcje:



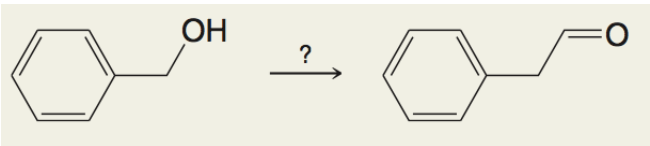
2. Jakich reagentów użyjesz do przeprowadzenia następujących reakcji

a) benzen -> bromobenzen -> bromek fenylomagnezowy -> alkohol benzylowy -> benzaldehyd
b) toluen -> kwas benzoesowy -> chlorek benzoilu -> benzaldehyd
c) bromek etylu -> 1-butyn -> butanon
d) 1-fenyloetanol -> acetofenon
e) benzen -> acetofenon
f) kwas benzoesowy -> acetofenon

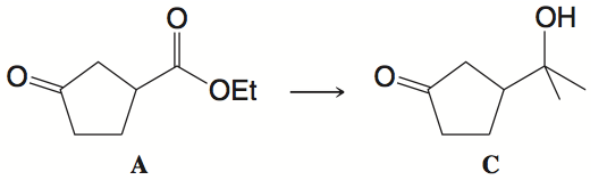
3. Wychodząc z Benzaldehydu zaproponować metodę syntezy:

(a) Benzyl alcohol
(b) Benzoic acid
(c) Benzoyl chloride
(d) Benzophenone
(e) 1-Phenylethanol
(f) 3-Methyl-1-phenyl-1-butanol
(g) Benzyl bromide
(h) Toluene
(i) $C_6H_5CH(OCH_3)_2$
(j) $C_6H_5CH^{18}O$

4. Przeprowadź następującą syntezę:

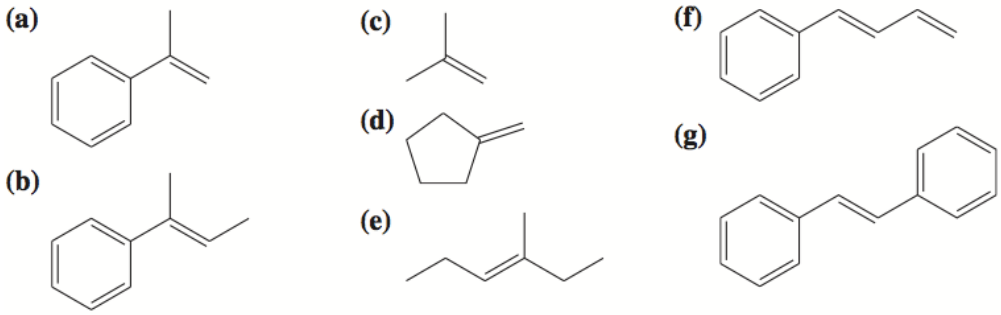


5. W jaki sposób wykorzystasz glikol etylenowy do następującego przekształcenia?



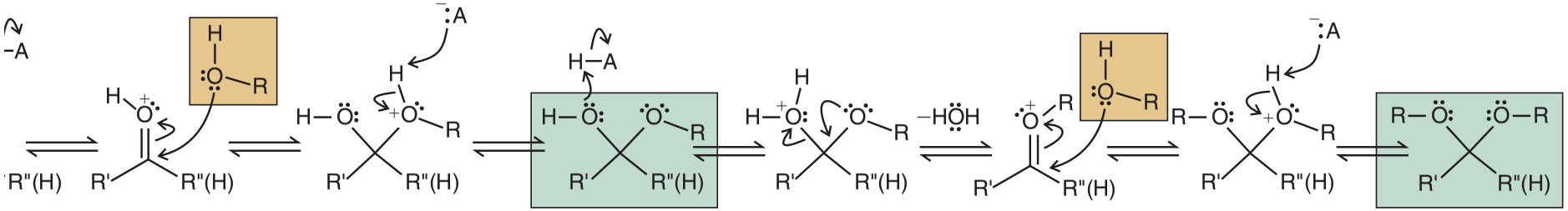
6. Pokaż w jaki sposób uzyskać przejścia wykorzystując: 1. reakcję utworzenia tioacetalu oraz 2. desulfuryzację na bazie Niklu Raneya:
   a) cykloheksanon -> cykloheksan b) benzaldehyd -> toluen

7. Wykorzystując reakcję Wittiga, mając do dyspozycji dowolnie potrzebny aldehyde, keton czy bromek alkilowy oraz trifenylofosfinę otrzymać poniższe struktury:



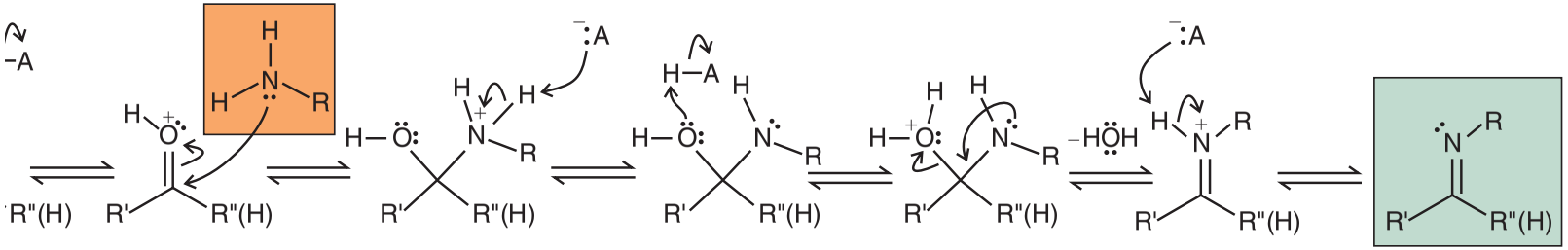
eps are nearly the same in acid-catalyzed reactions of aldehydes and ketones with alcohols and amines. Compare the isms vertically to see the similarities and differences. Note differences in completion of the mechanism for each type of product.

:etal and acetal formation: reaction with alcohols



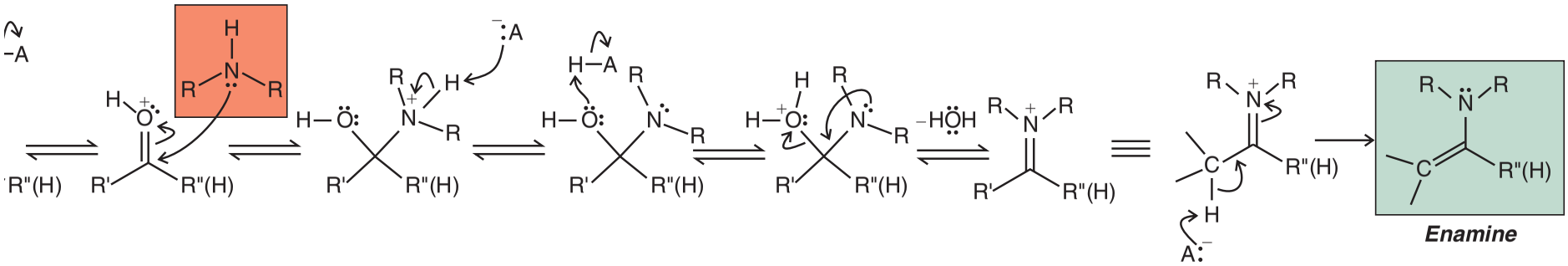
*In **acetal** formation, the oxonium ion is attacked by a second alcohol molecule.*

formation: reaction with primary amines

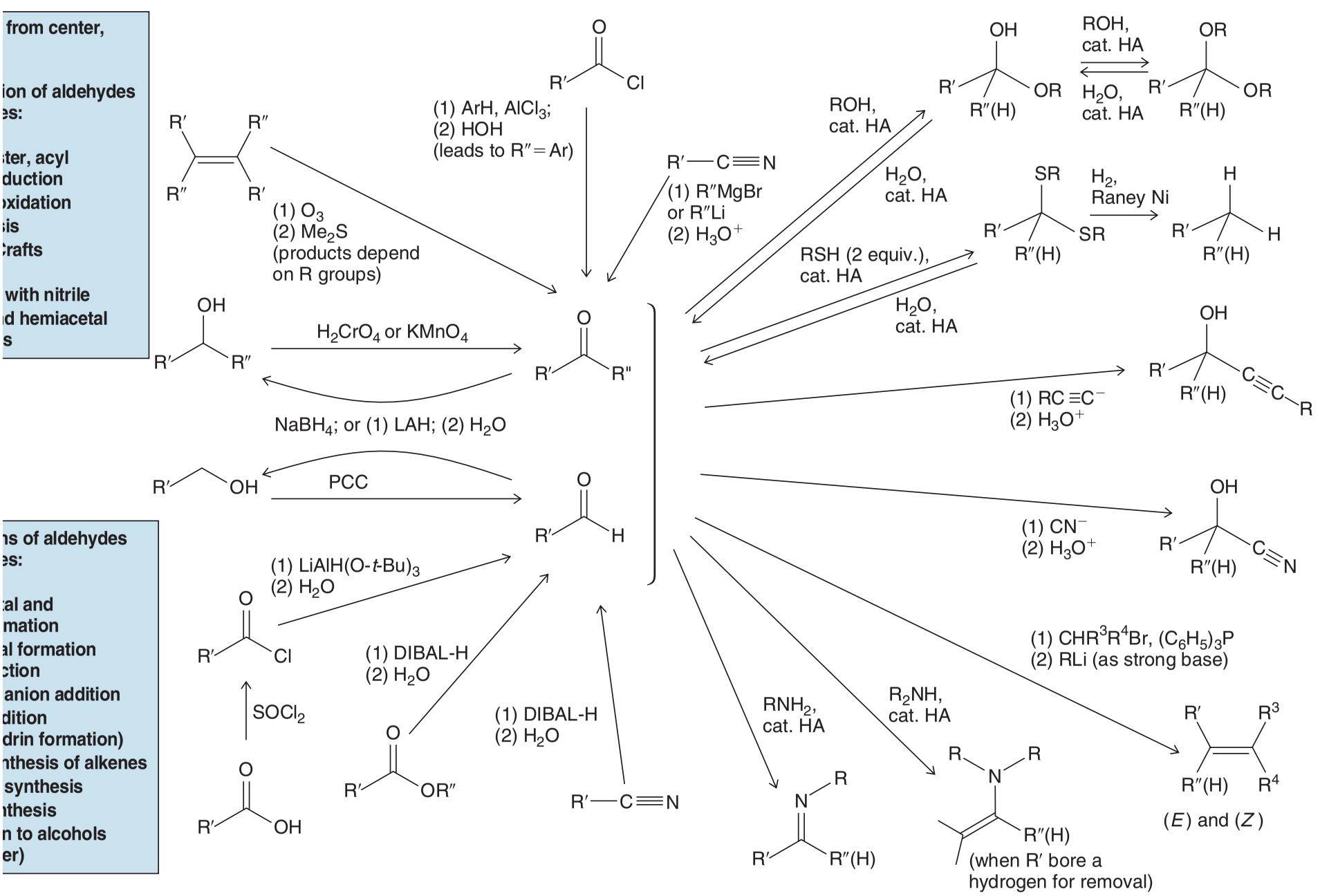


*In **imine** formation, the proton on the initial iminium ion is removed, leading to the stable imine product.*

ine formation: reaction with secondary amines



*In **enamine** formation, a proton is removed from a carbon adjacent to the iminium carbon (because no proton is available for removal from the nitrogen).*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er)
(1) O_3
(2) Me_2S
(products depend
on R groups)
(1) ArH, $AlCl_3$;
(2) HOH
(leads to R″ = Ar)
(1) R″MgBr
or R″Li
(2) H_3O^+
ROH,
cat. HA
H_2O,
cat. HA
RSH (2 equiv.),
cat. HA
H_2O,
cat. HA
H_2CrO_4 or $KMnO_4$
$NaBH_4$; or (1) LAH; (2) H_2O
PCC
(1) $RC{\equiv}C^-$
(2) H_3O^+
(1) CN^-
(2) H_3O^+
(1) $LiAlH(O\text{-}t\text{-}Bu)_3$
(2) H_2O
$SOCl_2$
(1) DIBAL-H
(2) H_2O
(1) DIBAL-H
(2) H_2O
H_2,
Raney Ni
RNH_2,
cat. HA
R_2NH,
cat. HA
(1) CHR^3R^4Br, $(C_6H_5)_3P$
(2) RLi (as strong base)
(E) and (Z)
(when R′ bore a
hydrogen for removal)

Wittig Reaction

reaction has proved to be a valuable method for synthesizing alkenes. The **ylide** the reaction is a molecule with no net charge but which has a negative carbon nt to a positive heteroatom, which in the Wittig reaction is a phosphorus atom. ylides are also called phosphoranes.

actions, which may produce multiple products when different β hydrogens are for removal.)

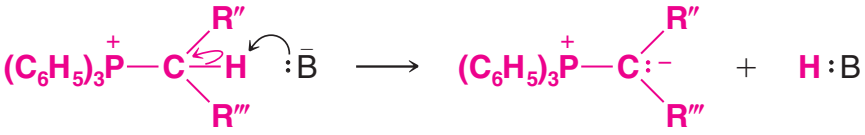
horus ylides are easily prepared from triphenylphosphine and primary or secondary des. Their preparation involves two reactions:

Reaction

1

Triphenylphosphine **An alkyltriphenylphosphonium halide**

2



A phosphorus ylide

Example

1

Methyltriphenylphosphonium bromide

can be represented as a hybrid of the two resonance structures shown nical calculations indicate that the contribution made by the first struc- portant.