

Universidad Nacional Autónoma de México

Química Orgánica IV (1606)

Laboratorio

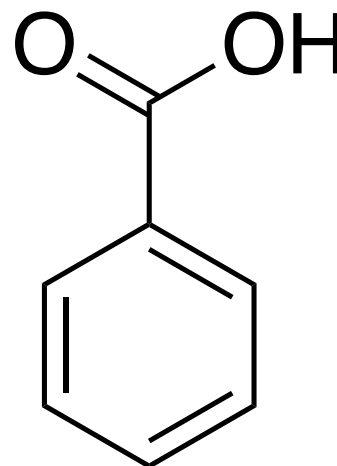
Semestre 2027 - 1



M. en C. Arturo García Zavala

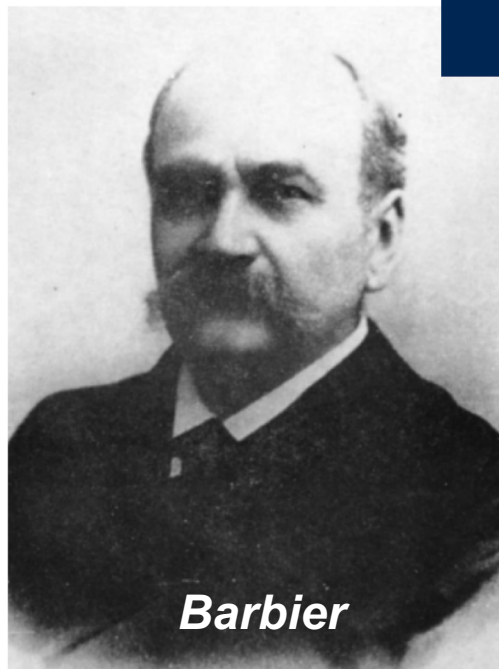
Práctica 4

Ácidos carboxílicos III
Carboxilación de Grignard

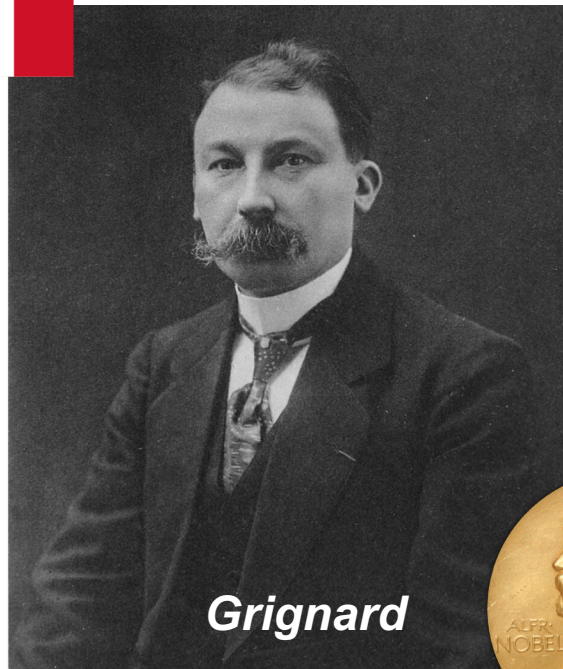


14/09/2026

Primeros
usos de
Mg
(1899)



Barbier



Grignard

Aislamiento,
análisis y
aplicación
de
RMgX
(1900*)



1912



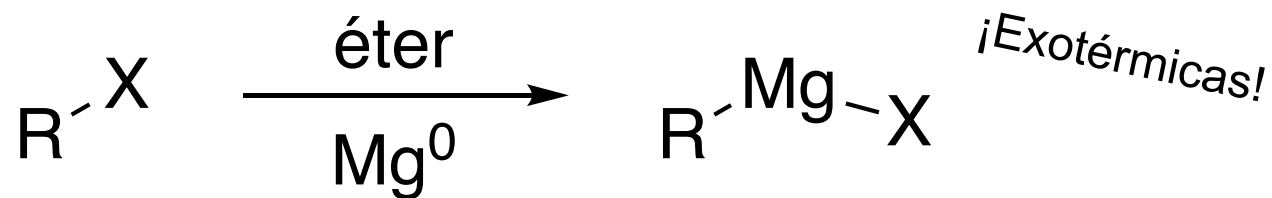
Barbier

Grignard

***Grignard, V.** Sur quelques nouvelles combinaisons organométalliques du magnésium et leur application à des synthèses d'alcools et d'hydrocarbures. *C. R. Hebd. Séances Acad. Sci.* 1900, 130, 1322–1324.

Reactivo de Grignard

Preparación



Grignard
(1901)



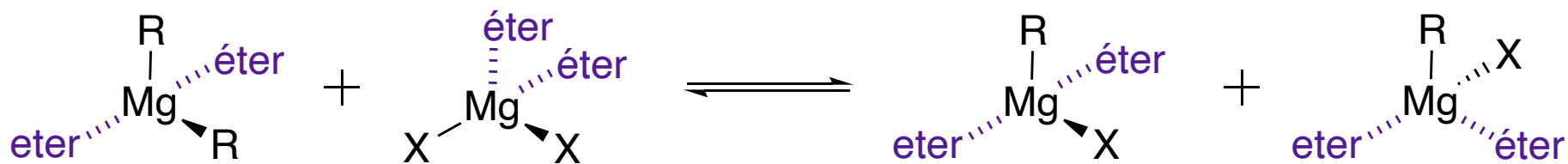
Schlenk
(1929)



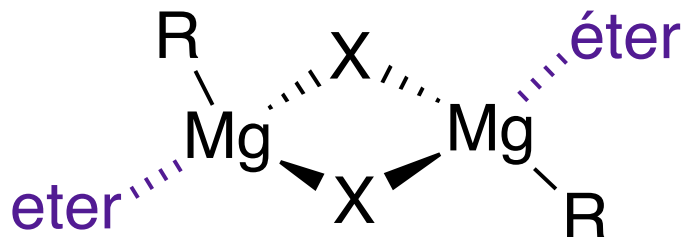
Powell, P. *Principles of Organometallic Chemistry*, 2nd ed.; Chapman and Hall: London, 1988; pp 50–54.

Reactivo de Grignard

Equilibrio de Schlenk



Especies dinucleares



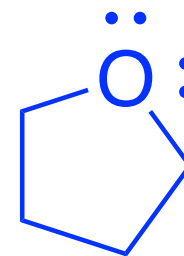
Peltzer, R. M.; Gauss, J.; Eisenstein, O.; Cascella, M. The Grignard Reaction—Unraveling a Chemical Puzzle. *J. Am. Chem. Soc.* **2020**, *142*, 2984–2994.

Reactivo de Grignard

¿Cuál éter utilizo?



Éter dietílico
(Dietil éter)

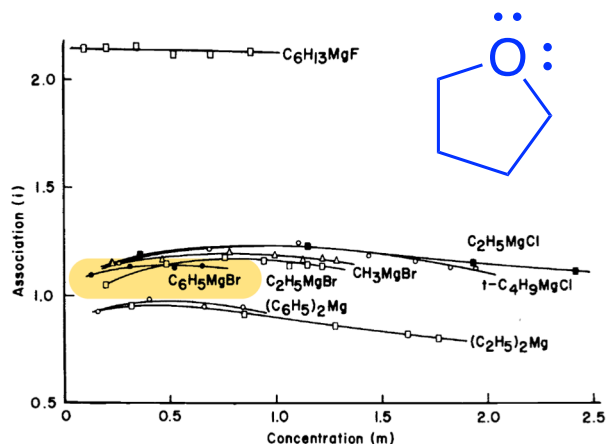


Tetrahidrofurano
(THF)

Reactivo de Grignard

THF

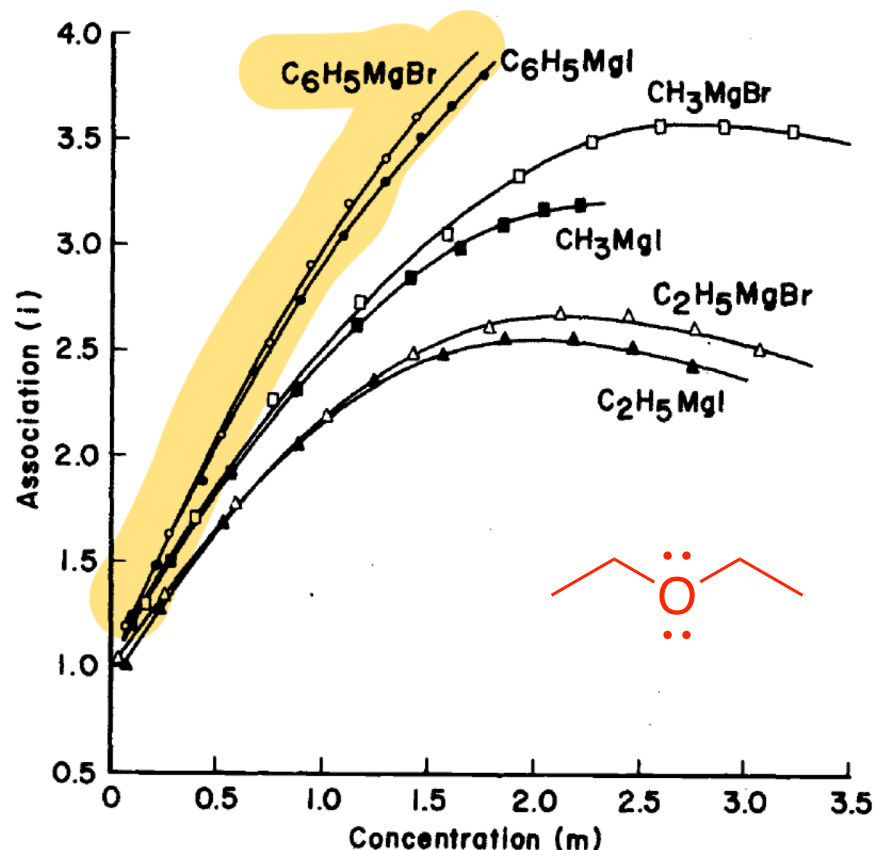
Dipolo permanente,
mejor solvatación,
menor asociación



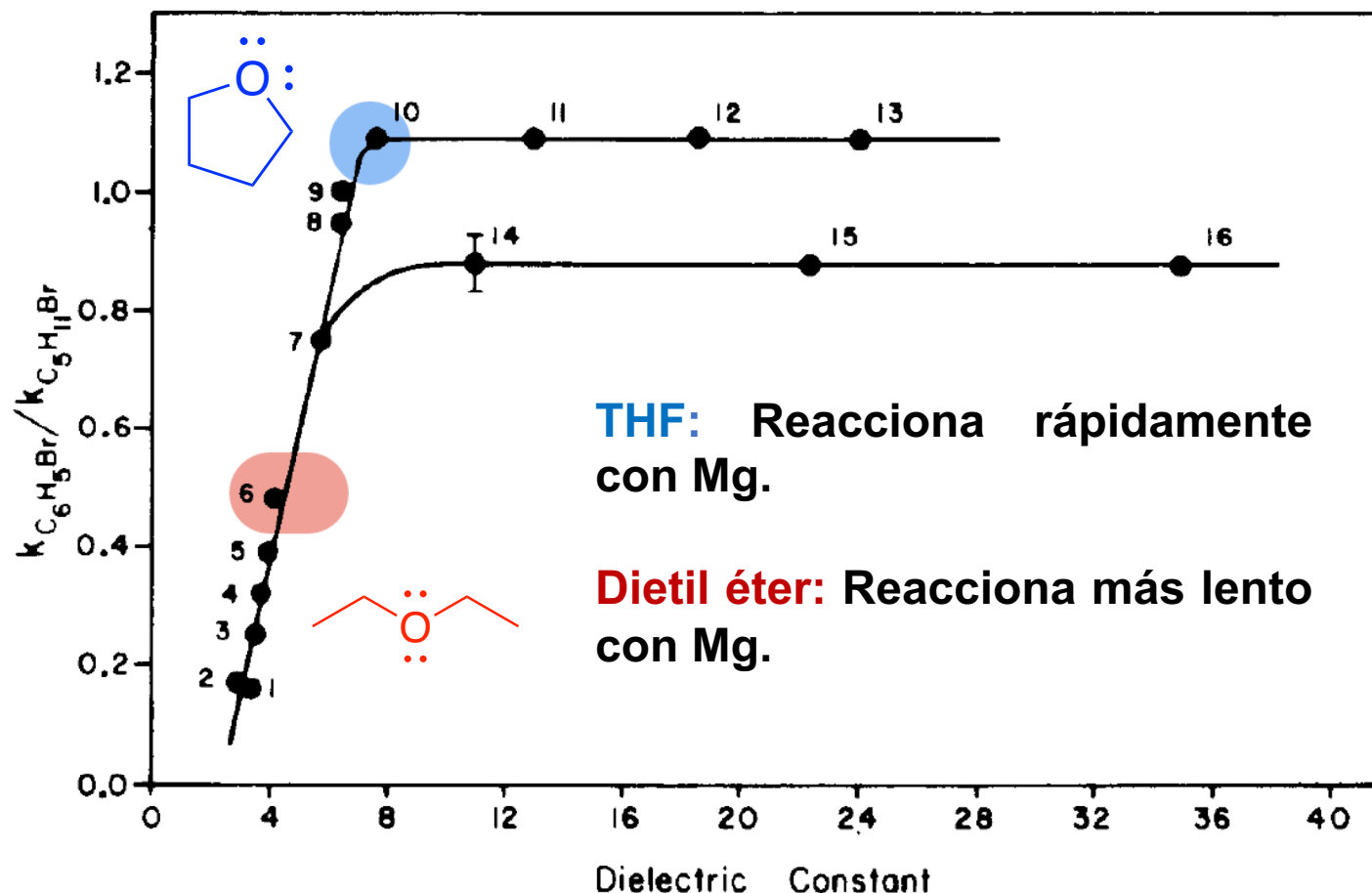
Ashby, E. C. A Detailed Description of the Mechanism of Reaction of Grignard Reagents with Ketones. *Pure Appl. Chem.* **1980**, 52, 545–569.

Dietil éter

Dipolo variable, peor solvatación,
mayor asociación



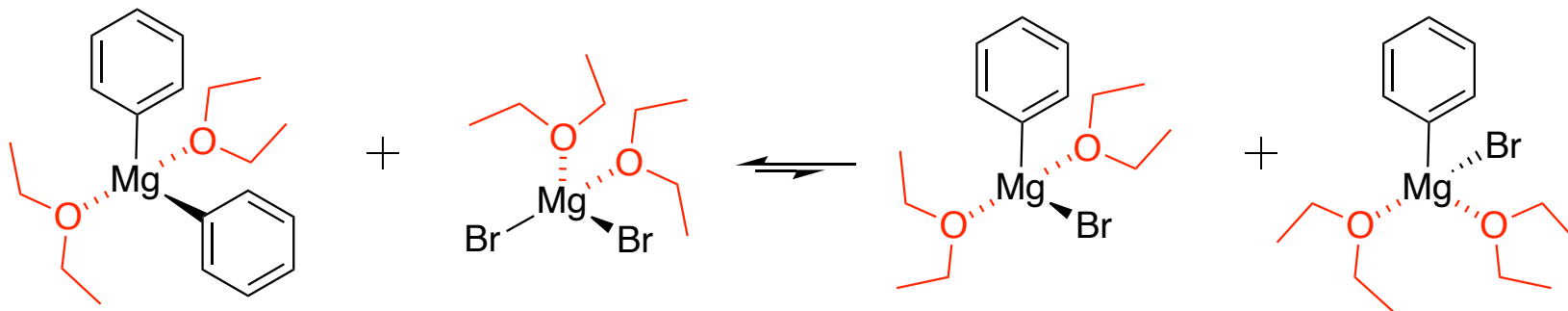
Reactivo de Grignard



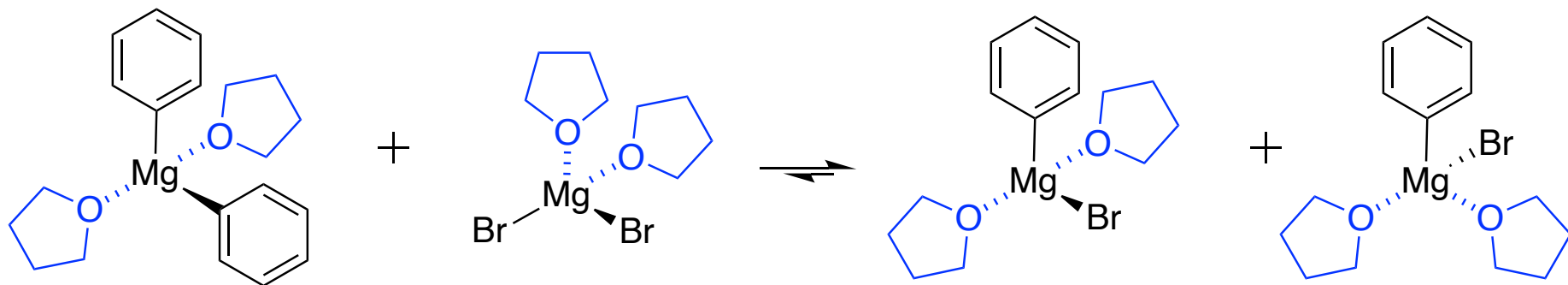
Rogers, H. R.; Rogers, R. J.; Mitchell, H. L.; Whitesides, G. M. Mechanism of Formation of Grignard Reagents. Kinetics of Reaction of Substituted Aryl Bromides with Magnesium and with Tri-*n*-butyltin Hydride in Ethereal Solvents. *J. Am. Chem. Soc.* **1980**, *102*, 231–238.

Reactivo de Grignard

¿Cuál éter utilizo?



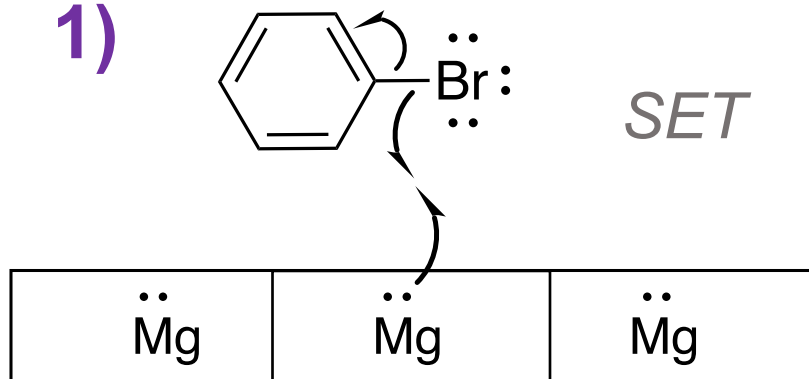
Depende



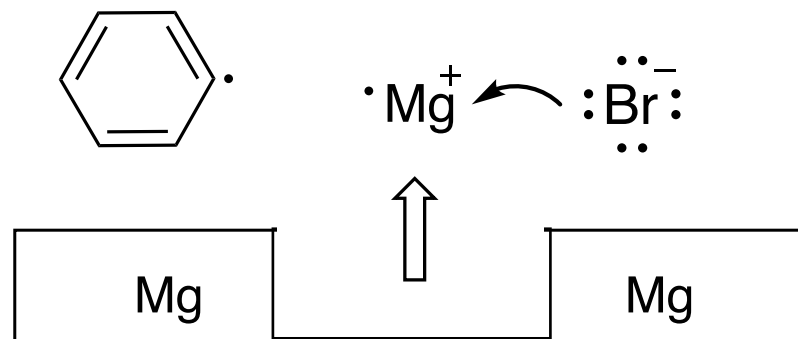
Formación de reactivo de Grignard

Mecanismo

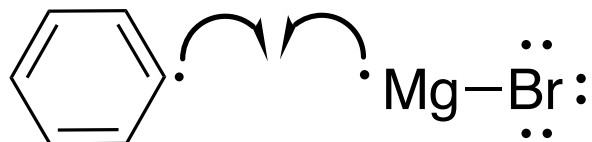
1)



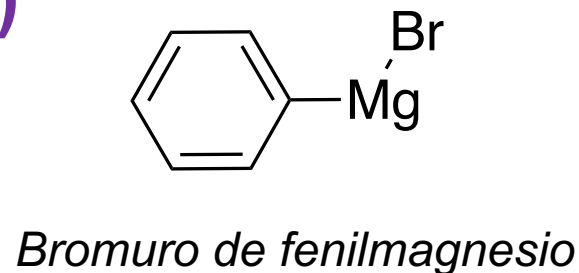
2)



3)



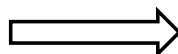
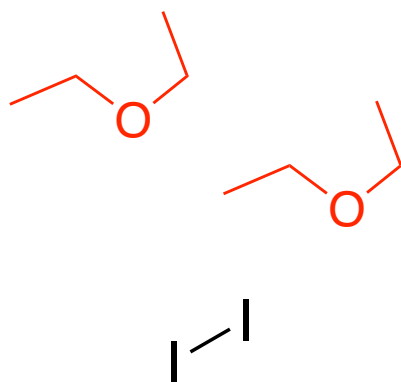
4)



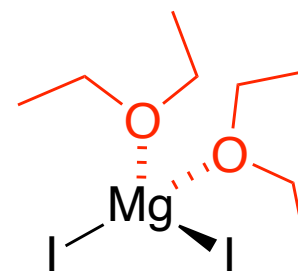
Li, J.J. (2014). Grignard reaction. In: Name Reactions. Springer, Cham. https://doi.org/10.1007/978-3-319-03979-4_122

Formación de reactivo de Grignard

Incremento de superficie de magnesio



El MgI_2 también captura agua

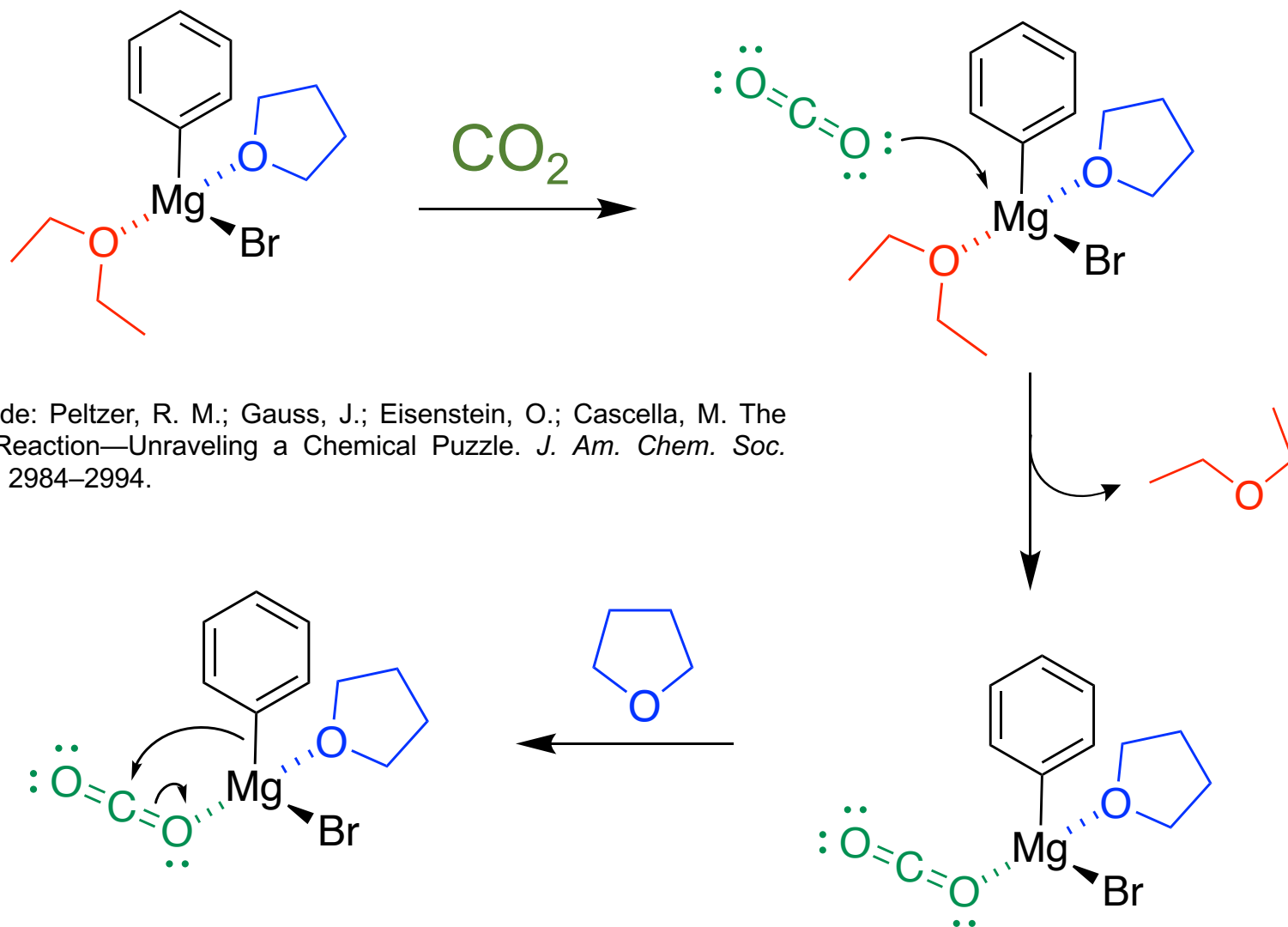


MgO		MgO
Mg	Mg	Mg
Mg	Mg	Mg

MgO		MgO
Mg		Mg
Mg	Mg	Mg

Powell, P. *Principles of Organometallic Chemistry*, 2nd ed.; Chapman and Hall: London, 1988; pp 50–54.

Carboxilación de Grignard



Adaptado de: Peltzer, R. M.; Gauss, J.; Eisenstein, O.; Casella, M. The Grignard Reaction—Unraveling a Chemical Puzzle. *J. Am. Chem. Soc.* **2020**, *142*, 2984–2994.

Carboxilación de Grignard

