

# DEPARTAMENTO DE QUÍMICA INORGÁNICA

Tutorial sobre [Organic Chemistry Portal](https://www.organic-chemistry.org)  
<https://www.organic-chemistry.org>

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La página web <https://www.organic-chemistry.org> ofrece, entre otros recursos, un listado de las reacciones más importantes en química orgánica y una selección de artículos relacionados con la síntesis orgánica que se va actualizando periódicamente. Dicho recurso resulta especialmente interesante para alumnos de los últimos cursos del Grado en Química.

En la página principal encontramos las distintas opciones que ofrece este portal. En la siguiente imagen se puede ver la interfaz de la página de inicio y las principales herramientas que presenta.

The screenshot shows the homepage of the Organic Chemistry Portal. On the left, there is a navigation menu with a red box highlighting the 'Main Categories' section, which includes 'Organic Reactions', 'Org. Chem. Highlights', 'Abstracts', 'Chemicals', 'Chemistry Tools', 'Chemistry Books', 'Job Market', and 'Product of the Month'. Below this are links for 'C-H activation with PolyCYPs+', 'Archive', 'Resources & Suppliers', 'Advertisement', and 'Imprint'. The main content area features a search bar, social media sharing options, and a 'From SINCOMPOUND' banner. Below this, there are several featured articles with their titles and authors, such as 'The Dong Synthesis of Phainoid A' and 'C-H Functionalization: The Davies/Sorensen Synthesis of Aflatoxin B<sub>2</sub>'. A large advertisement for 'PolyCYPs enzymes' is prominently displayed on the right side of the page.

Dentro de la categoría '**Organic Reactions**', pinchando en el apartado '**Name reactions**' podemos encontrar un extenso listado de reacciones orgánicas clasificadas por nombre y ordenadas alfabéticamente.

Organic Chemistry Portal

Site Search

any all words

Main Categories

Organic Reactions

Org. Chem. Highlights

Abstracts

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Job Market

Product of the Month

C-H activation with PolyCYPs+ Screening Kit

Archive

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Organic Chemistry Portal

Reactions >> Search, Name Reactions, Protecting Groups, Special Topics

Organic Reactions

Name Reactions

Contains information on the most important Name Reactions and keywords for the field of organic synthesis.

Organic Synthesis Search

A graphical index of bond types provides links to search for specific transformations of interest and locate examples to use in solving synthetic problems.

Protecting Groups

The Protecting Groups list contains stability data for the most important groups. The coverage of current protection and deprotection methods is continuously expanded.

Total Syntheses

Total synthesis has its roots in the mid-19th century, primarily as means for confirmation of structures. Today, scale-up and analogue synthesis of recently uncovered biochemically active species is more important.

Special Topics

Flow Chemistry, Green Chemistry, Microwave Synthesis, Multicomponent Reactions, Organocatalysis, Sonochemistry

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Organic Chemistry Portal

Reactions

Name Reactions

Please use the following URL if you want to set a link: <https://www.organic-chemistry.org/namedreactions/>

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

^ a

Acetoacetic Ester Condensation

Acetoacetic Ester Synthesis

Acyloin Condensation

Alder-Ene Reaction

Aldol Addition

Aldol Condensation

Appel Reaction

Arbuzov Reaction

Arndt-Eistert Synthesis

Azide-Alkyne 1,3-Dipolar Cycloaddition

Azo Coupling

^ b

Baeyer-Villiger Oxidation

Baker-Venkataraman Rearrangement

Balz-Schiemann Reaction

Bamford-Stevens Reaction

Barton Decarboxylation

Cada uno de los enlaces a los distintos nombres de reacción incluye un esquema general con la correspondiente explicación a la reacción en cuestión, el esquema del mecanismo de reacción, un enlace a bibliografía relacionada y los nombres (con sus correspondientes links) de reacciones similares.

A continuación, se muestra la reacción de acoplamiento de Buchwald-Hartwig (**Buchwald-Hartwig Cross Coupling Reaction**), y podemos ver que aparecen los enlaces a la bibliografía (**Literature**) y a las reacciones relacionadas (**Related Reactions**: Chan-Lam Coupling, Ullmann Reaction, Synthesis of aryl amines, Synthesis of diaryl ethers).

**Further Information**  
Literature

**Related Reactions**  
Chan-Lam Coupling  
Ullmann Reaction  
Synthesis of aryl amines  
Synthesis of diaryl ethers

**Buchwald-Hartwig Cross Coupling Reaction**

$$\text{R-C}_6\text{H}_4\text{-X} + \text{H}_2\text{NR}' \xrightarrow[\text{dioxane, 100}^\circ\text{C}]{\text{PdCl}_2(\text{dppf}) (\text{cat.}), \text{NaOtBu}} \text{R-C}_6\text{H}_4\text{-NHR}'$$

R = Alkyl, CN, COR, ...  
R' = Alkyl, Aryl

Palladium-catalyzed synthesis of aryl amines. Starting materials are aryl halides or pseudohalides (for example triflates) and primary or secondary amines.

$$\text{Ar-X} + \text{HO-Ar}' \xrightarrow[\text{toluene, 100}^\circ\text{C}]{\text{Pd}(\text{OAc})_2 (\text{cat.}), \text{ligand}, \text{K}_3\text{PO}_4} \text{Ar-O-Ar}'$$

X: Cl, Br

The synthesis of aryl ethers and especially diaryl ethers has recently received much attention as an alternative to the [Ullmann Ether Synthesis](#).  
Newer catalysts and methods offer a broad spectrum of interesting conversions.

**Mechanism of the Buchwald-Hartwig Coupling**

Otra interesante utilidad que presenta la categoría '**Organic Reactions**' es la de '**Protecting groups**'.

**Organic Chemistry Portal**

**Site Search**  
 >>  
 any  all words

**Main Categories**  
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**Product of the Month**  
**C-H activation with**  
 PolyCYPs+  
 A High-Throughput Product  
 Screening Kit  
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**BIOSYNTHESIS** - intermediates and building blocks for organic synthesis and drug discovery

**Carbosynth**

**Organic Chemistry Portal**  
**Reactions** >> Search, Name Reactions, Protecting Groups, Special Topics

**Organic Reactions**

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**Organic Synthesis Search**  
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**Protecting Groups** ←

The Protecting Groups list contains stability data for the most important groups. The coverage of current protection and deprotection methods is continuously expanded.

**Total Syntheses**  
 Total synthesis has its roots in the mid-19th century, primarily as means for confirmation of structures. Today, scale-up and analogue synthesis of recently uncovered biochemically active species is more important.

**Special Topics**  
[Flow Chemistry](#), [Green Chemistry](#), [Microwave Synthesis](#), [Multicomponent Reactions](#), [Organocatalysis](#), [Sonochemistry](#)

Aquí se puede encontrar una lista de los grupos protectores más importantes y, dentro de cada uno de estos grupos, aparecen los datos de estabilidad y los métodos de desprotección.

Organic Chemistry Portal  
Reactions >> Protecting Groups >> Stability

**Protecting Groups**

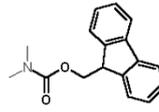
Stability data for the most frequently used protective groups, protection and deprotection methods

Functional Groups:

- Amino
- Carbonyl
- Carboxyl
- Hydroxyl (1,2-, 1,3-Diols)

Amino >> Stability

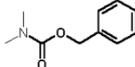
9-Fluorenylmethyl carbamate (Fmoc-NRR')



t-Butyl carbamate (Boc-NRR')



Benzyl carbamate (Z-NRR', Cbz-NRR')



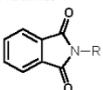
Acetamide



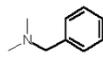
Trifluoroacetamide



Phthalimide



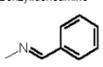
Benzylamine (Bn-NRR')



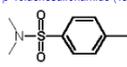
Triphenylmethylamine (Tr-NRR')



Benzylideneamine



p-Toluenesulfonamide (Ts-NRR')



Como ejemplo, se muestran a continuación los datos que podemos encontrar sobre el grupo *tert*-butil carbamato. En la tabla aparece la estabilidad de dicho grupo en agua, a distintos pHs, frente a bases, nucleófilos, electrófilos y frente a reacciones de oxidación y reducción.

Organic Chemistry Portal  
Reactions >> Protecting Groups >> Stability

**tert-Butyl carbamates**

BOC-NR<sub>2</sub>, BOC amines, BOC amino, BOC amide

T. W. Green, P. G. M. Wuts, *Protective Groups in Organic Synthesis*, Wiley-Interscience, New York, 1999, 518-525, 736-739.

Stability

	pH < 1, 100°C	pH = 1, RT	pH = 4, RT	pH = 9, RT	pH = 12, RT	pH > 12, 100°C
Bases:	LDA	NEt <sub>3</sub> , Py	t-BuOK	Others:	BOC	ROO <sub>2</sub>
Nucleophiles:	RLi	RMgX	ROsO <sub>4</sub>	Enolates:	TMH, R <sub>3</sub> NH <sub>2</sub>	NaOCH <sub>3</sub>
Electrophiles:	NO <sub>2</sub> Cl	RCOCl	CH <sub>3</sub> I	Others:	SO <sub>2</sub>	SO <sub>2</sub> ·NH <sub>2</sub>
Reductions:	H <sub>2</sub> / Ni	H <sub>2</sub> / Rh	Zn / HCl	LiAlH <sub>4</sub>	LiAlH <sub>4</sub>	LiAlH <sub>4</sub>
Oxidations:	KMnO <sub>4</sub>	OxO <sub>4</sub>	OxO <sub>4</sub> / Py	BrO <sub>3</sub> COOH	Cl <sub>2</sub> , Br <sub>2</sub> , O <sub>3</sub>	MnO <sub>2</sub> / CH <sub>2</sub> Cl <sub>2</sub>

General

The formation of Boc-protected amines and amino acids is conducted under either aqueous or anhydrous conditions, by reaction with a base and the anhydride Boc<sub>2</sub>O. Active esters and other derivatives such as Boc-OH<sub>2</sub> and Boc-N<sub>3</sub> can also be used.

$$R-NH_2 + \text{Boc}_2O \xrightarrow[\text{H}_2O, \text{THF}]{\text{NaHCO}_3} R-NH-CO-O-C(CH_3)_3 \xrightarrow[\text{diarsane}]{\text{HCl}} R-NH_2$$

The Boc group is stable towards most nucleophiles and bases. Therefore, an orthogonal protection strategy using a base-labile protection group such as Fmoc is possible. *tert*-Butyl carbamates are cleaved under anhydrous acidic conditions with the production of *tert*-butyl cations. Scavengers such as thiophenol may prevent nucleophilic substrates from being alkylated.