**CHEM 303 REPORT**

**SUZUKI CROSS COUPLING**

**Name and Surname**: Elif Nazenin Giray **Date of Experiment**:30.12.2021

**Section**:3 (Thursday)

**1.Reaction Scheme**





**2.Table of Reactants and Reagents**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Reagents/Reactants** | **Mol/mmol** | **Mwt**  **(g/mol)** | **Mass**  **(g or mg)** | **equivalence** | **Volume** | **Density** |
| 4-Bromobenzoic acid | 2,5 mmol | 201,02 g/mol | 0,50 g | 0,10 |  |  |
| Phenylboronic acid | 3,0 mmol | 121,93 g/mol | 0,37 g | 0,12 |  |  |
| Sodium carbonate | 7,5 mmol | 105,99 g/mol | 0,80 g | 0,30 | 10 mL | 0,081 g/mL |
| Palladium catalyst solution | 0,00025 mmol |  |  | 10-5 | 1 mL |  |
| Hydrochloric acid | 25 mmol | 36,46 g/mol | 0,91 g | 1 | 25 mL | 0,036 g/mL |

**3.Reaction Mechanism**



**4.Procedure**

After stirring start heating reaction mixture up 70when temperature up this point add 1.0 mL 0.25 mM palladium then keep this temperature 30 minutes

Place 0.50 g 4-bromobenzoic acid and 0.37 g phenylboronic acid an Erlenmeyer flask and start stirring. In Separate beaker 0.80 g Na2CO3 and 15 mL of deionized water .Stir mixture until reactants dissolved.

Add 25 mL of HCl to Erlenmeyer flask which in the ice bath .Isolate the product by vacuum filtration .Add white precipitates to Erlenmeyer flask.

Put the Erlenmeyer flask in ice bath and stir ice bath. Add HCl dropwisely.

Add 4 mL HCl to Erlenmeyer flask then heat and stir solution about 70°C.

Slowly add 30 mL EtOH.

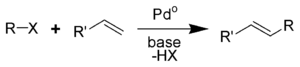
Keep the Erlenmeyer flask in ice bath for 15 minutes .

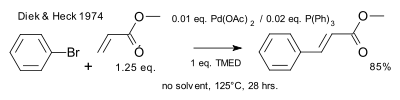
By vacuum distillation take the precipitates

**5.Questıons**

**1)** Greener reaction has some properties; these properties are energy-saving time and yield and less waste. Suzuki reaction becomes greener in some ways; these ways are microwave irradiation; this method decreases the completion time of reaction instead of traditional heating. Furthermore, a small number of ionic liquids added onto to HNT external surface cause an improved yield. These methods become both in Suzuki reaction become greener.

**2)** ***The Heck reaction*** (also called the Mizoroki–Heck reaction) is the [chemical reaction](https://en.wikipedia.org/wiki/Chemical_reaction) of an unsaturated [halide](https://en.wikipedia.org/wiki/Halide) (or [triflate](https://en.wikipedia.org/wiki/Triflate)) with an [alkene](https://en.wikipedia.org/wiki/Alkene) in the presence of a [base](https://en.wikipedia.org/wiki/Base_(chemistry)) and a [palladium catalyst](https://en.wikipedia.org/wiki/Palladium_catalyst) (or palladium [nanomaterial-based catalyst](https://en.wikipedia.org/wiki/Nanomaterial-based_catalyst)) to form a substituted alkene.





***The Sonogashira reaction*** is a [cross-coupling reaction](https://en.wikipedia.org/wiki/Cross-coupling_reaction) used in [organic synthesis](https://en.wikipedia.org/wiki/Organic_synthesis) to form [carbon–carbon bonds](https://en.wikipedia.org/wiki/Carbon%E2%80%93carbon_bond). It employs a [palladium](https://en.wikipedia.org/wiki/Palladium) [catalyst](https://en.wikipedia.org/wiki/Catalyst) as well as [copper](https://en.wikipedia.org/wiki/Copper) co-catalyst to form a carbon–carbon bond between a terminal [alkyne](https://en.wikipedia.org/wiki/Alkyne) and an [aryl](https://en.wikipedia.org/wiki/Aryl) or [vinyl halide](https://en.wikipedia.org/wiki/Vinyl_halide).

The Sonogashira Reaction

Diagram

Description automatically generated

***The Stille Coupling*** is a versatile C-C bond forming reaction between stannanes and halides or pseudohalides, with very few limitations on the R-groups. Well-elaborated methods allow the preparation of different products from all the combinations of halides and stannanes depicted below. The main drawback is the toxicity of the tin compounds used, and their low polarity, which makes them poorly soluble in water. Stannanes are stable, but boronic acids and their derivatives undergo much the same chemistry in what is known as the Suzuki Coupling.



A picture containing graphical user interface

Description automatically generated

**6. References**

[**https://chemistryscore.com/stille-reaction/**](https://chemistryscore.com/stille-reaction/)

[**https://en.wikipedia.org/wiki/Heck\_reaction**](https://en.wikipedia.org/wiki/Heck_reaction)

[**https://en.wikipedia.org/wiki/Sonogashira\_coupling**](https://en.wikipedia.org/wiki/Sonogashira_coupling)

[**https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/sonogashira-reaction**](https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/sonogashira-reaction)

[**https://www.organic-chemistry.org/namedreactions/stille-coupling.shtm**](https://www.organic-chemistry.org/namedreactions/stille-coupling.shtm)

Massaro M., Riela S., Lazzara G., GruttadauriaM., Milioto S.& Noto R.(2014*) Green conditions for the Suzuki reaction using microwave irradiation and a new HNT supported ionic liquid-like phase (HNT-SILLP) catalyst.*

DOI 10.1002/aoc.3114

<https://core.ac.uk/display/53288873?utm_source=pdf&utm_medium=banner&utm_campaign=pdf-decoration-v1>