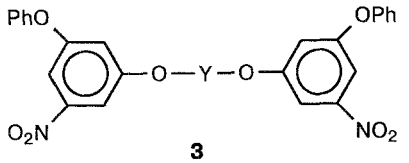
Ethers (**3**) were prepared in a similar way.



3

40—60 %

3,5-DNPAE: Ar = RC_6H_4 (R = H, 3-Me, 2-Me, 4-Br, 4-I, 4-F, 4-OH, 4-EtO, 4-COOH, 4-NH_2, 3-NEt_2, 4-MeCONH), 3-pyridyl, 2-naphthyl.
1: Ar = RC_6H_4 (R = H, 2-Me, 3-Me, 4-EtO, 4-Br, 4-I, 4-COOH), 2-naphthyl, 3-pyridyl.
2: Ar, Ar′ = Ph, 4-$EtOC_6H_4$; Ph, 4-IC_6H_4; Ph, 4-BrC_6H_4; Ph, 3-pyridyl; Ph, 4-FC_6H_4; Ph, 4-$HOOCC_6H_4$; 4-$EtOC_6H_4$, 3-MeC_6H_4.
3: Y is the corresponding moiety of hydroquinone, 2,2-bis-(4-hydroxyphenyl)propane, 2,2-bis(4-hydroxyphenyl)hexafluoropropane, or 4,4′-dihydroxydiphenyl sulfone.

Through the action of phenols, even the nitro group in 5-nitroresorcinol diaryl ethers can be replaced, *i.e.*, activation by other nitro groups is not required. This was shown using the reaction of **1** (R = Ph) with phenol (in *N*-methylpyrrolidone in the presence of K_2CO_3, 200 °C, 2 h) as an example. This reaction affords the known[3] triphenyl phloroglucinol ether.

3,5-DNPAE and compounds **1—3** prepared for the first time were characterized by ^1H, ^{13}C, and $^{14(15)}N$ NMR, IR, and mass spectra and also by the elemental analysis data.

References

1. N. N. Mel'nikov, *Pestitsidy. Khimiya, tekhnologiya, primenenie* [*Pecticides. Chemistry, Techonogy, and Use*], Khimiya, Moscow, 1987, 123 (in Russian).
2. T. Yoshimoto, K. Igarashi, T. Fujita, and T. Harayama, *J. Pesticide Sci.*, 1990, **15**, 341.
3. F. Ullman and P. Sponagel, *Chem. Ber.*, 1905, **38**, 2211.

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Palladium catalyzed cross-coupling of symmetrical diaryliodonium salts with sodium tetraphenylborate in water

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It has been shown previously that palladium-catalyzed reactions of aryl halides with organoboron compounds,[1] olefins,[2,3] carbon oxide,[4] and terminal acetylenes[5] occur in water at high rates and with high yields. Apart from aryl halides, diaryliodonium salts can be used in the catalytic reactions.[6—8]

We found that in the presence of catalytic amounts of $PdCl_2$, symmetrical diaryliodonium salts readily react with sodium tetraphenylborate when heated in water, irrespective of the nature of X, to give the corresponding diaryls in high yields. For participation of all four of the phenyl groups in Ph_4BNa in the reaction, the presence of a base, Na_2CO_3, is necessary:

$$2\ Ar_2IX + Ph_4BNa \xrightarrow[Na_2CO_3,\ H_2O]{1\ mol.\%\ PdCl_2} 4\ Ar{-}Ph \quad 96{-}98\ \%$$

X = HSO_4, BF_4, CF_3COO

Ar = *m*-$NO_2C_6H_4$, *p*-FC_6H_4, Ph

The reaction occurs in two steps:

$$1.\ Ar_2IX + \left[Ph{-}B\right] \xrightarrow{\text{"Pd"}} Ar{-}Ph + ArI + \left[X{-}B\right]$$

$$2.\ ArI + \left[Ph{-}B\right] \xrightarrow{\text{"Pd"}} Ar{-}Ph + \left[I{-}B\right]$$

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The first step involves cross-coupling of a diaryliodonium salt with the organoboron compound to give the product of phenylation and aryl iodide. Aryl iodide reacts in the second step. The intermediate formation of aryl iodide was confirmed by GLC.

The catalytic cycle of each of the steps involves oxidative addition, transmetallation, and reductive elimination.[9]

1 mmol of $(m\text{-}NO_2C_6H_4)_2IHSO_4$, 0.55 mmol of Ph_4BNa, 2 mmol of Na_2CO_3, 5 mL of H_2O, and 0.1 mL of a 0.1 *M* aqueous solution (0.01 mmol) of $PdCl_2$ were stirred for 1 h at 80 °C under argon, cooled to ambient temperature, and extracted with ether. The ethereal extracts were washed with water and dried with Na_2SO_4. Removal of the solvent gave 0.382 g (96 %) of *m*-nitrodiphenyl, m.p. 62 °C (from ethanol).[10]

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References

1. N. A. Bumagin, V. V. Bykov, and I. P. Beletskaya, *Dokl. Akad. Nauk SSSR*, 1990, **315**, 1133 [*Dokl. Chem.*, 1990, **315** (Engl. Transl.)].
2. N. A. Bumagin, P. G. More, and I. P. Beletskaya, *J. Organomet. Chem.*, 1989, **371**, 397.
3. N. A. Bumagin, L. I. Sukhomlinova, T. P. Tolstaya, and I. P. Beletskaya, *Dokl. Akad. Nauk*, 1993, **332**, 455 [*Dokl. Chem.*, 1990, **332** (Engl. Transl.)].
4. N. A. Bumagin, K. V. Nikitin, and I. P. Beletskaya, *Dokl. Akad. Nauk SSSR*, 1990, **312**, 1129 [*Dokl. Chem.*, 1990, **312** (Engl. Transl.)].
5. E. V. Luzikova, N. A. Bumagin, and I. P. Beletskaya, *Izv. Akad. Nauk, Ser. Khim.*, 1993, 616 [*Russ. Chem. Bull.*, 1993, **42**, 585 (Engl. Transl.)].
6. M. Uchiama, T. Suzuki, and Y. Yamazakiy, *Nippon Kagaku Kaishi*, 1982, **2**, 236.
7. N. A. Bumagin, L. I. Sukhomlinova, A. N. Vanchikov, T. P. Tolstaya, and I. P. Beletskaya, *Izv. Akad. Nauk, Ser. Khim.*, 1992, 2683 [*Bull. Russ. Acad. Sci., Div. Chem. Sci.*, 1992, **41**, 2128 (Engl. Transl.)].
8. M. Uchiama, T. Suzuki, and Y. Yamazaki, *Nippon Kagaku Kaishi*, 1985, **3**, 527, 558.
9. N. A. Bumagin and I. P. Beletskaya, *Usp. Khim.*, 1990, **59**, 2003 [*Russ. Chem. Rev.*, 1990, **59** (Engl. Transl.)].
10. W. Blakey and H. A. Scarborough, *J. Chem. Soc.*, 1927, 3003.

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Tris(*p*-nitrophenyl)(triphenylphosphinegold)methane

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A gold derivative of the triphenylmethane series was prepared for the first time. The treatment of tris(*p*-nitrophenylmethane) (**1**) with tris(phosphinegold)oxonium tetrafluoroborate in the presence of NaH in an argon atmosphere gave tris(*p*-nitrophenyl)(triphenylphosphinegold)methane (**2**) as a dark-blue crystalline solid with a dec. point above 170 °C that is relatively stable in the solid state at negative temperatures. Found (%): C, 53.27; H, 3.20; N, 4.83. $C_{37}H_{27}AuN_3O_6P$. Calculated (%): C, 53.05; H, 3.25; N, 5.01. UV (THF), λ_{max}/nm: 731, 523. IR (vaseline oil), ν/cm^{-1}: 1530 $\nu_{as}(NO_2)$; 1348, 1262, $\nu_s(NO_2)$.

$$(p\text{-}NO_2C_6H_4)_3CH + (Ph_3PAu)_3O^+BF_4^- \xrightarrow[NaH]{\text{abs. THF}} \underset{\mathbf{1}}{} \longrightarrow \underset{\mathbf{2}\quad (63\ \%)}{(p\text{-}NO_2C_6H_4)_3C(AuPPh_3)}$$

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