Parinthorn Temyarasilp 2014: Practical One Pot Methodology for Carbon-Heteroatom Bond Formation Mediated by Phosphorus Reagents and Synthesis of Chiral Biquinolyls as Precursors for Polydentate Auxiliaries. Doctor of Philosophy (Chemistry), Major Field: Chemistry, Department of Chemistry. Thesis Advisor: Assistant Professor Wanchai Pluempanupat, Ph.D. 373 pages.

A new and convenient method for carbon-heteroatom bond formation using trivalent phosphorus reagents in one pot reaction was disclosed.

The oxidation-reduction condensation between various nucleophiles and alkyl diphenylphosphites, generated *in situ* from alcohols and chlorodiphenylphosphine ($ClPPh_2$), proceeded smoothly in the presence of camphorquinone to furnish the corresponding products in low to high yields.

The halogenation of alcohols, carboxylic acid and phenol derivatives utilizing a new combination of triphenylphosphine (PPh_3) and halogenating agents smoothly converted into the corresponding alkyl halides, acid halides and halobenzene derivatives, respectively in good yields. Moreover, nucleophilic substitution of alkyl halides and acid halides, generated *in situ* from alcohols and carboxylic acids, could be reacted with various nitrogen, oxygen and sulfur nucleophiles to afford the corresponding products in moderate to high yields.

In addition, 7,7'-Dihydroxy-8,8'-biquinolyl (azaBINOL) and its derivatives, which used as a substrate for the preparation of chiral phosphinite catalysts were prepared from 7-hydroxyquinoline *via* *N*,*N*-dimethyl *O*-quinol-7-yl carbamate by directed *ortho* metallation (DoM) followed by $FeCl_3$ oxidative coupling or Ullmann coupling of 8-iodoquinolin-7-yl dimethylcarbamate and hydrolysis of the resulting dicarbamate. Moreover, the preparation of 2,2'-disubstituted derivatives of 8,8'-biquinolyl and adding the oxide or alkyl group at *N* position were also tried.

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