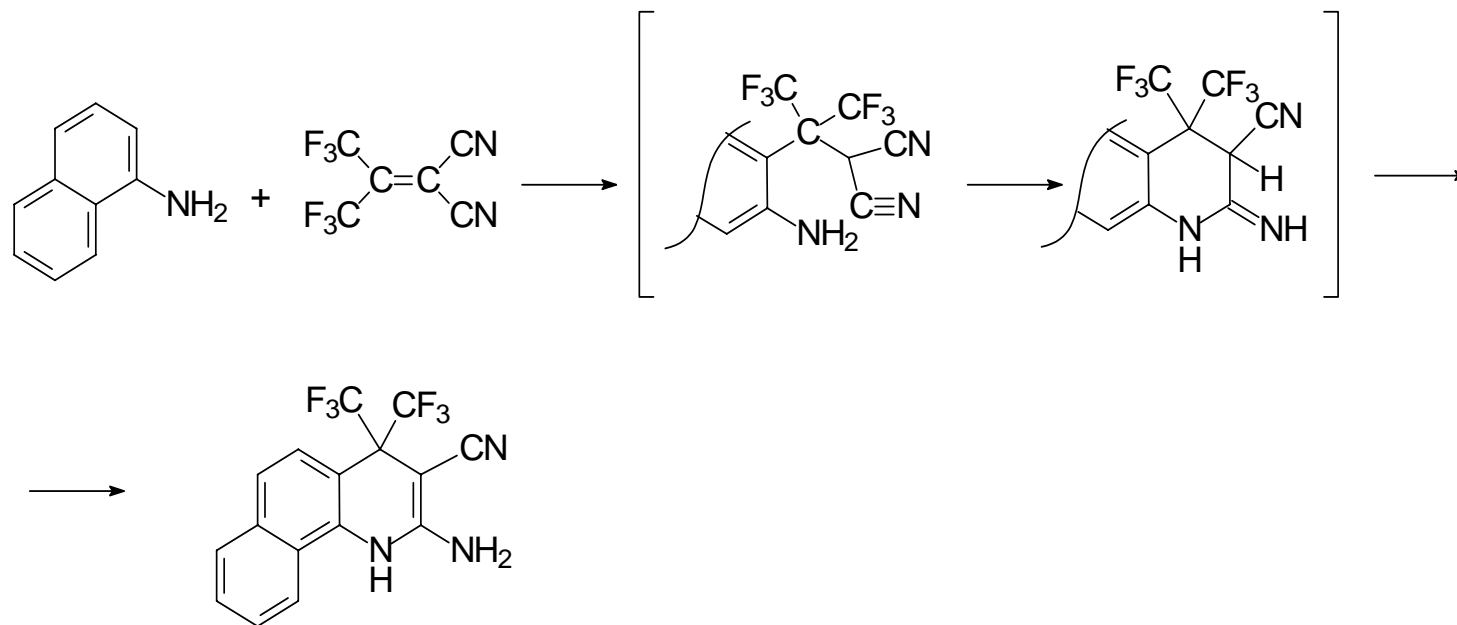
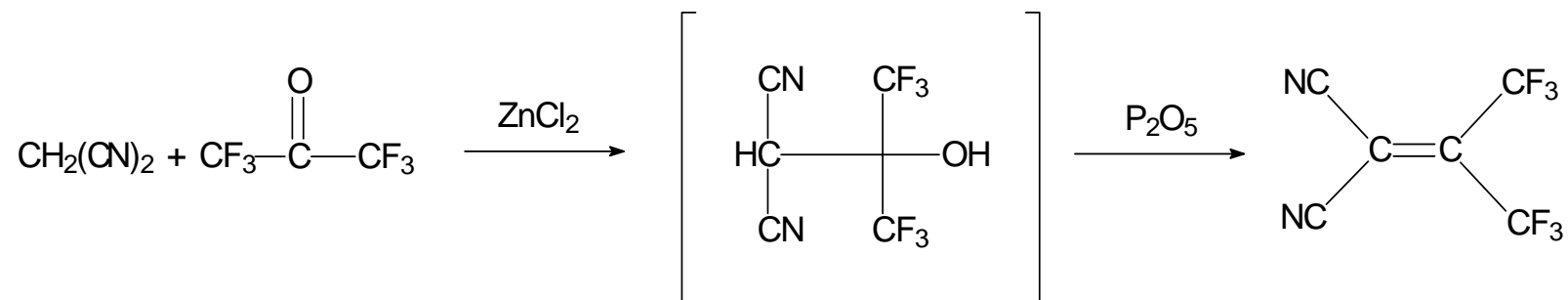
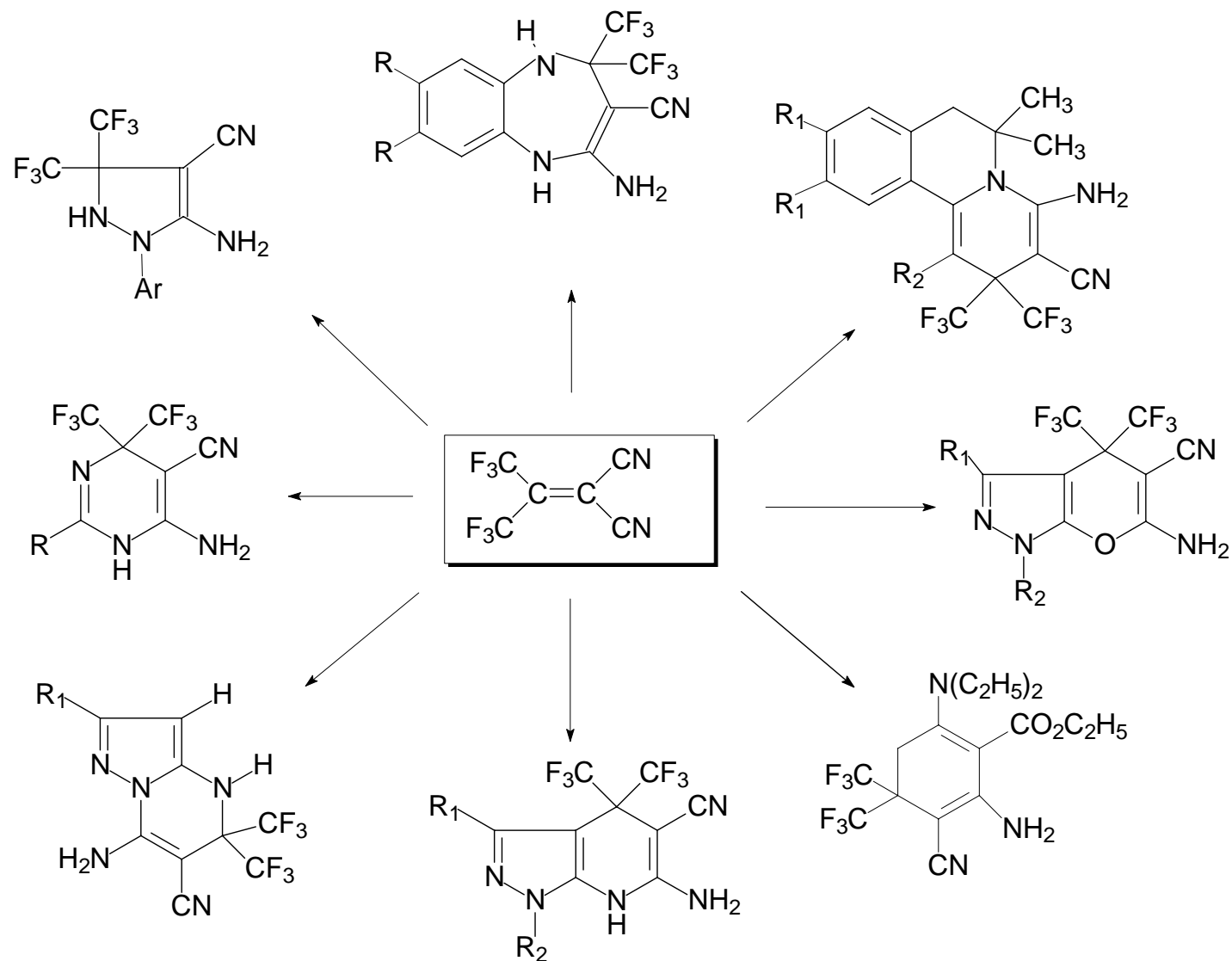


**FLUORINATED CYANOETHYLENES AS
PRECURSORS OF CF₂X-SUBSTITUTED
NITROGEN-CONTAINING HETEROCYCLES**

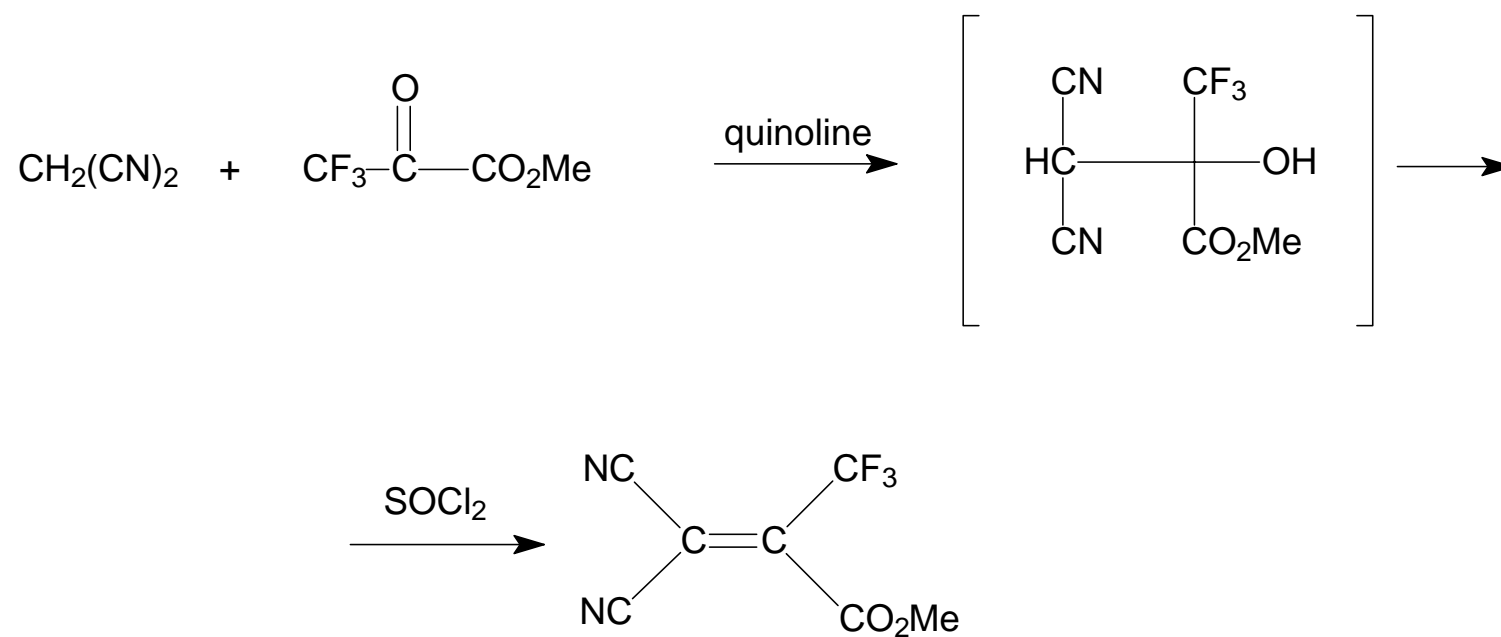
Synthesis of 1,1-dicyano-2,2-bis(trifluoromethyl)ethylene



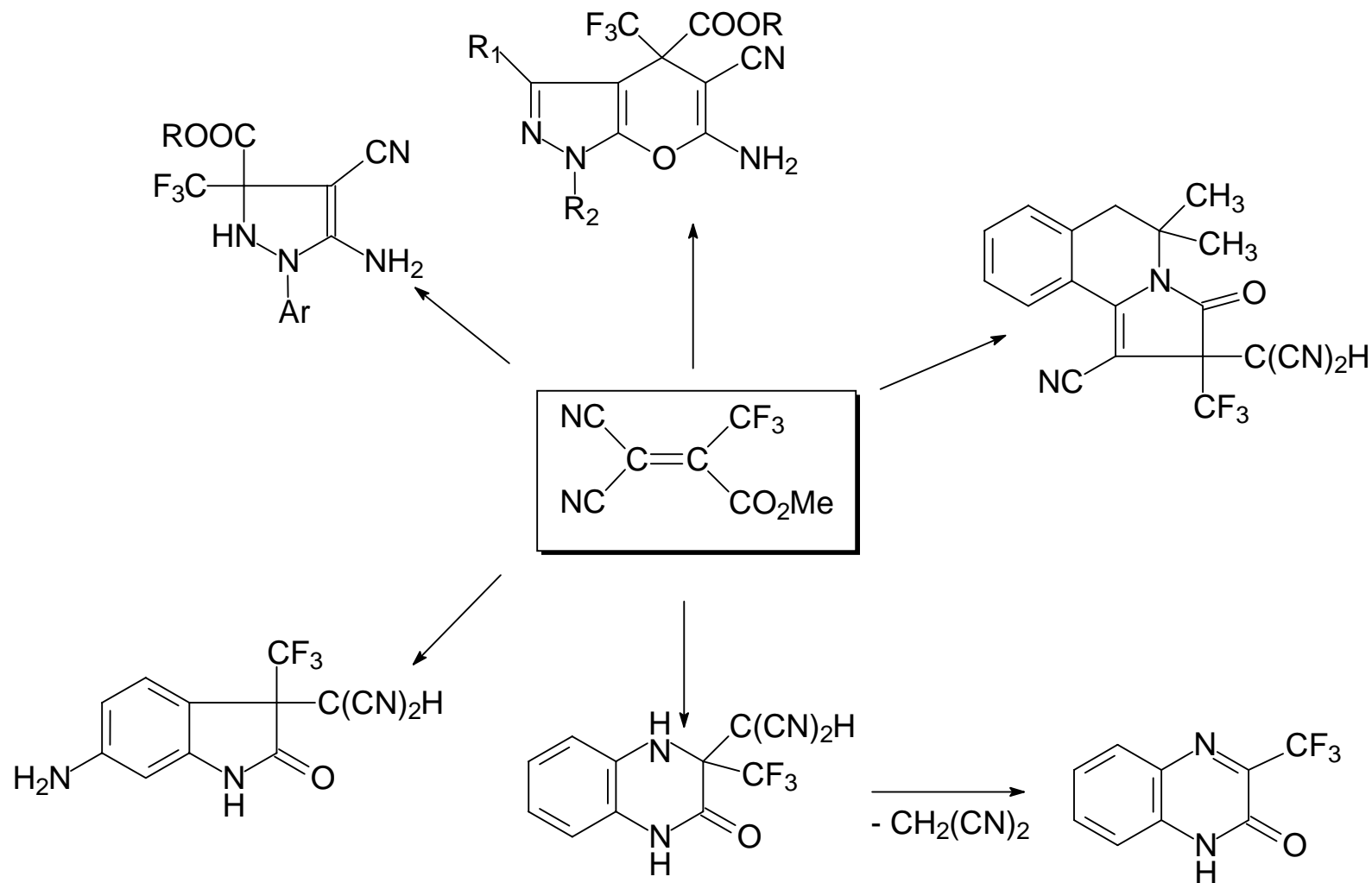
Reaction of 1,1-dicyano-2,2-bis(trifluoromethyl)ethylene with arylamines, enamines, and nitrogen heterocycles



Synthesis of methyl 3,3-dicyano-2-trifluoromethylacrylate

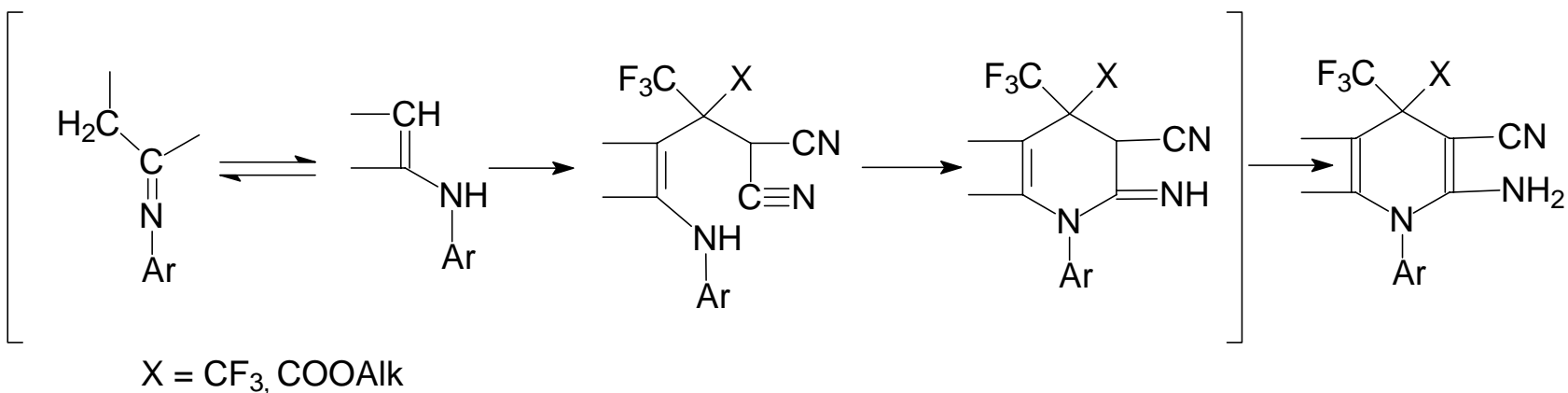
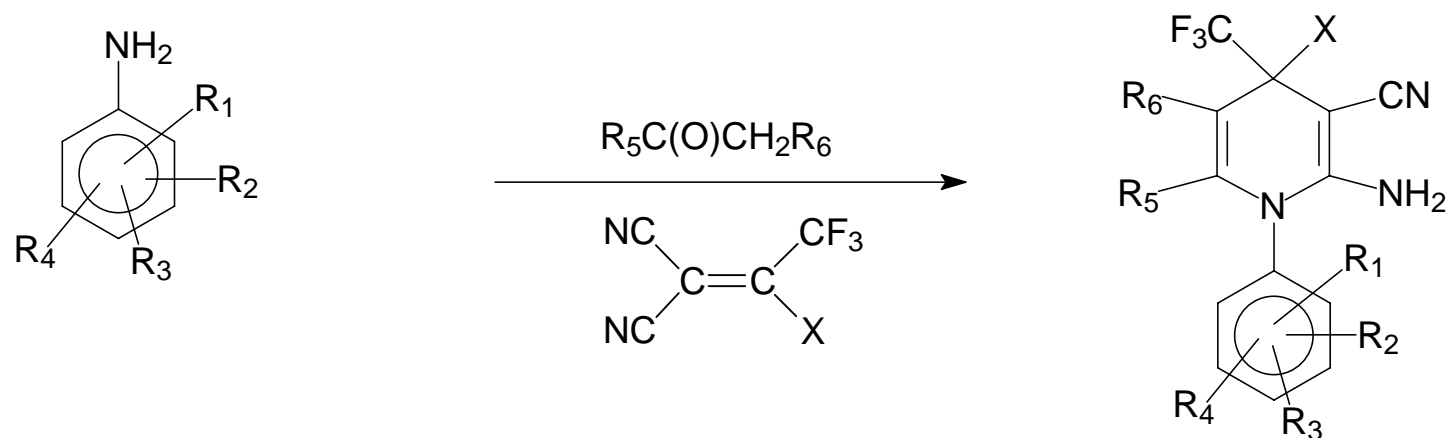


Reactions of methyl 3,3-dicyano-2-trifluoromethylacrylate

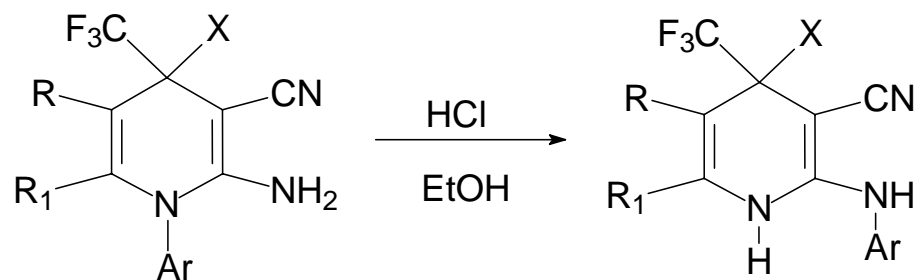


J. Fluorine Chem. 51 (1991) 323

Three-component reaction of fluorine-containing 1,1-dicyanoethylenes with aryl amines and ketones

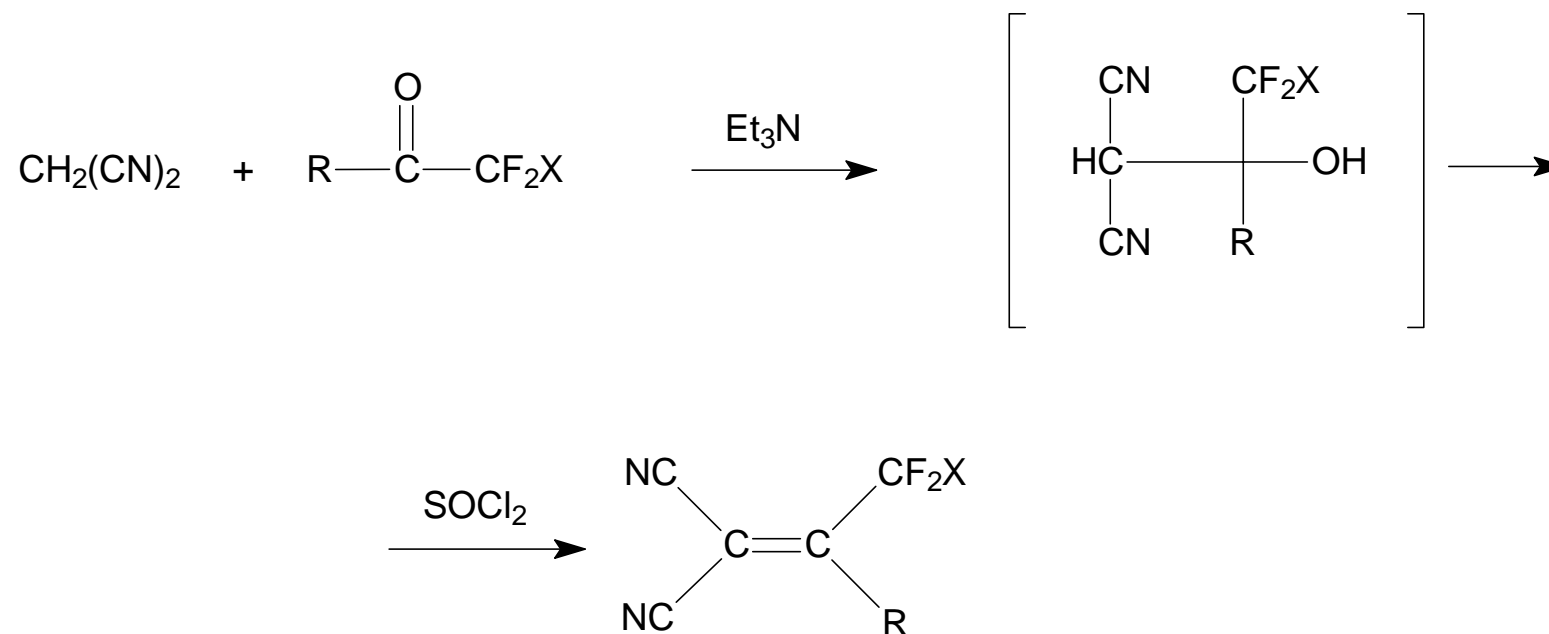


Isomerisation of 1-aryl-2-amino-1,4-dihydropyridines



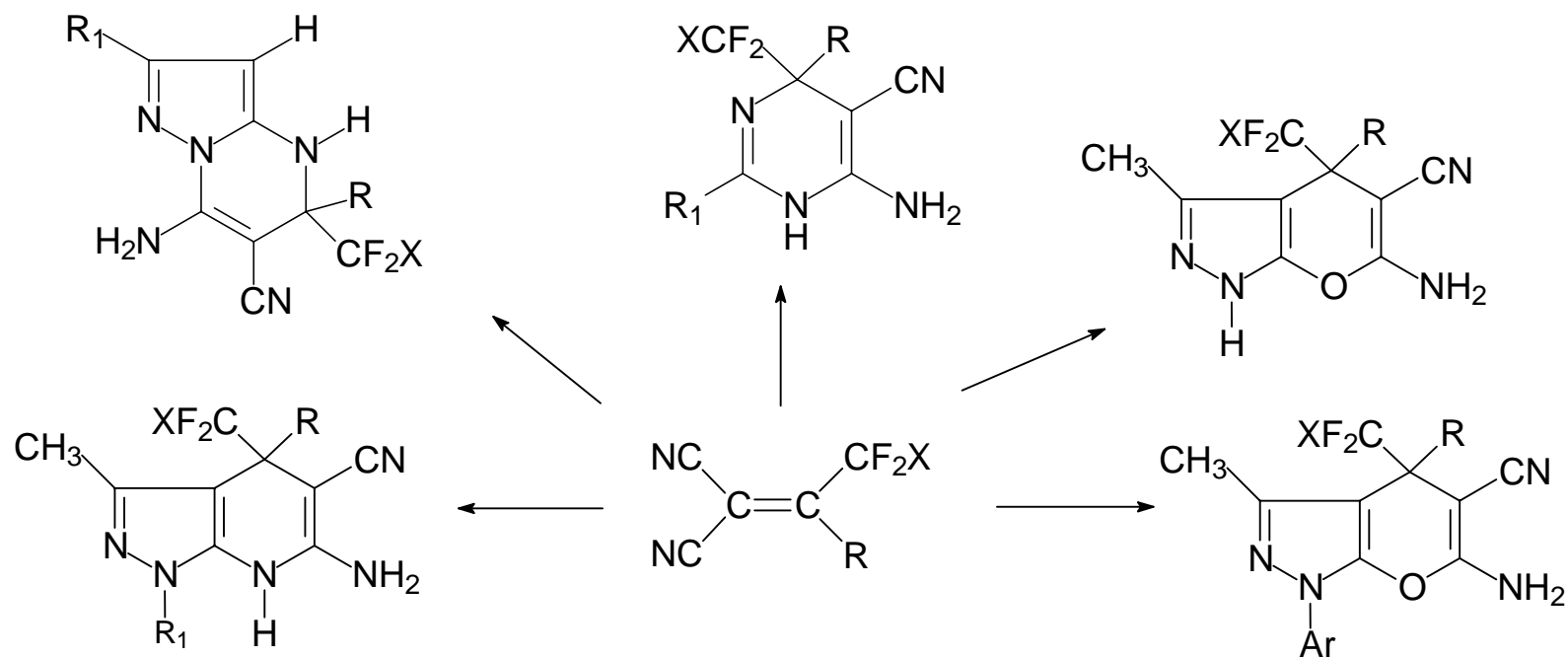
X = CO₂Et, CF₃
R = Alk, R₁ = Alk, H

Synthesis of CF₂H- and CF₂Cl-substituted 1,1-dicyanoethylenes



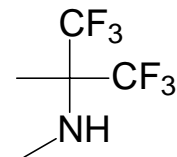
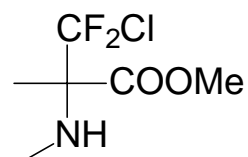
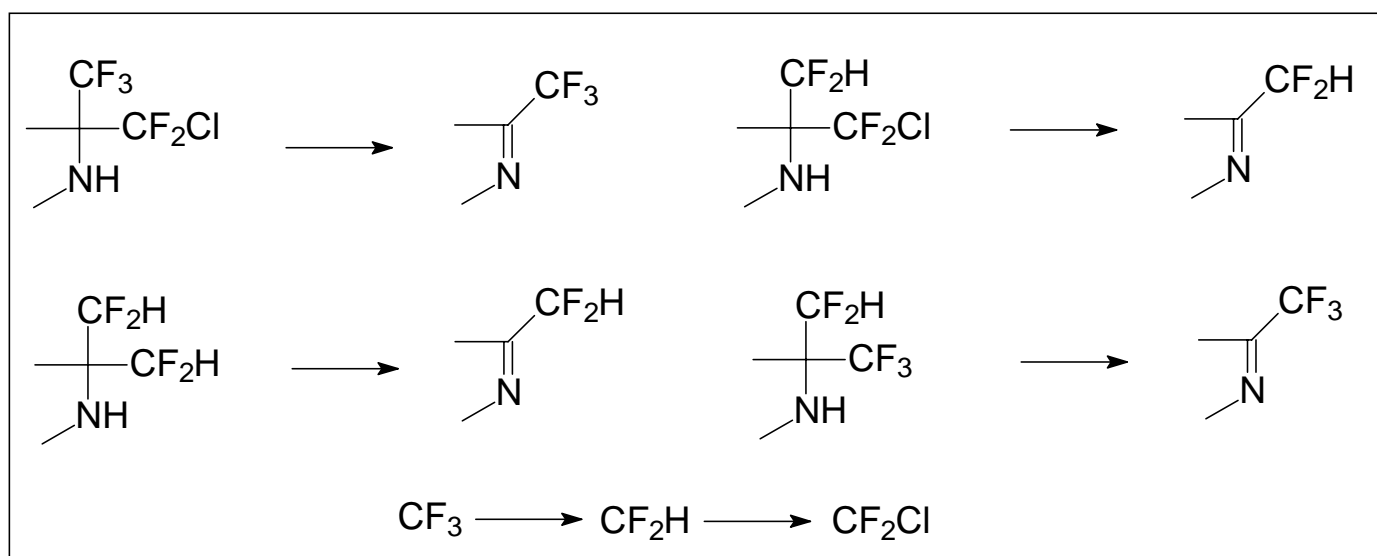
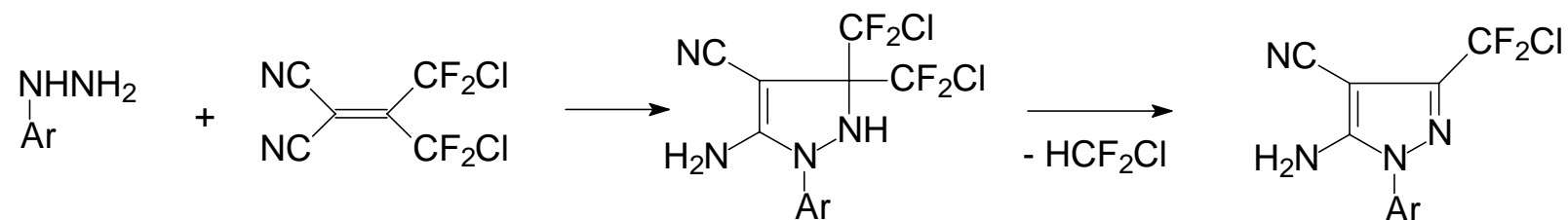
X, R = Cl, CF₂Cl; H, CF₂Cl; H, CF₂H; H, CF₃; Cl, CO₂Me; Br, CO₂Me

Heterocyclisation reactions of CF₂H- and CF₂Cl-substituted 1,1-dicyanoethylenes

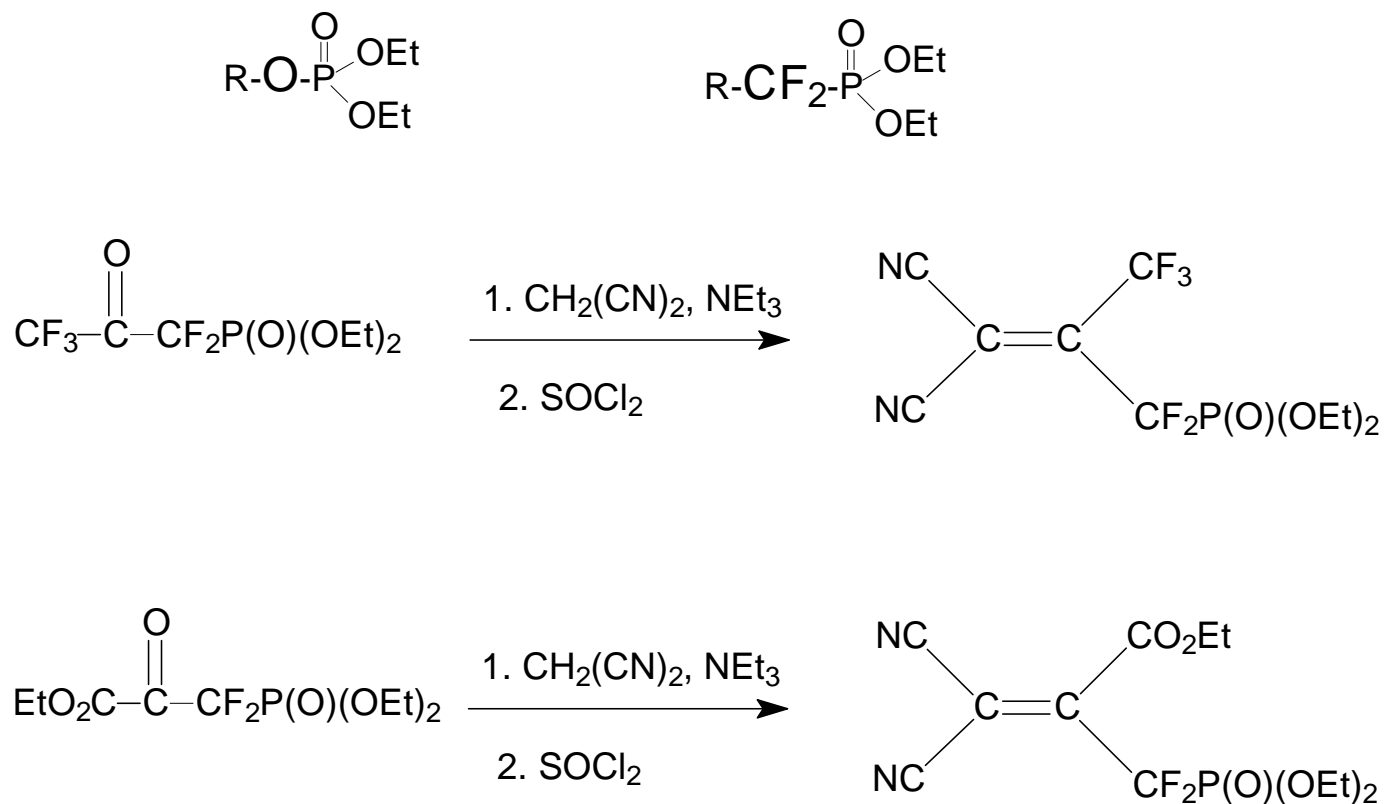


X, R = Cl, CF₂Cl; H, CF₂Cl; H, CF₂H; H, CF₃; Cl, CO₂Me; Br, CO₂Me

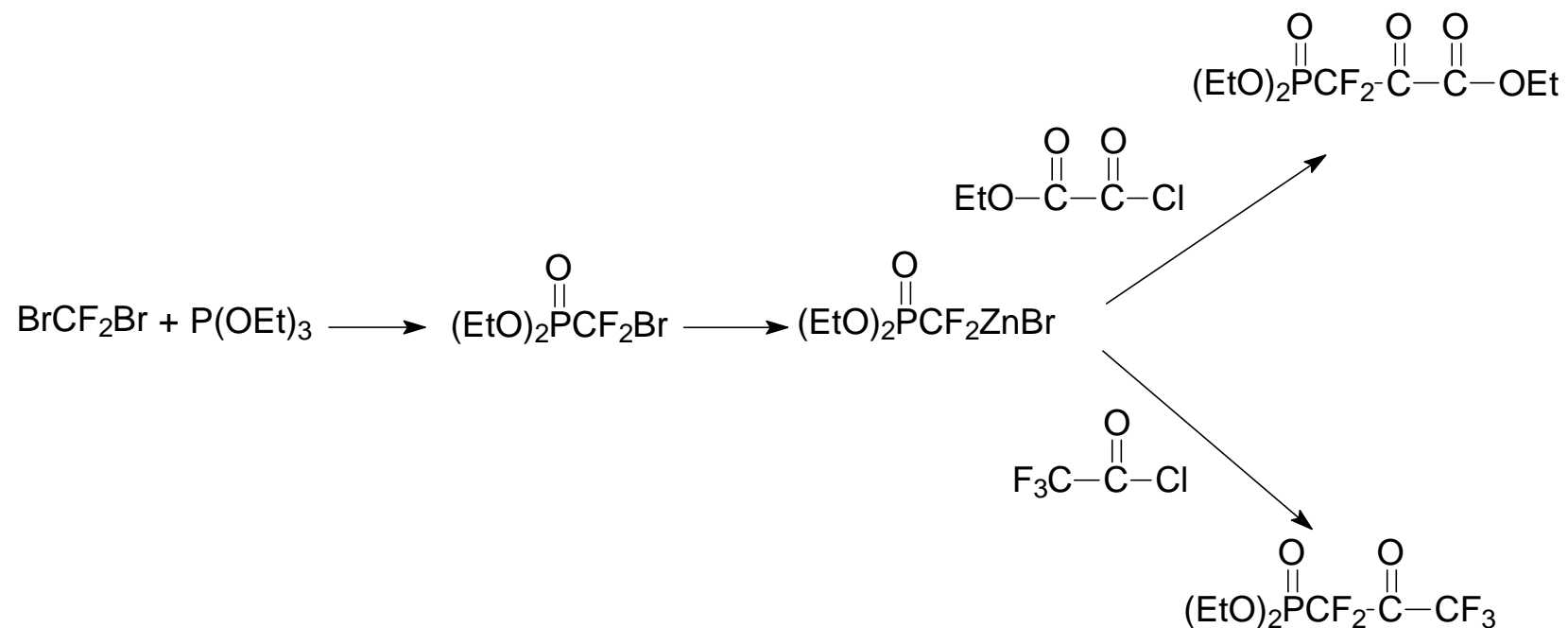
Reactions of fluorine-containing 1,1-dicyanoethylenes with aryl hydrazines



Synthesis of 1,1-dicyanoethylenes with diethoxyphosphoryldifluoromethyl group



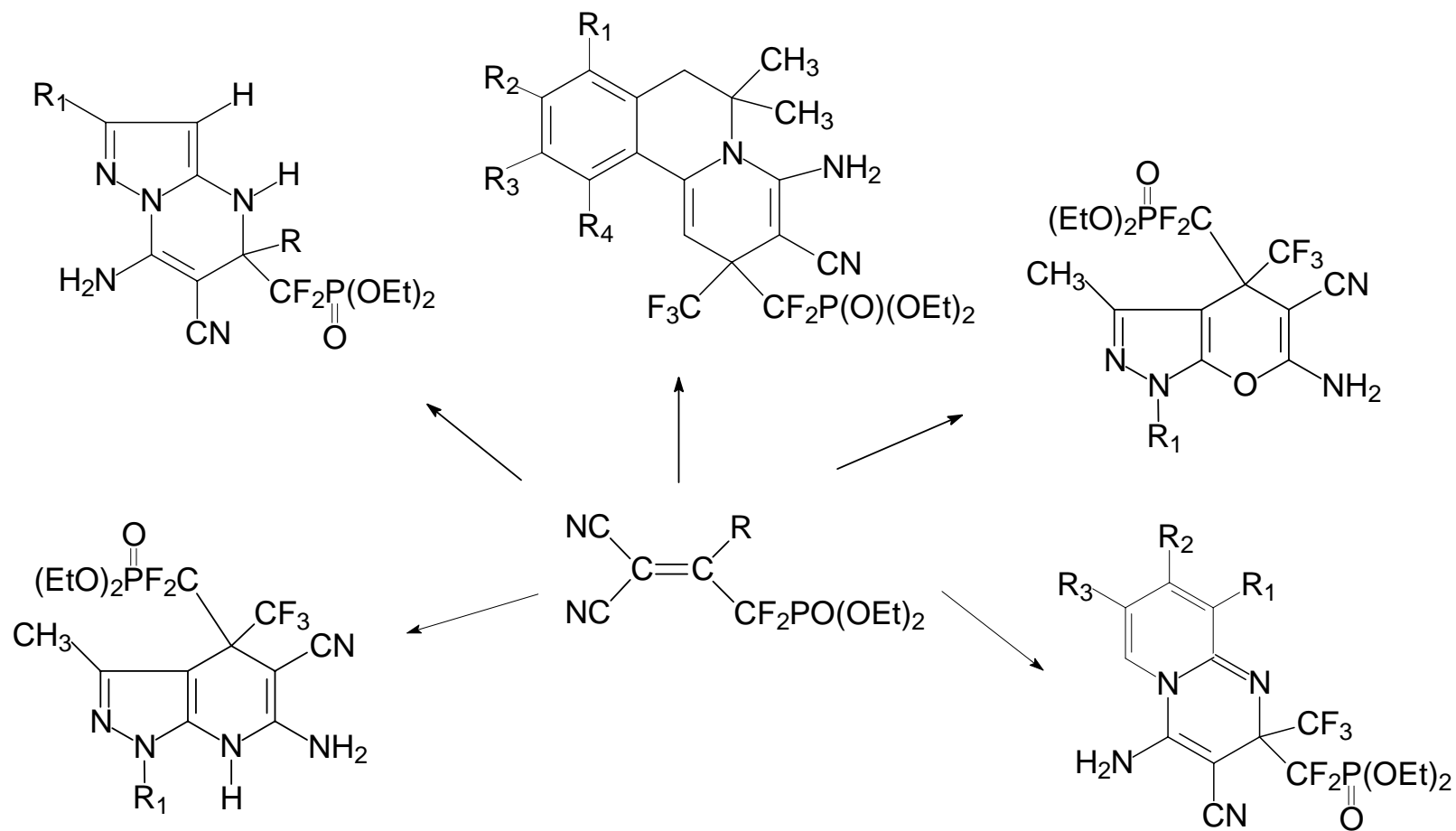
Synthesis of ketones, containing diethoxyphosphoryldifluoromethyl group



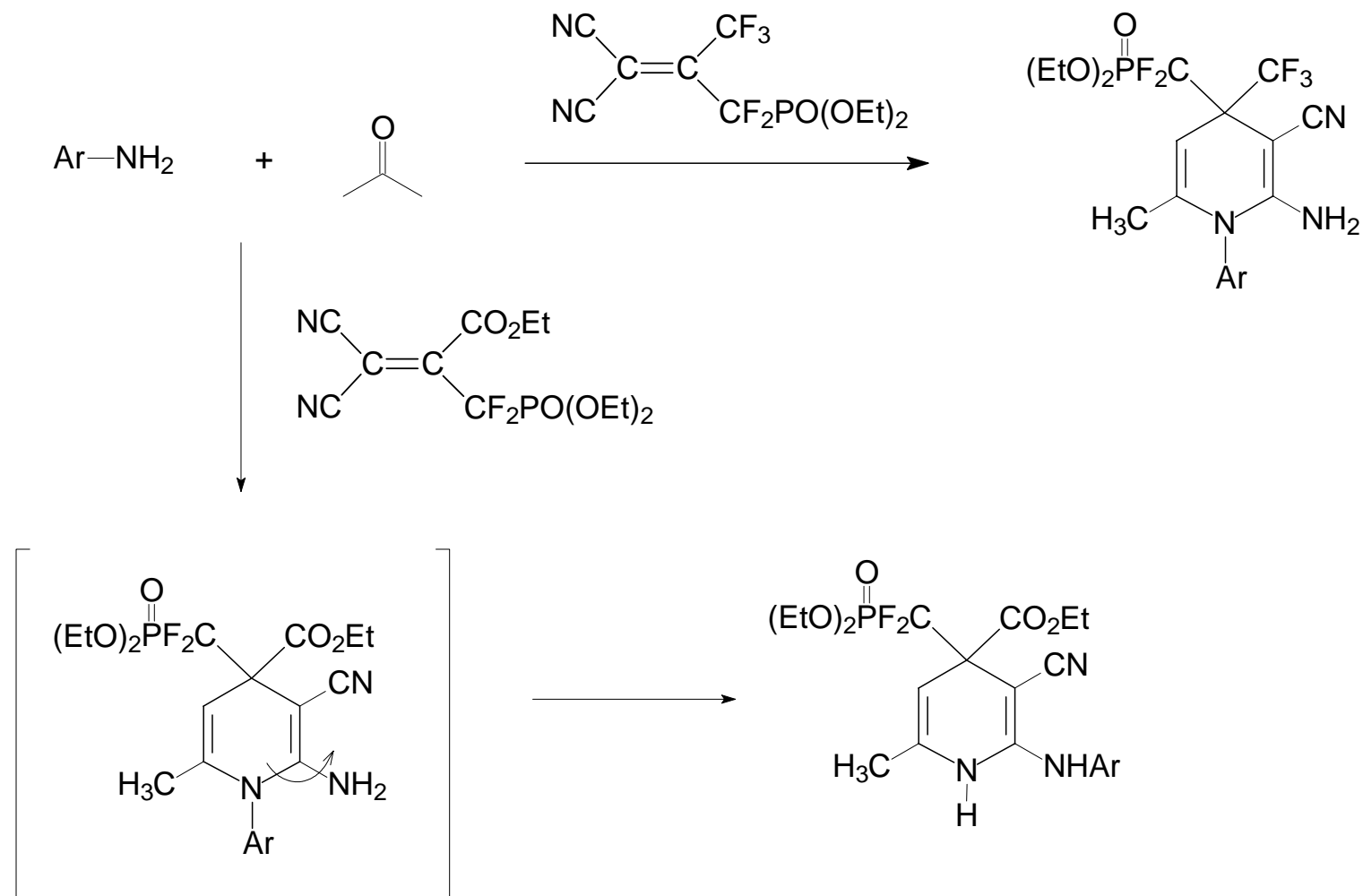
D.J.Burton, L.G. Sprague, *J. Org. Chem.* 53 (1988) 1523

H.-J. Tsai, *Phosphorus, Sulfur, Silicon* 122 (1997) 247

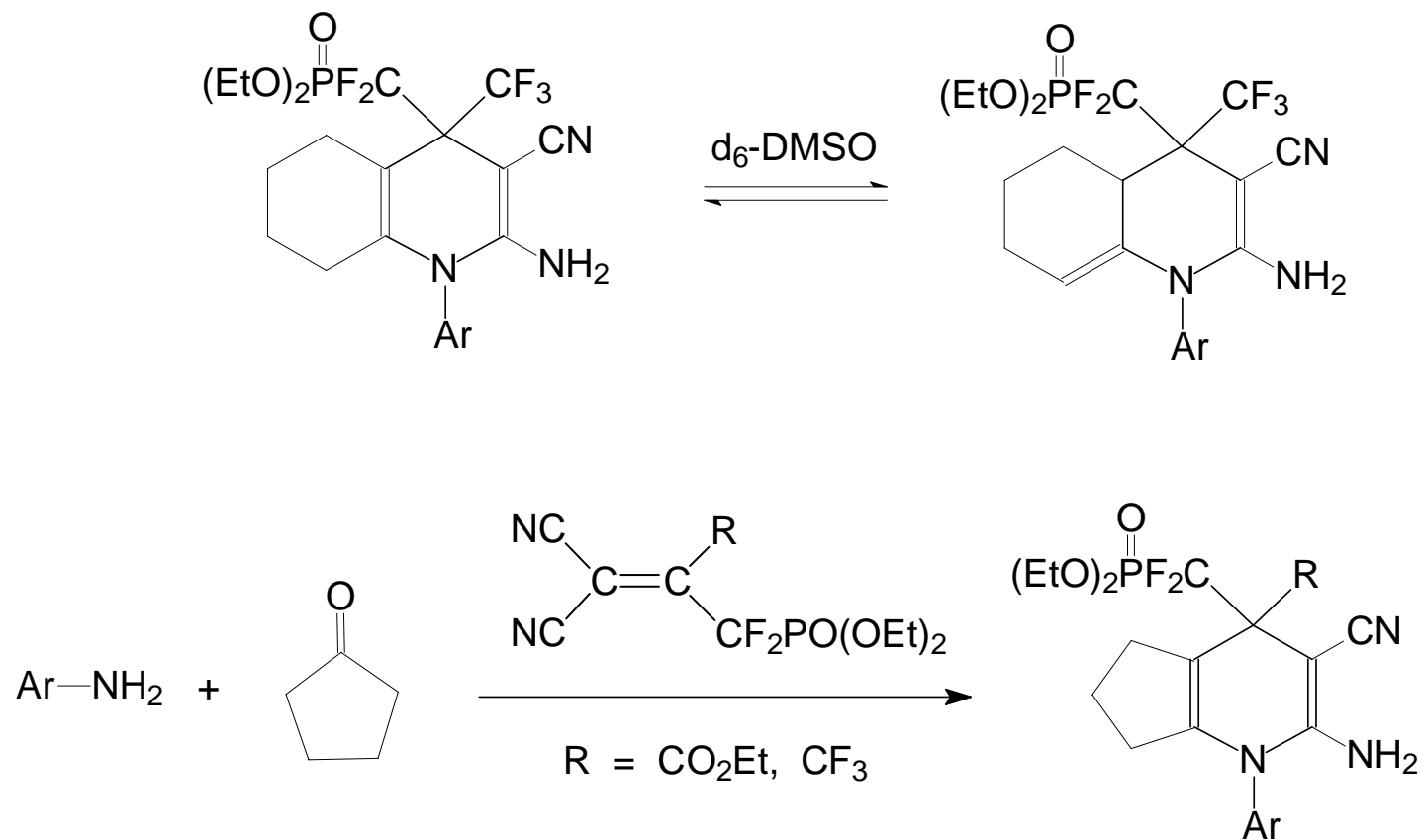
Heterocyclisation reactions of 1,1-dicyanoethylenes with diethoxyphosphoryldifluoromethyl group



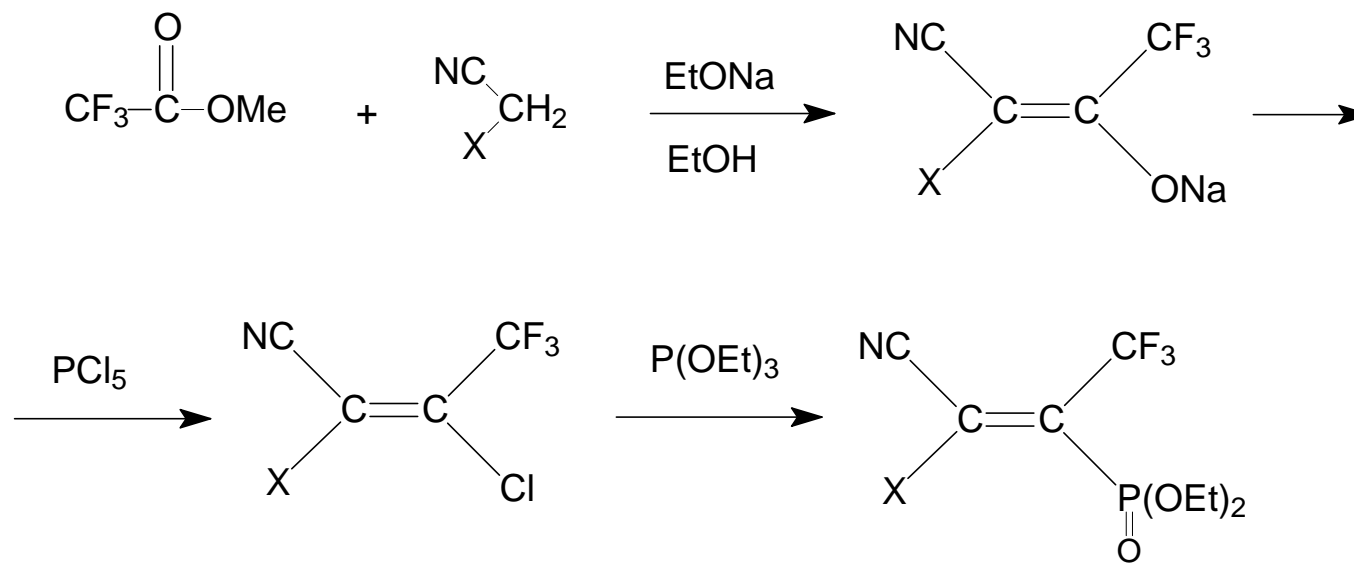
Three-component reaction of 1,1-dicyano-2- diethoxyphosphoryl difluoromethyl-ethylenes with aryl amines and ketones



Double bond isomerisation in cyclohexane-annelated 1,4-dihydropyridines



Synthesis of 2-diethoxyphosphoryl-2-trifluoromethyl-1-cyanoethylenes

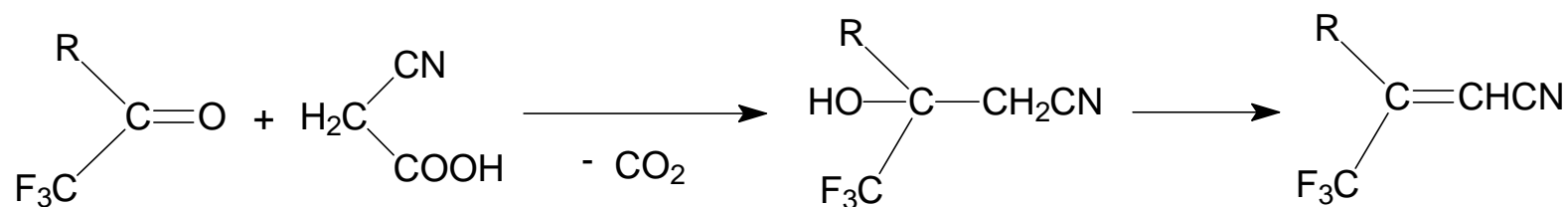
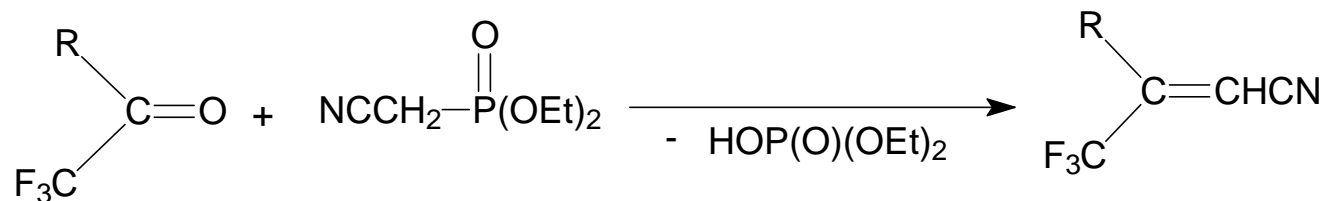
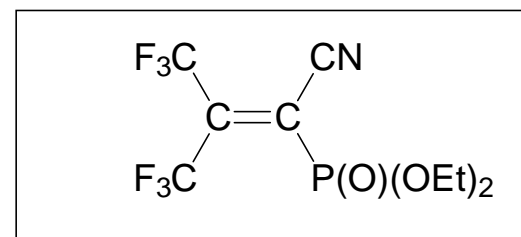
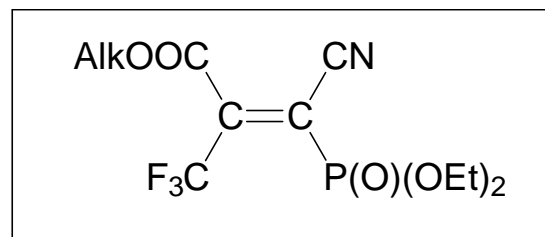


V. I. Krokhtyak, A. Ya. Il'chenko, *Zh. Org. Khim.* 16 (1980) 1694

V. I. Krokhtyak, A. Ya. Il'chenko, L. M. Yagupol'skii, *Zh. Org. Khim.* 17 (1981) 268

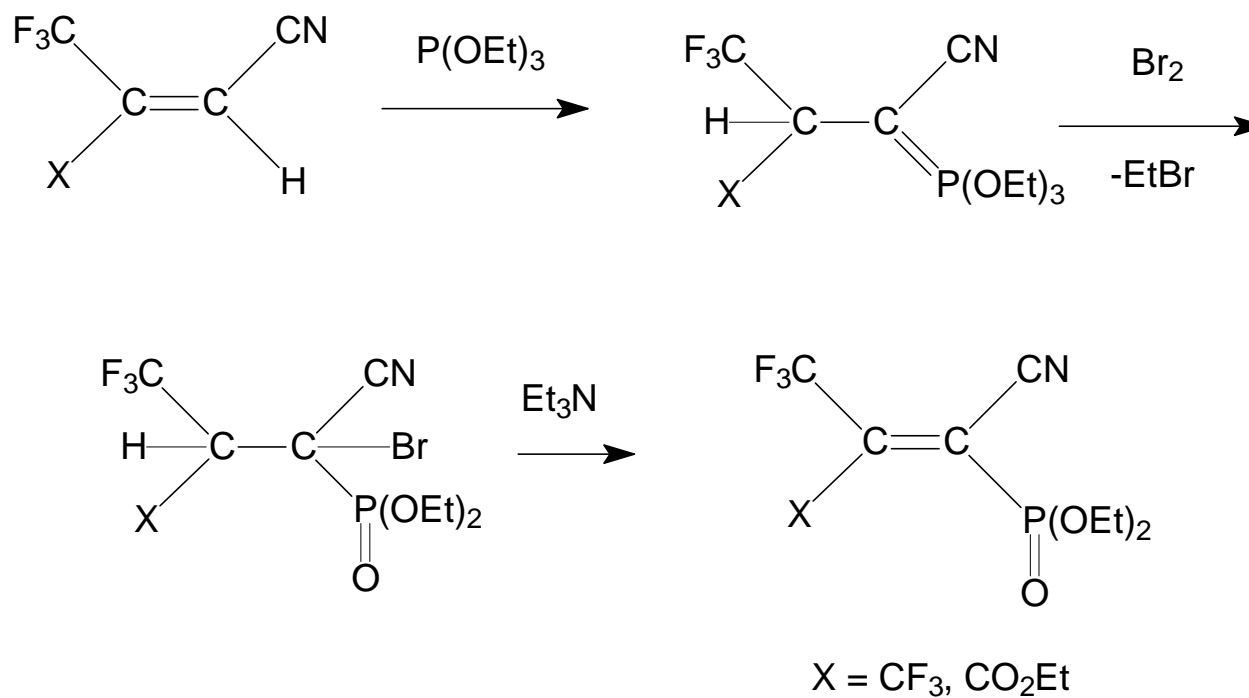
Ya. G. Bal'on, B. N. Kozhushko, Yu. A. Paliichuk and V. A. Shokol, *Zh. Obshch. Khim.*, 62 (1992) 2530

Approaches to fluorinated 1-diethoxyphosphoryl-1-cyanoethylenes

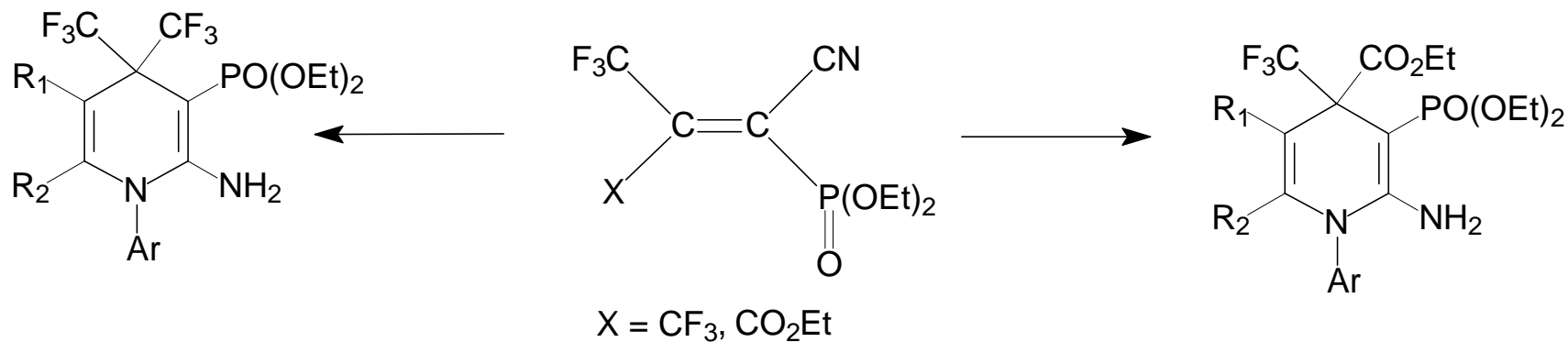
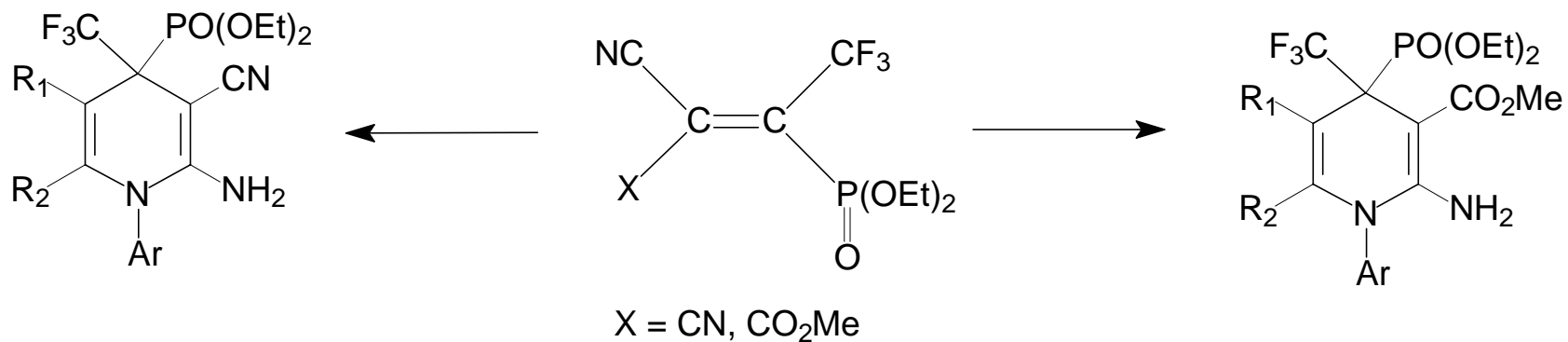


R = CF₃, COOEt

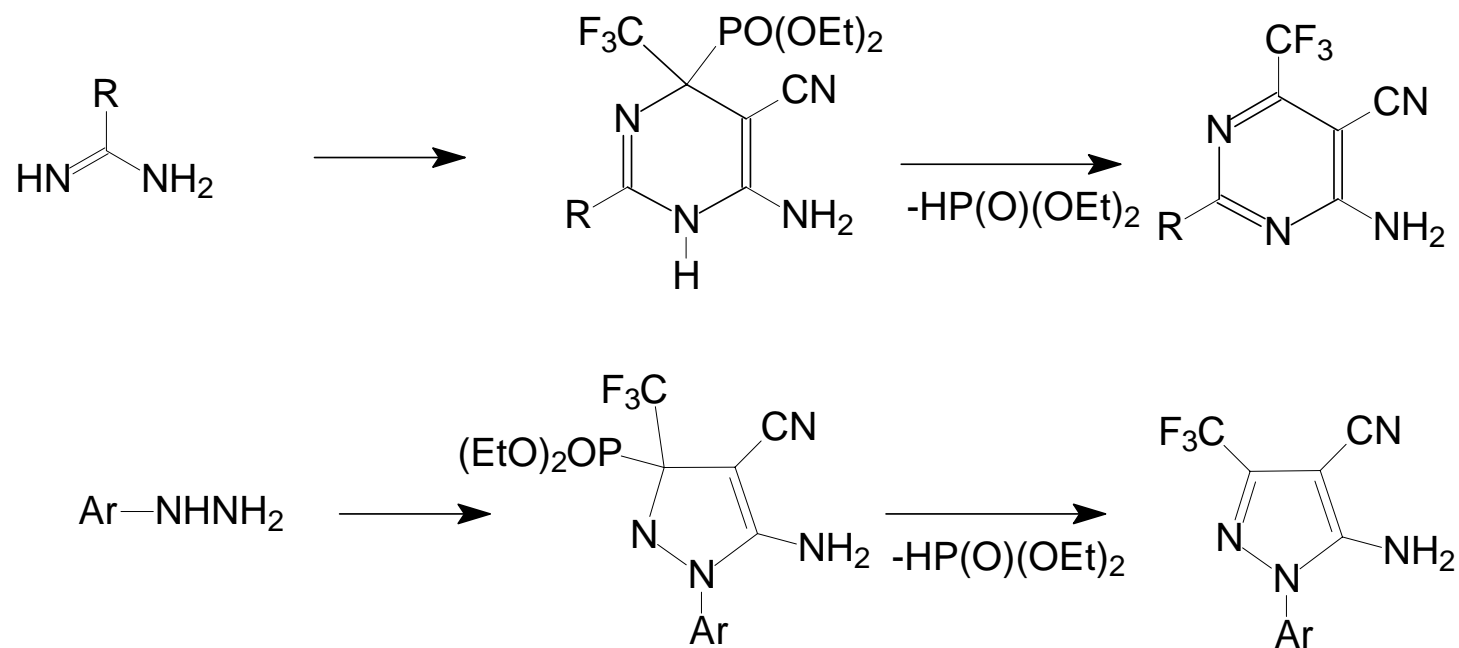
Synthesis of fluorinated 1-diethoxyphosphoryl-1-cyanoethylenes



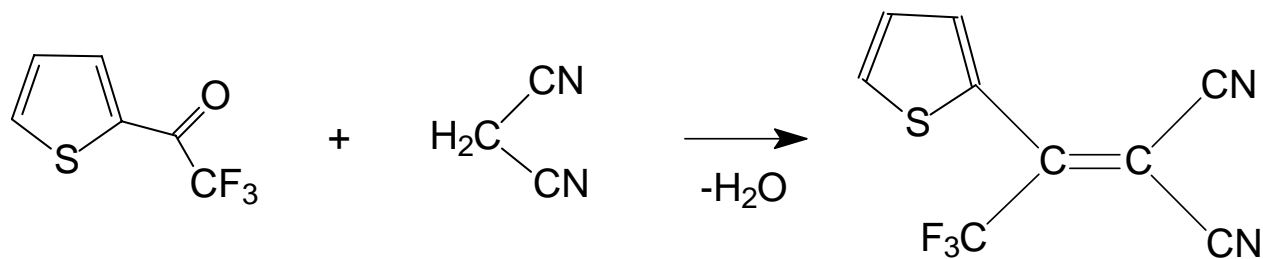
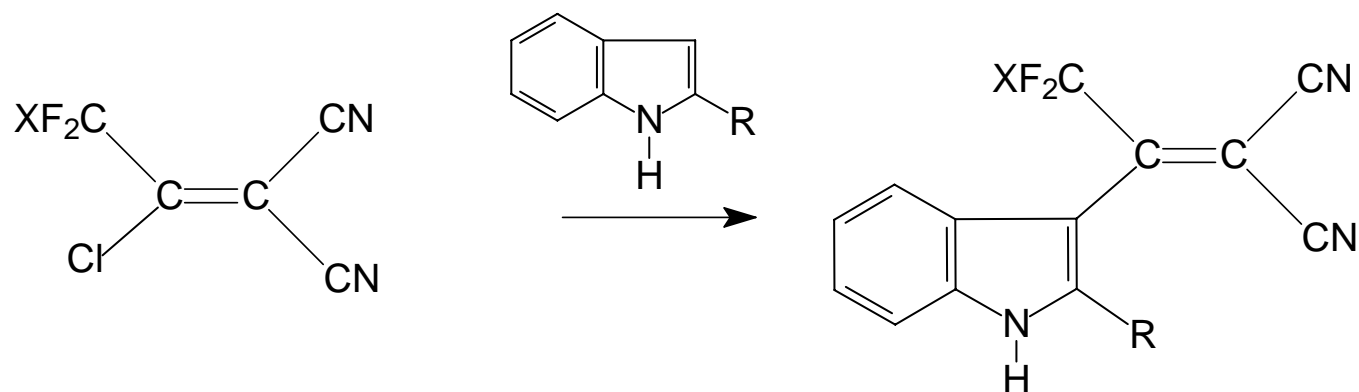
Synthesis of 3- and 4-ethoxyphosphoryl-1,4-dihydro-2-aminopyridines



Synthesis of fluorinated pyrimidines and pyrroles



Synthesis of fluorinated 2-heteroaryl-1,1-dicyanoethylenes



Acknowledgements

This work was supported by

E.I. Du Pont de Nemours and Co

in the frame of co-operation through

International Science and Technology Centre