Rearrangement of 4-oxobutane-1,1,2,2-tetracarbonitriles to the penta-1,3-diene-1,1,3-tricarbonitrile moiety as an approach to novel acceptors for donor-acceptor chromophores

Mikhail Yu. Belikov, Sergey V. Fedoseev, Oleg V. Ershov, Mikhail Yu. Ievlev, Viktor A. Tafeenko

PII: S0040-4039(16)30963-7
DOI: http://dx.doi.org/10.1016/j.tetlet.2016.07.095
Reference: TETL 47957

To appear in: *Tetrahedron Letters*

Received Date: 14 July 2016
Revised Date: 25 July 2016
Accepted Date: 29 July 2016

Please cite this article as: Belikov, M.Y., Fedoseev, S.V., Ershov, O.V., Ievlev, M.Y., Tafeenko, V.A., Rearrangement of 4-oxobutane-1,1,2,2-tetracarbonitriles to the penta-1,3-diene-1,1,3-tricarbonitrile moiety as an approach to novel acceptors for donor-acceptor chromophores, *Tetrahedron Letters* (2016), doi: http://dx.doi.org/10.1016/j.tetlet.2016.07.095

Rearrangement of 4-oxobutane-1,1,2,2-tetracarbonitriles to the penta-1,3-diene-1,1,3-tricarbonitrile moiety as an approach to novel acceptors for donor-acceptor chromophores

Mikhail Yu. Belikov,[a*] Sergey V. Fedoseev,[a] Oleg V. Ershov,[a]
Mikhail Yu. Ievlev, [a] Viktor A. Tafeenko [b]

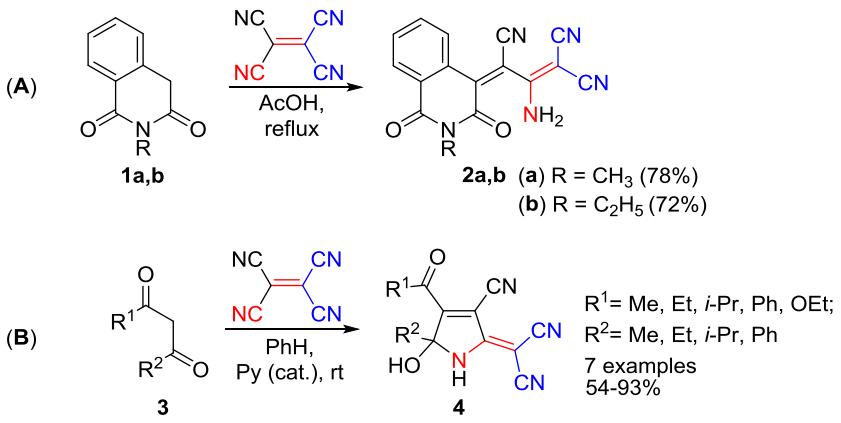
[a]*Ulyanov Chuvash State University, Cheboksary, Moskovsky pr., 15, Russia*
[b]*Lomonosov Moscow State University, Moscow, Leninskie gori, 1, Russia*
**Corresponding author. Tel.: +79083002657; fax: +79083002657; e-mail: belikovmil@mail.ru.*

Abstract – The rearrangement of 4-oxobutane-1,1,2,2-tetracarbonitriles to give the penta-1,3-diene-1,1,3-tricarbonitrile moiety, accompanied by elongation of the carbon chain *via* introduction of the cyano group carbon atom to the carbon skeleton, is described. The rearrangement in acetic acid in the presence of ammonium acetate allows the synthesis of 2-(3-cyano-7a-hydroxy-5,6,7,7a-tetrahydro-1*H*-indol-2(4*H*)-ylidene)malononitriles, which are structural analogs of practically significant tricyanofuran (TCF) and tricyanopyrrole (TCP) acceptors for donor-acceptor chromophores.

Keywords: Rearrangement; 4-oxobutane-1,1,2,2-tetracarbonitriles; pyrroles; cyano groups; donor-acceptor chromophores.

Rearrangements are an important group of reactions which have the advantage, in comparison to other reactions, of the possibility of a one-step transformation of the carbon skeleton. In recent years a number of reviews describing the use of rearrangements in organic synthesis, including for the preparation of practically important products, have been reported.[1a-f] In this regard, the study of new rearrangement reactions of organic compounds is an important task.

A prerequisite for this work was the report of an unexpected reaction pathway of tetracyanoethylene (TCNE) with some methylene-active compounds: imides **1** (Scheme 1, A),[2a] 1,3-diketones and ketoesters **3** (Scheme 1, B).[2b] Thus, it was reported that compounds **2** were obtained as a result of the reaction between imides **1** and TCNE in acetic acid,[2a] wherein the carbon skeleton rearrangement of the incoming TCNE moiety is obvious from the structure of products **2** (Scheme 1, A). Also, the formation of pyrrole derivatives **4**, structurally similar to compounds **2**, was described for the reaction of 1,3-dicarbonyl compounds **3** with TCNE in benzene (Scheme 1, B).[2b]



Scheme 1. Rearrangement during the reaction of methylene-active imides **1** (**A**) and 1,3-dicarbonyl compounds **3** (**B**) with TCNE.