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Recent Publications of ISHC Members

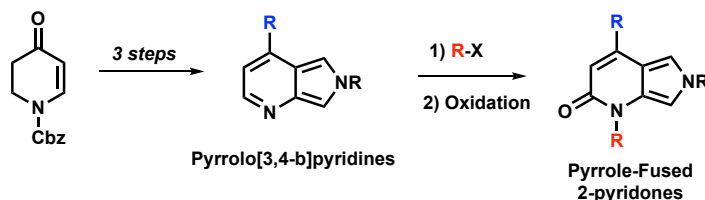
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A Facile Synthesis of 4-Azaaisindoles and Their Transformation into Novel Pyrrole-Fused 2-Pyridones

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Tetrahedron **2021**, 78, 131807 (1–8).

DOI: 10.1016/j.tet.2020.131807



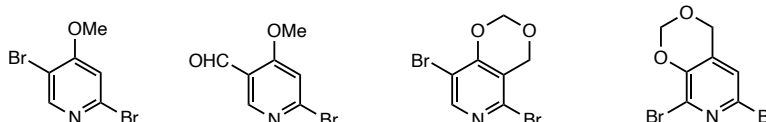
Abstract: We describe herein a novel, efficient and practical synthetic approach to access pyrrolo[3,4-*b*]pyridines from dihydropyridones in three steps, in which a pyrrole unit is generated from a dihydropyridone using TosMIC reagent. Protection of the resulting pyrrole, Grignard addition followed by oxidative aromatization afford substituted pyrrolo[3,4-*b*]pyridines. These underutilized structures are subsequently transformed to novel pyrrole-fused 2-pyridones via *N*-alkylation and then oxidation.

Preparation of Substituted Alkoxy pyridines via Directed Metalation and Metal-Halogen Exchange

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Arkivoc **2021**, part v, 57–72.

DOI: 10.24820/ark.5550190.p011.464



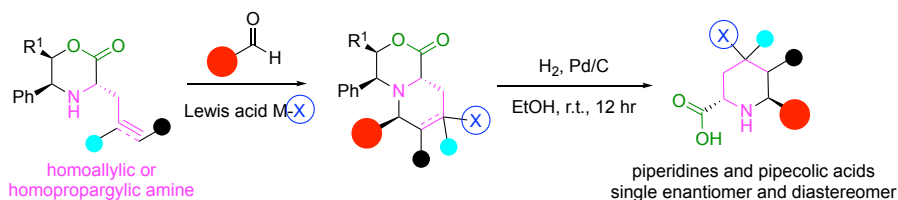
Abstract: Several halo-substituted alkoxy pyridines were prepared and subjected to directed metalation and metal-halogen exchange reactions. The studies resulted in useful methods for synthesis of numerous substituted pyridines via regioselective lithiation, magnesiation and halogen dance reactions.

A Stereoselective aza-Prins Reaction: Rapid Access to Enantiopure Piperidines and Pipecolic Acids

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J. Org. Chem. **2021**, 86, 2076–2089.

DOI: 10.1021/acs.joc.0c01897



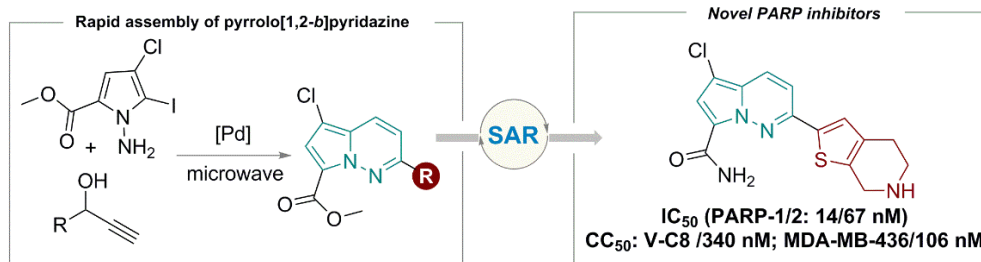
Abstract: The aza-Prins reaction is a widely employed and highly efficient method for the preparation of saturated nitrogen-containing heterocycles. Its major drawback has always been a lack of diastereoselectivity and the formation of racemic products. Herein, we address these problems and report, for the first time, the synthesis of both diastereomerically and enantiopure multiply substituted piperidines via the aza-Prins reaction. This method is widely applicable for natural product synthesis and is exemplified here by the synthesis of enantiopure pipercolic acid derivatives.

Identification of 2-Substituted Pyrrolo[1,2-*b*]pyridazine Derivatives as New PARP-1 Inhibitors

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Bioorg. Med. Chem. Lett. **2021**, *31*, 127710 (1–4).

DOI: 10.1016/j.bmcl.2020.127710



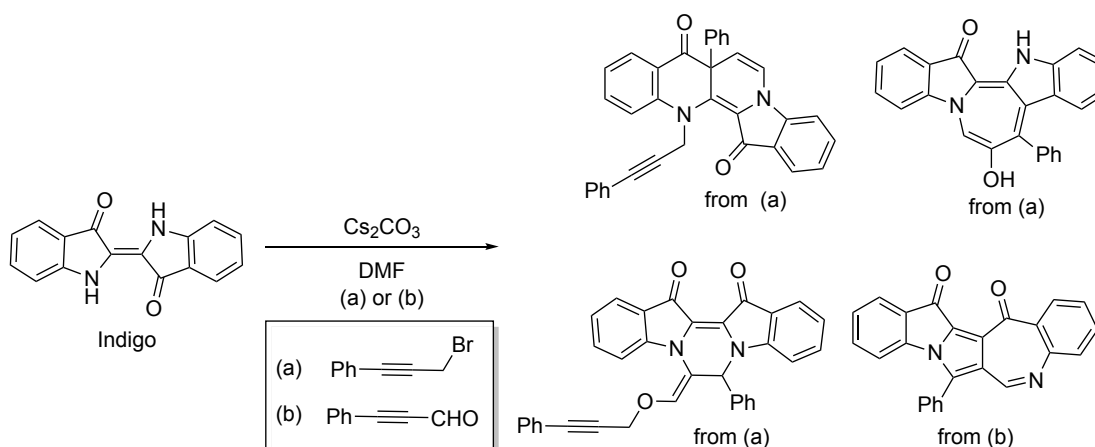
Abstract: A library of new 2-substituted pyrrolo[1,2-*b*]pyridazine derivatives were rapidly assembled and identified as PARP inhibitors. Structure-activity relationship for this class of inhibitor resulted in the discovery of most potent compounds **15a** and **15b** that exhibited about 29- and 5-fold selective activity against PARP-1 over PARP-2 respectively. The antiproliferative activity of the as-prepared compounds were demonstrated by further cellular assay in *BRCA2*-deficient V-C8 and *BRCA1*-deficient MDA-MB-436 cell lines, displaying that compound **15b** could robustly reduce the corresponding cell proliferation and growth with CC₅₀s of 340 and 106 nM respectively. The PK property of **15b** was also investigated here.

The Cascade Reactions of Indigo with Propargyl Substrates for Heterocyclic and Photophysical Diversity

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Chem. Eur. J. **2021**, *27*, 3708–3721.

DOI: 10.1002/chem.202003662



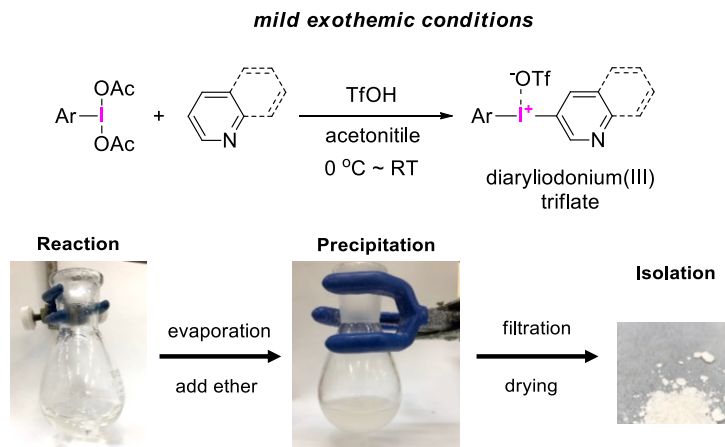
Abstract: With its amino, keto and vinylogous amide functionality in close proximity, the readily available dye indigo affords a number of opportunities for rapid access to a diverse range of heterocyclic structures with potentially interesting photophysical properties. In this paper, products from the base-induced reaction of indigo, with a range of substituted propargyl substrates, is reported together with photophysical properties of some of these products. The influence of substituents on product outcomes was analysed in mechanistic terms and supported by DFT studies.

Practical Synthesis of Diaryliodonium(III) Triflates Using $\text{ArI}(\text{OAc})_2/\text{TfOH}/\text{MeCN}$ Reaction System

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Russ. Chem. Bull. **2020**, 69, 2328–2332.

DOI: 10.1007/s11172-020-3035-9



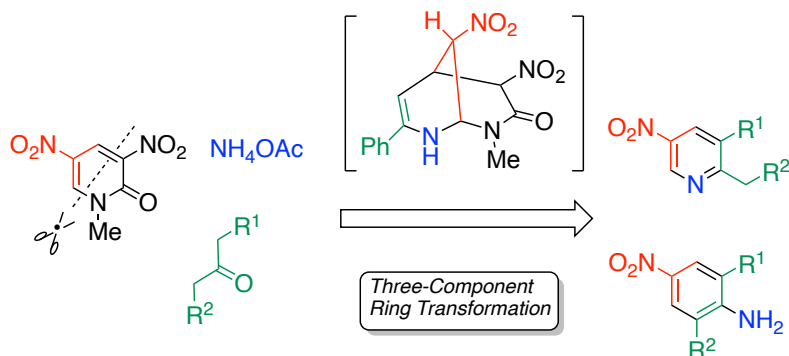
Abstract: Diaryliodonium(III) triflates were synthesized in a safe manner by the reaction of aryliodonium(III) diacetates $\text{ArI}(\text{OAc})_2$ with triflic acid (TfOH) in MeCN under mild exothermic conditions. This method provides access to a variety of diaryliodonium(III) triflates, including derivatives with two different aryl substituents, with high purity.

Synthesis of Nitroaromatic Compounds via Three-Component Ring Transformations

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Molecules **2021**, 26 639 (1–18).

DOI: 10.3390/molecules26030639



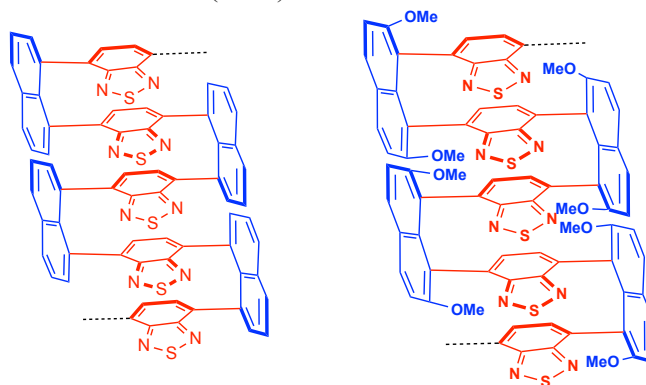
Abstract: 1-Methyl-3,5-dinitro-2-pyridone serves as an excellent substrate for nucleophilic-type ring transformation because of the electron deficiency and presence of a good leaving group. In this review, we focus on the three-component ring transformation (TCRT) of dinitropyridone involving a ketone and a nitrogen source. When dinitropyridone is allowed to react with a ketone in the presence of ammonia, TCRT proceeds to afford nitropyridines that are not easily produced by alternative procedures. Ammonium acetate can be used as a nitrogen source instead of ammonia to undergo the TCRT, leading to nitroanilines in addition to nitropyridines. In these reactions, dinitropyridone serves as a safe synthetic equivalent of unstable nitromalonaldehyde.

Triple-Columned and Multiple-Layered 3D Polymers: Design, Synthesis, Aggregation Induced Emission (AIE), and Computational Study

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Research **2021**, *2021*, Article ID 3565791 (1–13).

DOI: 10.34133/2021/3565791



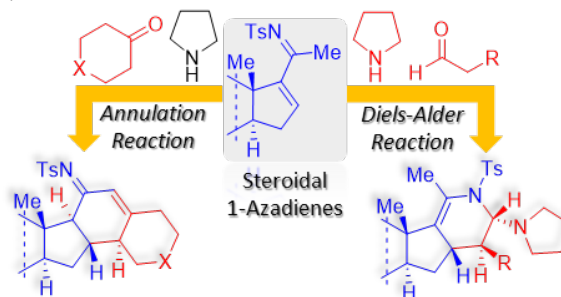
Abstract: Conjugated polymers and oligomers have great potentials in various fields, especially in materials and biological sciences because of their intriguing electronic and optoelectronic properties. In recent years, the through-space conjugation system has emerged as a new assembled pattern of multidimensional polymers. Here, a novel series of structurally-condensed multi-column/multi-layer 3D polymers and oligomers have been designed and synthesized through one-pot Suzuki polycondensation (SPC). The intramolecularly stacked arrangement of polymers can be supported by either X-ray structural analysis or computational analysis. In all cases, polymers were obtained with modest to good yields, as determined by GPC and ¹H-NMR. MALDI-TOF analysis has proved the speculation of step-growth process of this polymerization. The computational study of *ab initio* and DFT calculations based on trimer and pentamer models gives details of the structures and the electronic transition. Experimental results of optical and AIE research confirmed by calculation indicates the present work would facilitate the research and applications in materials.

Reactivity of Steroidal 1-Azadienes Toward Enamines: An Approach to Novel Chiral Penta- and Hexacyclic Stereoids

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DOI: 10.1039/d0ob02344b



Abstract: The chemical behavior of steroidal *N*-sulfonyl-1-azadienes toward carbonyl compounds, in the presence of pyrrolidine, is described. With aldehydes, these azadienes participate in hetero-Diels–Alder reactions with the *in situ* generated enamines. The stereoselectivity results from the approach of the dienophiles from the less hindered α -face of the steroid, with the pyrrolidine moiety endo and retention of the enamine trans geometry. This diastereoselective synthetic methodology led to a new class of chiral pentacyclic steroids. Interestingly, the studied steroidal scaffolds follow a different mechanistic pathway with cyclic ketones. They undergo a diastereoselective annulation reaction, under enamine catalysis, affording chiral hexacyclic steroids.