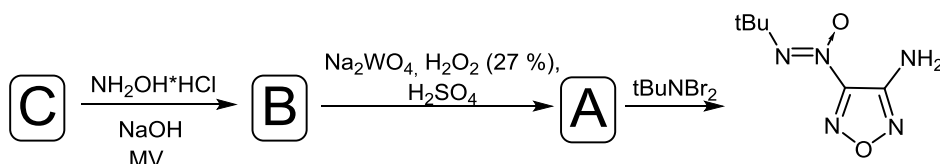


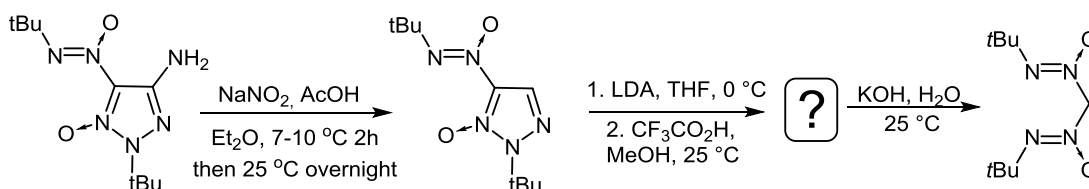
Heterocyclic problems

Problems:

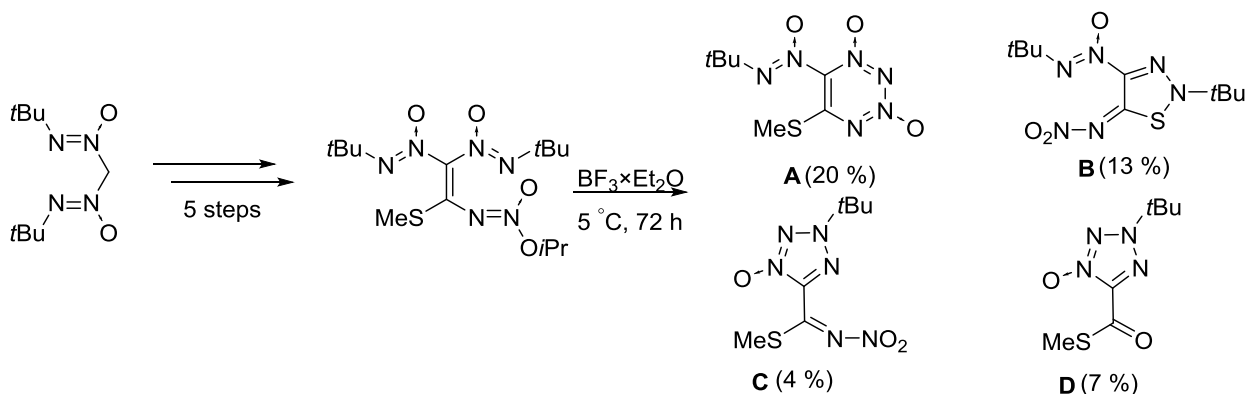
I. Write all missing compounds. Which simple and much known compound could you suggest as starting material, if the reaction from C to B includes base-catalyzed dehydration?¹



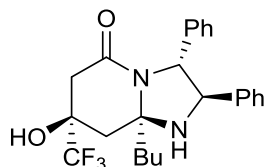
II. Propose the mechanism for first reaction. Write the missing compound.²



III. Explain the formation of four compounds A, B, C, D (target molecule is A).



IV. Suggest initial compounds for three component condensation to get following molecule.³



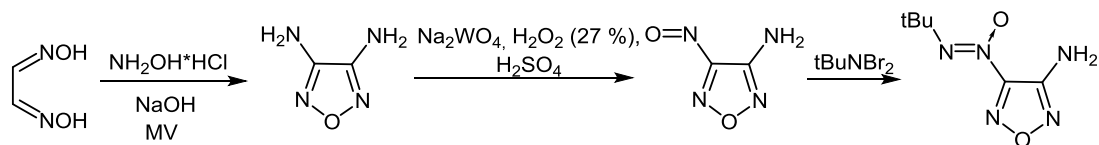
¹ R. S. Kusrkar, S. K. Goswami, M. B. Talawar, G. M. Gore and S. N. Asthana *J. Chem. Res.* **2005**, 245-247; T. M. Mel'nikova, T. S. Novikova, L. I. Khmel'nitskii and A. B. Sheremetev *Mendeleev Commun.* **2001**, 11 (1), 30-31; V. P. Zelenov, A. A. Voronin, A. M. Churakov, Yu. A. Strelenko, M. I. Struchkova and V. A. Tartakovsky *Russian Chemical Bulletin, International Edition* **2013**, 62 (1), 117-122.

² M. S. Klenov, O. V. Anikin, A. M. Churakov, Y. A. Strelenko, I. V. Fedyanin, I. V. Ananyev and V. A. Tartakovsky *Eur. J. Org. Chem.* **2015**, 6170-6179.

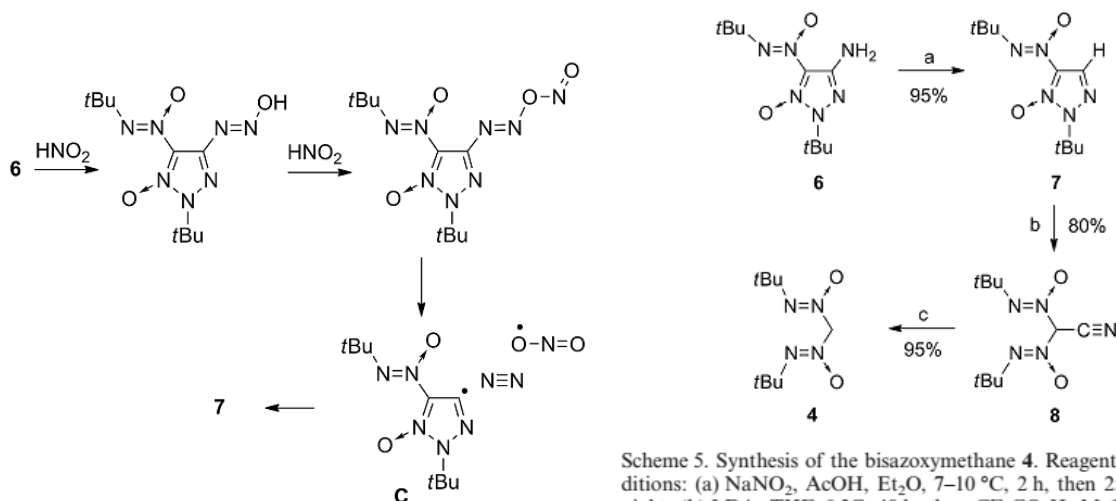
³ M. V. Goryaeva, Y. V. Burgart, Y. S. Kudyakova, M. A. Ezhikova, M. I. Kodess, P. A. Slepukhin and V. I. Saloutin *Eur. J. Org. Chem.* **2015**, 6306-6314

Solution:

Problem I:

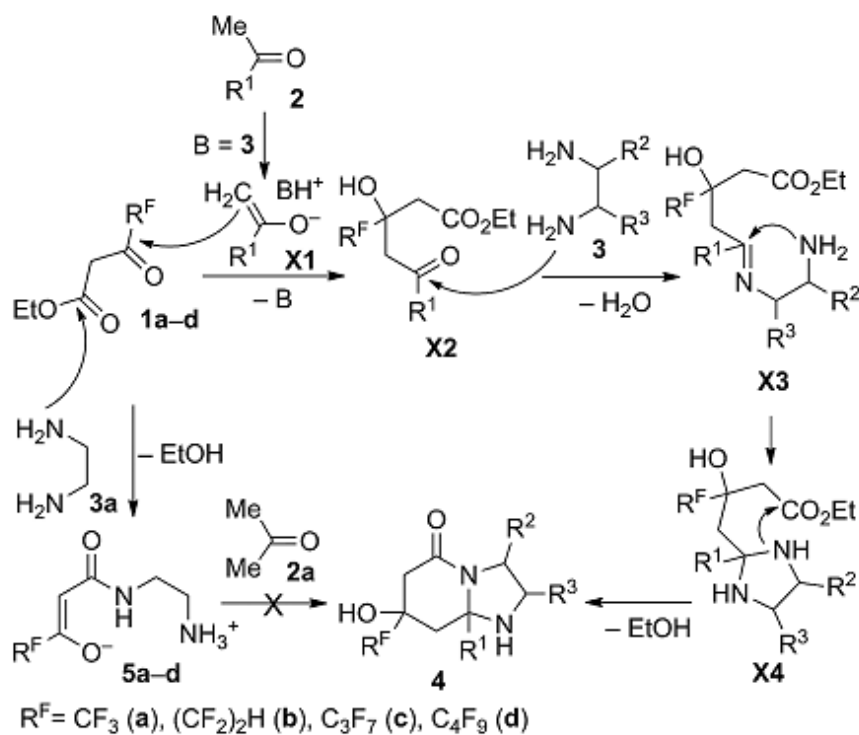


Problem II:



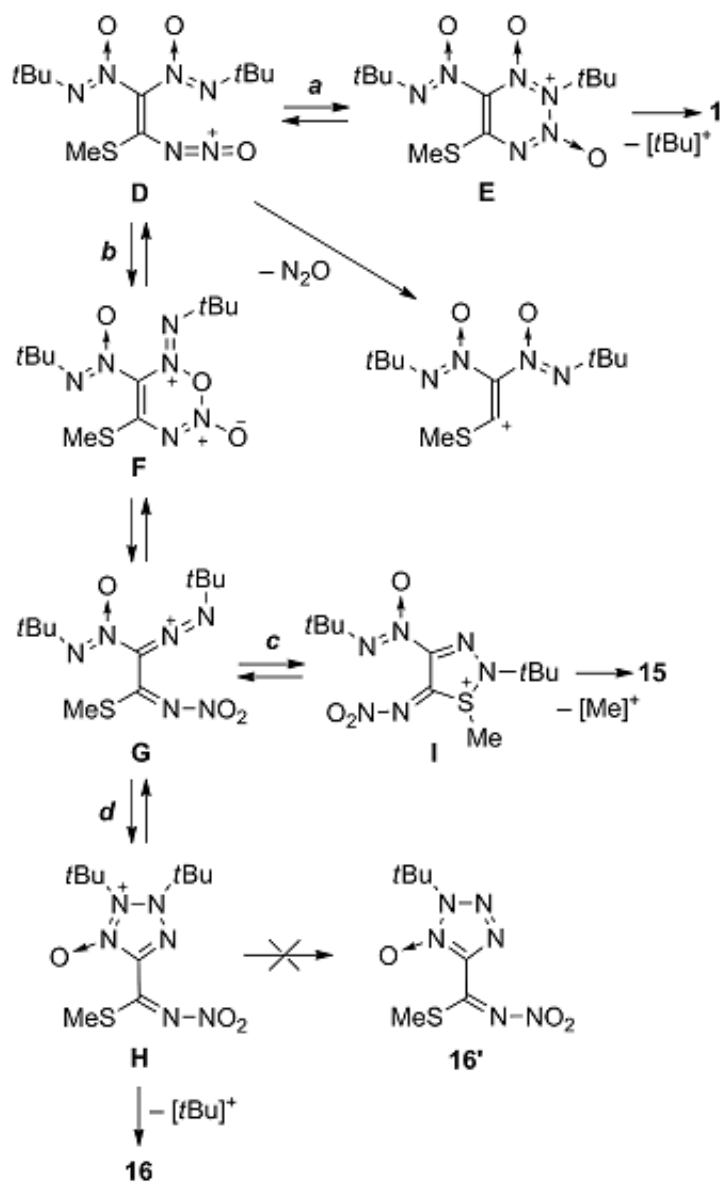
Scheme 5. Synthesis of the bisoxazolone **4**. Reagents and conditions: (a) NaNO_2 , AcOH , Et_2O , $7-10^\circ\text{C}$, 2 h, then 25°C , overnight; (b) LDA , THF , 0°C , 48 h, then $\text{CF}_3\text{CO}_2\text{H}$, MeOH , 25°C ; (c) KOH , H_2O , 25°C , 14 d.

Problem IV:



Scheme 2. A plausible mechanism for the three-component synthesis of hexahydroimidazo[1,2-*a*]pyridine-5-ones **4**.

Problem III:



Scheme 12. Plausible mechanism for the formation of compounds **1**, **15**, and **16**.