



Diazeniumdiolate and Sydnone Energetic Compounds



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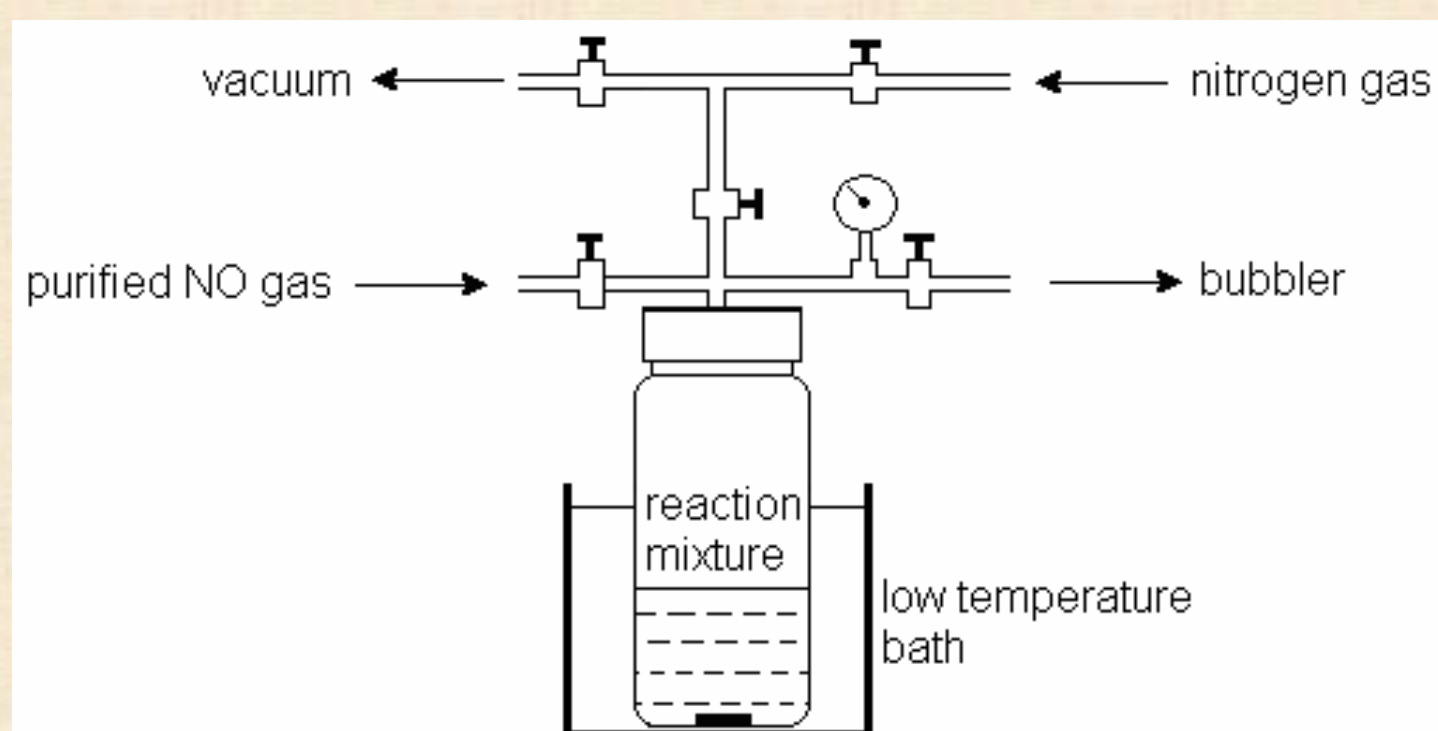
Abstract

New diazeniumdiolate & sydnone-N-oxide salts are synthesized and identified by spectral and X-ray data. Thermal (DSC) studies reveal exothermic decomposition.

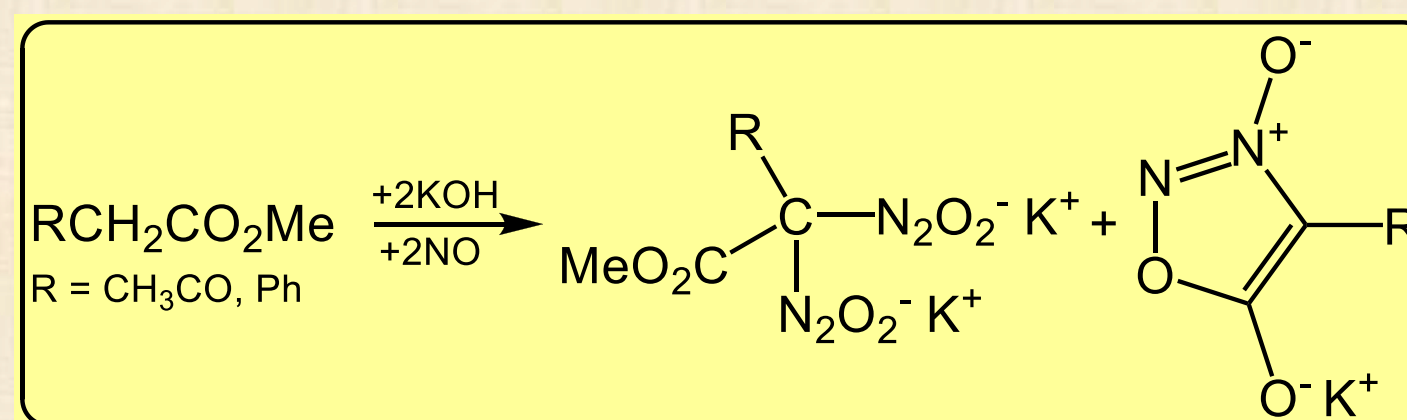
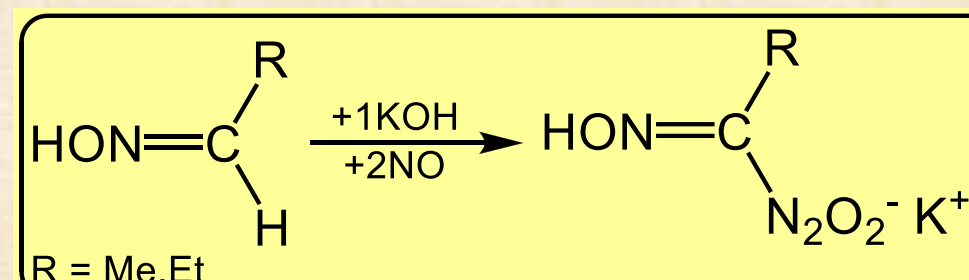
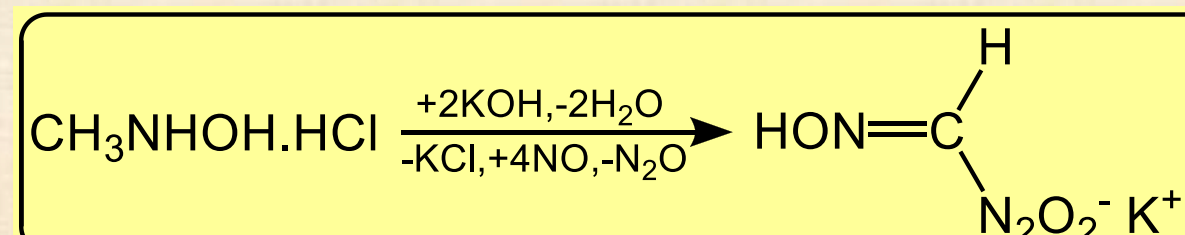
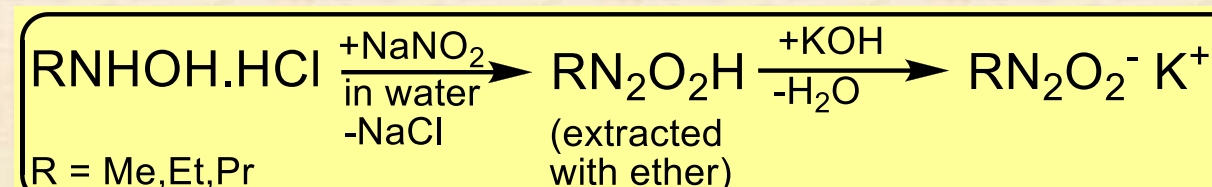
Introduction

High energy density materials (HEDM) are potential jet fuels, and are of great interest to NASA.¹ Nitrogen-rich HEDM's release N₂ on decomposition, and are considered *green fuels*.² We have synthesized new energetic materials from less expensive substances. Two methods of nitrosylation: one with nitrous acid and another with NO gas at ca. 2 atm pressure are employed successfully. Both cis and trans addition of (NO)₂ are observed.

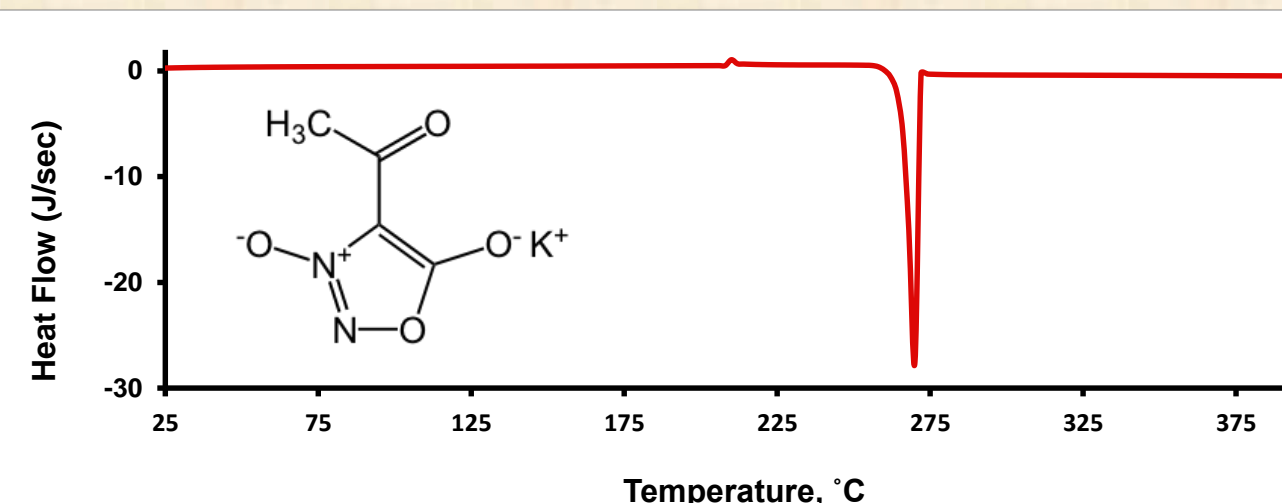
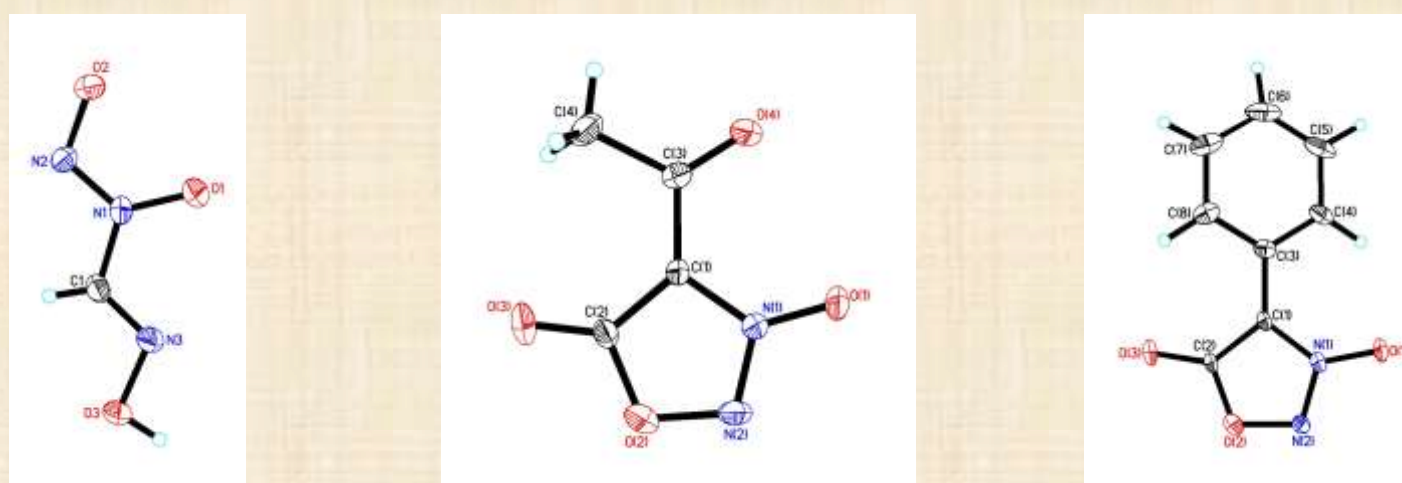
Nitric Oxide Reactor



Syntheses



Structures and DSC



DSC Data

Compound	T _{onset} , T _{max} , °C	ΔH, cal/g	ΔH, cal/mol
MeN ₂ O ₂ K	326, 331	-340	-38800
EtN ₂ O ₂ K	275, 280	-245	-31400
n-PrN ₂ O ₂ K	266, 279	-395	-56170
i-PrN ₂ O ₂ K	285, 292	-235	-33420
CH(NO ₂)N ₂ O ₂ K	218, 222	-350	-50100
MeC(NO ₂)N ₂ O ₂ K	182, 183	-251	-55010
EtC(NO ₂)N ₂ O ₂ K	176, 177	-332	-56890
PhC(N ₂ O ₂ K) ₂ CO ₂ Me	196, 197	-251	-86800
PhC ₂ N ₂ O ₃ K	264, 266	-315	-68040
CH ₃ COC ₂ N ₂ O ₃ K	267,		

Conclusions

The readily synthesized new HEDM's are quite stable under ambient conditions, but exothermically decompose at high temperatures. The isolated sydnone-N-oxide salts demonstrate the trans addition of dimeric nitric oxide to nucleophiles.

References

1. Klapötke, T. M. in *High Energy Density Materials*. Springer: Berlin, 2007, pp 85–122.
2. Giles, J. *Nature*, 2004, 427, 580–581.

Acknowledgement

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- ✦ Thanks.