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An Efficient Method for Production and Storage of Unstable S-Nitrosothiols Under Mild and Heterogeneous Condition with Sodium Nitrite and Oxalic Acid Dihydrate

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AN EFFICIENT METHOD FOR PRODUCTION AND STORAGE OF UNSTABLE S-NITROSOTHIOLS UNDER MILD AND HETEROGENEOUS CONDITION WITH SODIUM NITRITE AND OXALIC ACID DIHYDRATE

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Abstract: *Thiols can be readily converted to their corresponding nitrosothiols with a combination of oxalic acid and sodium nitrite in t-butanol at room temperature (26-30 °C). The reaction mixture could be solidified with decreasing its temperature to 15 °C and was stored for several days without any destruction of the nitrosothiols.*

Nitroso compounds in general are quite well-known compounds, and their reactions have been extensively studied from different points of views.[1] Compounds are very well-known in which the nitroso group is bound to carbon, nitrogen and oxygen sites within molecules. Much less well-known are those in which the nitroso group is bound to sulfur due to unstability of these compounds. Currently, there is considerable interest in the chemistry and biochemistry of nitrosothiols, Since (a) they are being examined as possible drugs to effect vasodilation and to reduce platelet aggregation, (b) they are now believed to play

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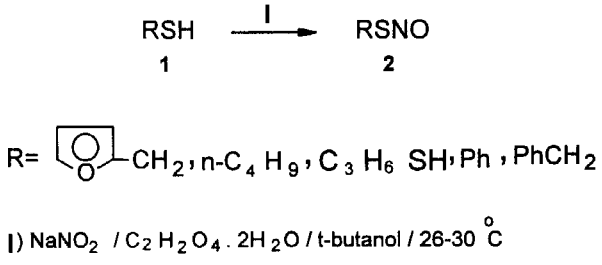
an important part in some of the physiological processes involving nitric oxide,[2] (c) they are being as a source of thiyl radicals[3] or as nitrosating agents.[4]

Although a diversity of methods are available for s-nitrosation of thiols[1] but developments of convenient, selective and mild procedures are important objective of current relevance. Consequently, introduction of new reagents or reagent systems is still fraught with experimental challenges, generally because there are some limitations such as low half time for study the chemistry of this class of compounds due to oxidation ability of media[2-4] or the reagents which were converting nitrosothiols to their corresponding disulfides immediately.[5-7] Here a simple and chemoselective heterogeneous system for quantitative conversion of thiols to their corresponding nitrosothiols under mild conditions is reported.



Scheme

Present s-nitrosation reactions can be readily carried out only by placing $NaNO_2$, $C_2H_2O_4.2H_2O$,[8] thiol **1** and t-butanol as the usable solvent in a reaction vessel and efficiently stirring the resultant heterogeneous mixture at room temperature for 5-15 minutes (Scheme)[9] and the reaction mixture having nitrosothiol **2** could be solidified and was stored below 15 °C for several days without any destruction of nitrosothiols. In addition to the above advantage, this

method also could be used for conversion of thiols to their corresponding disulfides

quantitatively with increasing temperature[7], addition trace amounts of Cu^{2+} salts[5,6] or other transition metals as a catalyst for releasing of NO from nitrosothiols.[2,4]

In conclusion this is a convenient method for the stabilization of the nitrosothiols. Therefore, we are interested to use this method for the synthesis of stable nitrosothiols (monomeric and polymeric forms), spectroscopy study, addition reaction and indicator ability of stable nitrosothiols for analytical measurement of some transition metals.

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9. A typical experimental procedure is as follows: To a solution of *n*-butyl thiol (0.180 g, 2 mmol) in *t*-butanol (10 ml) $C_2H_2O_4.2H_2O$ (0.252 g, 4 mmol) and $NaNO_3$ (0.207 g, 3 mmol) was added. The resulting mixture was stirred at room temperature (26-30°c) for 15 minutes and a bright red heterogeneous solution was obtained. This mixture either could be used immediately or stored below 15 °c. All products were characterized by comparison of their UV spectra with those reported in the literature.[5-7] Typical spectra are as follows: λ_{max} (*t*-butanol): BuSNO, 340,518,548 nm; PhSNO, 381,528, 568 nm.

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