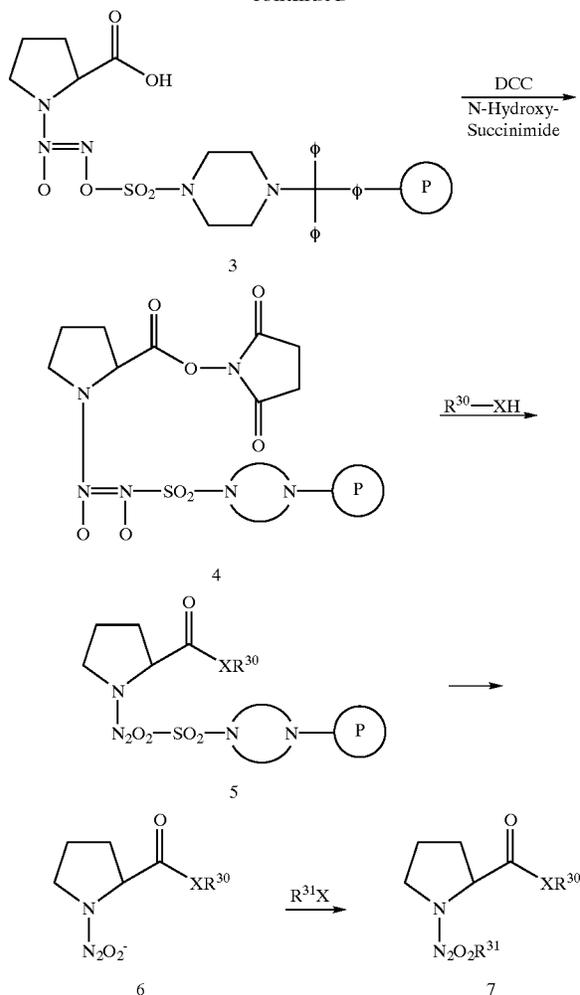


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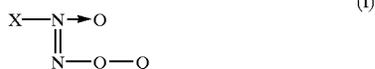


All publications, patents and patent applications, cited herein are hereby incorporated by reference to the same extent as if each publication were individually and specifically indicated to be incorporated by reference and were set forth in its entirety herein.

While this invention has been described with emphasis upon preferred embodiments, it will be obvious to those of ordinary skill in the art that the preferred embodiments may be varied. It is intended that the invention may be practiced otherwise than as specifically described herein. Accordingly, this invention includes all modifications encompassed within the spirit and scope of the appended claims.

What is claimed is:

1. An O²-substituted diazeniumdiolate having the formula



wherein X is selected from the group consisting of an amino, a polyamino, a C₁-C₂₄ aliphatic, a C₆-C₃₀ aryl, a C₃-C₃₀ heteroaromatic having 1 to 3 heteroatoms selected from the group consisting of oxygen, nitrogen and sulfur, a C₃-C₃₀ nonaromatic cyclic, and an oximyl, and Q is selected from the group consisting of an acridinyl, an anthracenyl, a

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benzimidazolyl, a benzisoxazolyl, a benzofuryl, a benzothienyl, a benzoxazolyl, a benzopyrazolyl, a benzothiazolyl, a carbazolyl, a chlorophyllyl, a cinnolyl, a furyl, an imidazolyl, an indolyl, an isobenzofuryl, an isoindolyl, an isoxazolyl, an isothiazolyl, an isoquinolyl, a naphthyl, an oxazolyl, a phenanthryl, a phenanthridinyl, a phenothiazinyl, a phenoxazinyl, a phenyl, a phthalimidyl, a phthalazinyl, a phthalocyaninyl, a pteridinyl, a purinyl, which is optionally part of a nucleic acid, a ribosylpurinyl, a pyrazinyl, a pyrazolyl, a pyridazolyl, a pyridyl, a pyrimidyl, which is optionally part of a nucleic acid, a ribosylpyrimidyl, a pyrrocolinyl, a pyrrol, a quinolyl, a quinoxalinyl, a quinoxalinyl, a sydnonyl, a tetrazolyl, a thiazolyl, a thienyl, a thyroxinyl, a triazinyl, and a triazolyl, wherein a ring atom of Q is bonded to the O²-oxygen, wherein X and Q are optionally substituted, with the proviso that, when Q is an imidazolyl, X is not an imidazolyl.

2. The diazeniumdiolate of claim 1, wherein Q is part of a vitamin.

3. The diazeniumdiolate of claim 1, wherein Q is part of a hormone.

4. The diazeniumdiolate of claim 1, wherein Q is a pyrimidyl, which, optionally, is part of a nucleic acid.

5. The diazeniumdiolate of claim 4, wherein Q is a ribosylpyrimidyl.

6. The diazeniumdiolate of claim 1, wherein Q is a purinyl, which, optionally, is part of a nucleic acid.

7. The compound of claim 6, wherein Q is a ribosylpurinyl.

8. The diazeniumdiolate of claim 1, wherein X is linked to the N¹ nitrogen through an atom other than a carbon atom.

9. The diazeniumdiolate of claim 1, wherein X is substituted with one or more moieties selected from the group consisting of —[N(NO)O]⁻, a halo, hydroxy, an alkylthio, an alkoxy, an aryloxy, an amino, cyano, a sulfonato, mercapto, nitro, a C₁-C₁₂ aliphatic, a C₃-C₈ cycloalkyl, a C₃-C₈ heterocyclic, a C₂-C₁₂ olefinic, benzyl, phenyl, benzylcarbonyl, phenylcarbonyl, glucosyl, ribosyl, glucosyl, mannosyl, deoxyribosyl, dextranyl, starch, glycogenyl, lactosyl, fucosyl, galactosyl, fructosyl, glucosaminyl, galactosaminyl, heparinyl, maltosyl, sucrosyl, sialyl, cellulose, phosphorylated pentosyl, polyphosphorylated pentosyl, phosphorylated hexosyl, polyphosphorylated hexosyl, phosphono, phosphato, and phosphato in which one or more oxygen atoms are independently replaced with S or NR¹, wherein R¹ is a C₁-C₈ aliphatic, a C₃-C₈ cycloalkyl, a C₆-C₈ aryl, or a C₃-C₈ heteroaromatic having 1 to 3 heteroatoms selected from the group consisting of oxygen, nitrogen and sulfur.

10. The diazeniumdiolate of claim 1, wherein Q is substituted with one or more moieties selected from the group consisting of X[N(O)NO]⁻, wherein X is as defined in claim 1, halo, hydroxy, alkylthio, arylthio, alkoxy, aryloxy, amino, mono- or di-substituted amino, ammonio, substituted ammonio, nitroso, cyano, sulfonato, mercapto, nitro, oxo, a C₁-C₂₄ aliphatic, a C₂-C₁₂ olefinic, a C₃-C₂₄ cycloalkyl, a C₃-C₂₄ heterocyclic, benzyl, phenyl, substituted benzyl, substituted phenyl, benzylcarbonyl, phenylcarbonyl, glucosyl, ribosyl, glucosyl, mannosyl, deoxyribosyl, dextranyl, starch, glycogenyl, lactosyl, fucosyl, galactosyl, fructosyl, glucosaminyl, galactosaminyl, heparinyl, maltosyl, sucrosyl, sialyl, cellulose, phosphorylated pentosyl, polyphosphorylated pentosyl, phosphorylated