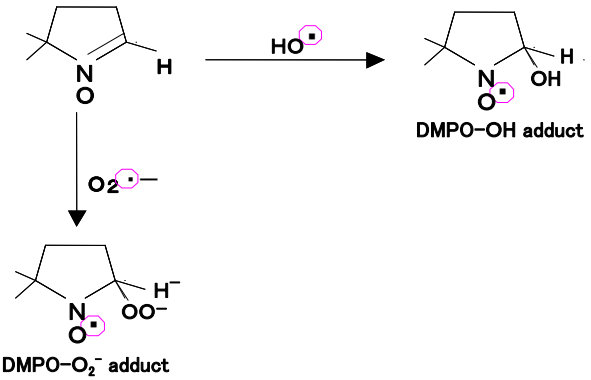
Frequently-Used Spin Trap Reagents

When measuring short-lived radicals in solutions that include active oxygen, it is common to use a spin trap reagent. The spin trap reagent itself is not a radical, but it traps radicals and gives a long lived adduct, a NO radical. As the lifetime of this is long, good measurements at room temperature are possible.

Depending on the combination of radical type and spin trap reagent, the stability of each adduct differs. For example, whilst the hydroxyl radical (HO˙) is very short lived, the half life of the DMPO adduct may be several hours, depending on the composition and temperature of solution to be used.

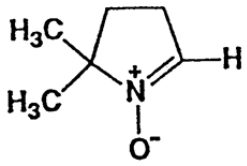


In the case of the DMPO adduct of superoxide anion radical (O2˙), the half life is 1 to 2 minutes in neutral phosphate buffer solution. These addition reactions are shown above.

There are two types of spin trap reagent, Nitron and Nitroso series, and are used according to radical type and reaction.

The following are the major spin trap reagents available:-

5,5-dimethyl-1-pyrroline-N-oxide (DMPO)



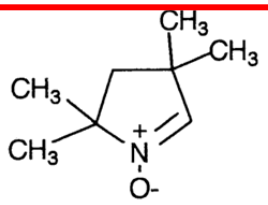
Molecular weight：113

Application：O 2 ˙⁻, HO˙, C-center radical

Characteristics：Most popular water-soluble trap reagent

After opening, keep cold avoiding light and oxygen.

3,3,5,5-Tetramethyl-1-pyrroline-N-oxide (M4PO)



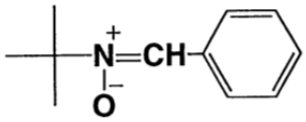
Molecular weight：141

Application：same as DMPO, reaction speed with HO˙ is high.

Characteristics：Hard to generate

Absorbs moisture easily, CAUTION.

N-tert-Buthyl-α-phenylnitrone
(PBN)

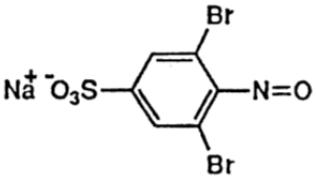


Molecular Weight：177

Application：C-center radical, HO˙(beer flavor quality)

Characteristics：Relatively stable and easy to handle

3,5-Dibromo-4-nitrosobenzenesulfonic acid
sodium salt (DBNBS)



Molecular Weight：357

Application：C-center radical

Characteristics：Nitroso series

Poor solubility in water