

研究论文

锰离子参与的类Fenton反应的HPLC和ESR波谱研究

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摘要 利用自旋捕捉-ESR技术及芳环羟基化反应-高效液相色谱(HPLC)法两种方法研究了Mn²⁺参与的类Fenton反应. 两种方法均检测到Mn²⁺与H₂O₂反应产生•OH. 建立了HPLC-

荧光检测器对•OH的高灵敏快速检测方法. 检测了超氧化物歧化酶以及几种Mn²⁺配体对产生•OH的影响.

结果显示, Mn²⁺与H₂O₂反应可以发生类Fenton反应, 产生•OH. 这一现象可能是Mn²⁺

引起生物体内氧化损伤的重要原因.

关键词 [锰](#) [羟基自由基](#) [类Fenton反应](#) [电子顺磁共振](#) [高效液相色谱](#) [氧化胁迫](#)

分类号

Manganous Participation in Fenton Like Reaction Studied by HPLC and ESR Spectroscopy

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Abstract Using ESR spectroscopy, it was showed that manganous could substitute for iron or copper ion in Fenton system to evolve hydroxyl radical. In the presence of 5,5-dimethyl-1-pyrroline-1-oxide (DMPO), four hyperfine splitting line signal of DMPO/•OH adduct was observed. HPLC with fluorescence detection (excitation 277 nm and emission 306 nm) was also used to detect the generation of hydroxyl radical in this system. *L*-Phenylalanine, which could be converted to highly fluorescent *L*-tyrosine in the presence of •OH, was used as fluorescence probe. The variety of fluorescence intensity of *L*-tyrosine reflected the generation of •OH. ESR spectrum and HPLC result proved that hydroxyl radical was generated in this system. The effect of several *in vivo* environment factors, such as Cu-Zn superoxide dismutase (Cu-Zn SOD), chelators (phosphate, pyrophosphate, EDTA and desferrioxamine) were also considered. ESR spectrum showed that Cu-Zn SOD restrained DMPO/•OH adduct signal markedly, which could not be restrained by denatured enzyme. Chelators partly restricted the generation of •OH, but could not eliminate the radical. It is suggested that hydroxyl radical initiated by manganous complex and hydrogen peroxide might be an important reason why manganous could induce oxidative stress *in vivo*.

Key words [manganous](#) [hydroxyl radical](#) [Fenton like reaction](#) [ESR](#) [HPLC](#) [oxidative stress](#)

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