

## Organic matter transformation in the environment investigated by quantitative electron paramagnetic resonance (EPR) spectroscopy: studies on lignins.

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### Streszczenie

The lignins separated from angiosperm and gymnosperm trees, peat and xylitic brown coal were investigated by quantitative EPR. Observed free radicals in lignins are sensitive to alkaline environment. Gaseous ammonia interacting with solid lignins in resonance cavity shifts quinone–hydroquinone equilibria towards formation of semiquinone anions. Complexation of copper(II) by lignins causes drastic decrease of the semiquinones in the matrices. Formation of lignin–Pb(II) complexes yielded radicals characterised by unusually low  $g$ -value (1.9999–2.0003). Monomeric structural units of the investigated lignins were recognised by pyrolysis with in situ methylation by tetramethylammonium hydroxide. Although for the natural lignins the mixture of normal semiquinone signals at  $g$  about 2.0034 and signals at  $g$  1.9999 were observed, some monomeric components of lignins (e.g., caffeic acid, pyrogallol) gave pure lines at  $g=1.9999$ . The bacterial oxidative biodegradation of lignin monomeric components and their Pb(II) complexes resulted in increase of the radical signals.

### Słowa kluczowe

Lignin, Lignin–copper(II) complexes, Lignin–lead(II) complexes, Semiquinone radical, Caffeic acid, Pyrogallol, Biodegradation, EPR

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