

COULD HUMIC SUBSTANCES BE GOOD ANTIOXIDANTS?

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Abstract

Humic substances (HS) are natural macromolecules that can be found everywhere (e.g., soils, waters, air, peat, coal deposits) in the environment. Humic substances (HS) are natural organic colloids built up randomly from the decay products of plant originated biomass in humification process. [1]

In today's modern world, processed foods, medicines, cosmetics, and electro smog produce so much free radical in living organisms that antioxidants taken from the outside will become increasingly important to neutralize this increased load.

Antioxidants are substances that inhibit the oxidation in a broader sense oxidation retardants. The most important physiological role of antioxidant substances is to deactivate the free radicals continuously formed in the Szent-Györgyi-Krebs cycle, and to counteract the radicals with different oxidizing properties that enter the body from the outside.

There are well known antioxidants like vitamin-C; vitamin-A; flavonoids; resveratrol, ect. These antioxidants like flavonoid and the resveratrol are formed in plants. The reason plants produce these materials is to protect themselves for the effect of the UV radiation. When the UV light beam hits the plant it produces free radicals. By producing antioxidant molecules the plants can protect themselves from this effect [2]. The reason we think that the humic substances could be great antioxidant is this. Because they are formed from plant residues. So these materials are like the essence of the decomposed plant. [3]. Humic acid also has antioxidant properties via phenolic and polyphenolic hydroxyl groups, and behaves as free radical scavengers. Secondary substituents on the polyphenolic structure that support the electron-donating ability of phenolic OH groups by inductive and mesomeric effects also enhance the antioxidant property. [4]

First of all we extracted different fractions (humic acid, fulvic acid and hymatomelic acid) from a raw material the Leonardite. Then we measured the antioxidant capacity of these fractions. Although it is not an easy task. We measured the total phenol content (TPC) of the samples. We used gallic acid as a reference molecule. The values are as follows: while gallic acid (GS) gave 982 mg/g TPC, the values of fulvic acid 9 mg/g TPC and hymatomelic acid 52 mg/g TPC are much lower. We also measured the antioxidant capacity by the DPPH and CUPRAC methods, and the values were as follows. For the DPPH radical scavenging activity for the fulvic acid was 20,4 % for the hymatomelic 31,4 % in an interval concentration from 0-1 mg/ml. From the results we can conclude that humic substances has antioxidant, free radical inhibitory effects.

References

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