

# PHOTOCHEM®

Quality is the difference



## Getting the antioxidant picture

### Free radicals

All living organisms are permanently influenced by highly reactive molecules - the free radicals. Radicals are unstable oxygen compounds with an unpaired electron in their atomic electron shell.

Typical free radicals in biological and environmental chemistry are:

- Superoxide radical  $O_2^{\bullet-}$
- Hydroxyl radical  $HO^{\bullet}$
- Peroxide radical  $ROO^{\bullet}$

As all molecules endeavor to have complete electron pairs, the oxygen radicals react very aggressive with other molecules snatching electrons away from them. That way, these molecules themselves become radicals - thus starting a chain reaction.

In living cells, free radicals have the potential to modify important proteins, damage the genotype and the cell membrane.

All types of tissue and organs can be affected by their varied effects.

### Antioxidants

To prevent free radical damage, the body has a defense system. Antioxidants are one part of this. They are molecules which can safely interact with free radicals and terminate the chain reaction before vital molecules are damaged. Antioxidants can be divided into enzymatic and nonenzymatic groups.

The enzymatic antioxidants include superoxide dismutase (SOD), glutathione peroxidase, etc... The nonenzymatic antioxidants include ascorbic acid,  $\alpha$ -tocopherol, uric acid, bilirubin, zinc, selenium, etc...

### Analysis of antioxidants with the PHOTOCHEM®

Analytik Jena offers the first system solution for the quantification of water-soluble and lipid-soluble antioxidants separately on one single system.

### How does the PHOTOCHEM® work?

PHOTOCHEM® is using the method of photochemiluminescence (PCL). The method combines the very fast photochemical radical generation with the highly sensitive luminometric detection.

Free radicals (superoxide anion radicals) are produced by optical excitation of a photosensitizer. These radicals are partially eliminated from the sample by reaction with the antioxidants present in the sample. In the measuring cell the remaining radicals cause the detector substance to luminescence. Subsequently the antioxidant capacity of the sample is determined in a separate cell by means of a photomultiplier tube (PMT).

The results are presented in equivalent concentration units of ascorbic acid for water-soluble substances or Trolox® (synthetic vitamin E) units for lipid-soluble substances.

The user, however, is free to use other antioxidants for the calibration and analysis.



## Unique benefits

- First instrument available for the examination of the antioxidative capacity of both lipid-soluble and water-soluble substances on a single system
- Measurement of the total antioxidative capacity (sum parameters) of most diverse and complex substance mixtures
- Extremely short measuring times <3 minutes
- Very high sensitivity
- Needs only a few µL of the sample
- Does not require any complicated or time-consuming sample preparation
- Sampling, measurement and rinse cycles are performed automatically
- Instrument standardized ready-to-use kits for various applications
- Delivers results of practical quantitative relevance for the characterization of the antioxidative status of organisms
- Robust functionality in routine procedures
- Service-friendly
- Compact, ergonomic design with a small footprint
- Computer controlled system and curve analysis with comfortable software

## Applications

The PHOTOCHEM® is applicable for all applications, in which the antioxidative properties of substances, as well as their interactions have to be quantified.

Some of the application fields are...



### Food

*Analysis of food quality, control of technological processing food production, improvement of the shelf life of products, detection of the antioxidative efficacy of food supplements, development of Novel Food.*



### Cosmetics

*Improvement of the antiradical properties of cosmetics and control of the long-term stability of products.*



### Medicine

*Clinical routine diagnostics and follow-up control of the therapy of relevant diseases (cancer, atherosclerosis, cardiac infarction, ischaemic organic lesions, Down's syndrome, control of the quality of conserved blood). Medical research into diseases that are characterized by disturbances of the antioxidative system.*



### Chemistry

*Determination of the antiradical effects of additives, monitoring of the quality parameters of mineral-, transformer- and turbine oils jet propulsion fuels, bio-diesel, caoutchouc and plastic materials.*



### Pharmacy

*Examination of the antioxidative properties of new drugs for the direct use in therapy or for the antioxidative stabilization of pharmaceuticals.*



### Environmental medicine

*Monitoring of the antioxidative balance of sections of the population under the influence of environmental noxae.*



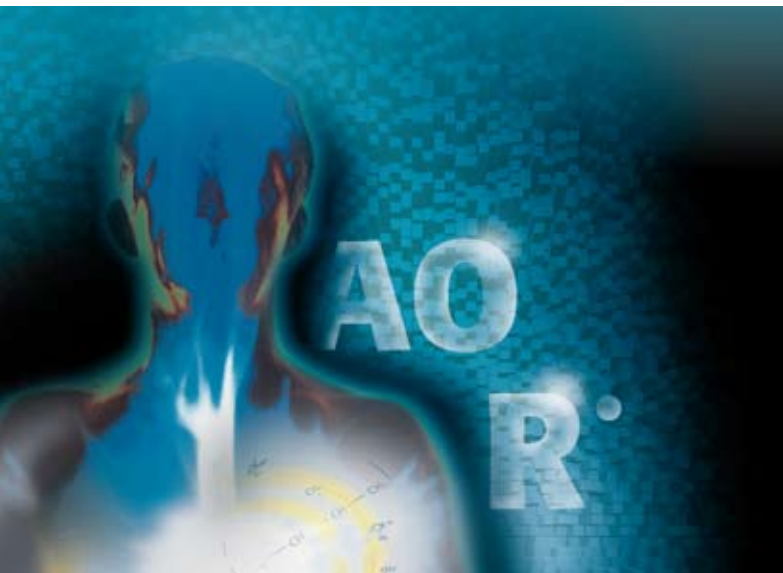
### Biology

*Examination of oxidative stress phenomena by increased UV irradiation and other environmental factors, improvement of the resistance to stress factors.*



### Naturopathy

*Objectification of the effects of alternative therapies, such as UV blood and whole-body irradiation, phytotherapies, oxygen treatment.*





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Subject to changes in design and scope of delivery as well as further technical development!