



Magnettech ESR5000

- Bench-top EPR Spectrometer

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Our bench-top ESR5000 EPR spectrometer is a compact high performance instrument with sensitivity and reliability for demanding applications in the field of EPR spectroscopy.

Unique and Far-reaching

EPR (Electron Paramagnetic Resonance) spectroscopy is the only technique that unambiguously detects and quantifies species with unpaired electrons. These species include free radicals, transition metals and defects in materials.

From membranes to solar cells – EPR applications spread far and wide...

It has led to the understanding of metalloprotein structures and the processes involved in photosynthesis. In biology, EPR can be applied to the study of membrane proteins, metalloenzymes, IDPs, RNA, DNA, spin labeling/trapping, nitric oxides and ROS & RNS. EPR is the only method available for the direct detection of paramagnetic ROS and RNS species. Further applications include polymer synthesis, testing the purity of silicon in solar cells and spin trapping to assess the oxidative stability of flavors. In electrochemistry, redox chemistry, photochemistry and catalysis, EPR can be used to study metal centers and radicals involved in chemical processes.

Versatile and Nondestructive

In EPR spectroscopy, the sample can be a solid, a liquid, a gas, colored solutions, turbid solutions, or even a cell suspension. In the EPR measurement there is no contact with the sample so the sample is preserved for further analyses.

Easy to Use

EPR is a very accessible spectroscopy. Sample preparation is minimal, just requiring placing the sample in a tube regardless whether the sample is a solid, liquid, or gas. Detection of unpaired electrons in both free radicals and in transition metals is unambiguous. From the EPR spectrum it is easy to obtain precise quantitative information about the radicals present. Also, the EPR spectrum can be fitted to improve the quantitative results and to precisely extract parameters to characterize the species and compare with literature.

Customizable

Each laboratory has its own requirements for preparing and measuring their samples. In some cases, the sample may require special sample holders to position the sample in the EPR spectrometer. Other cases may require irradiation with UV light or heating and cooling of the sample to generate the radicals or to observe changes in the sample due to the exposure. The specialized equipment necessary for these cases is available for each laboratory's needs.



Compact Size

45 kg, 397 x 262 x 192 mm

Versatile Options

Temperature controller, autosampler, goniometer and more

Application Oriented

For industrial and academic use

● Application Fields

Life Sciences

Nitric oxide measurement, reactive oxygen species (ROS), oxidative stress, photo dynamics

Environmental Toxicology

Generation of radicals by pollutants

Biophysical Features

Oximetry, membrane fluidity, pH in microenvironment, viscosity, phase partitioning

Food Chemistry and Pharmacy

Antioxidative properties of foodstuff, radiation-induced radicals, long term product stability, impurity profiling

Alanine Dosimetry

Alanine dosimetry (tablets and thin films)

Bioinorganic Chemistry

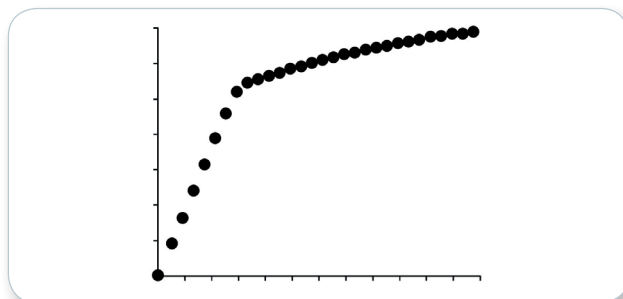
Bioinorganic transition metal compounds, fenton chemistry, effect of heavy metal ions on tissue

Polymers

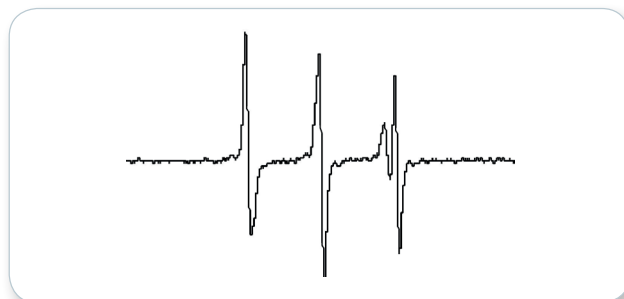
Living polymers, UV stability, temperature stability

Cosmetics

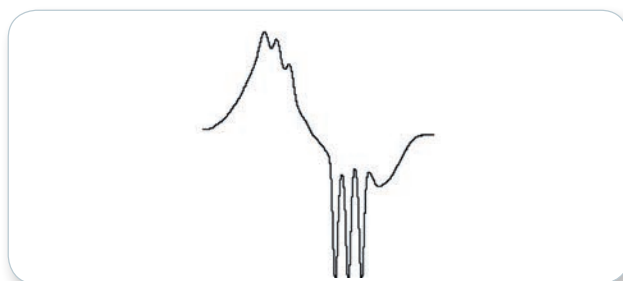
Radical protection effectiveness, protection quality of UV-filters in creme, shampoo etc.



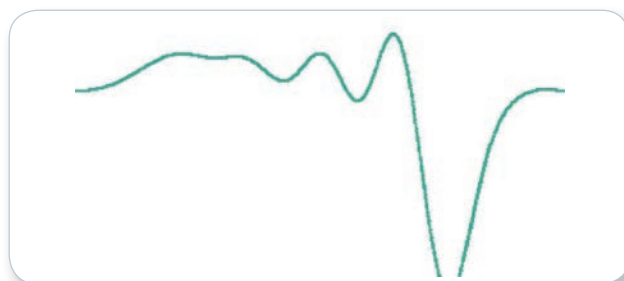
Kinetic of ROS generation by xanthine / xanthine oxidase



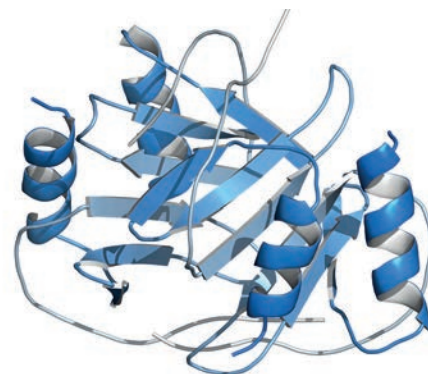
Tempco in a two phase system oil/water



NO-Hemoglobin



SOD mimetic Cu(II) complex



● Accessories

Temperature Controller



Temperature range -180°C to 200°C Liquid nitrogen storage, measurement with cavity integrated nitrogen dewar.

Bio Temperature Controller



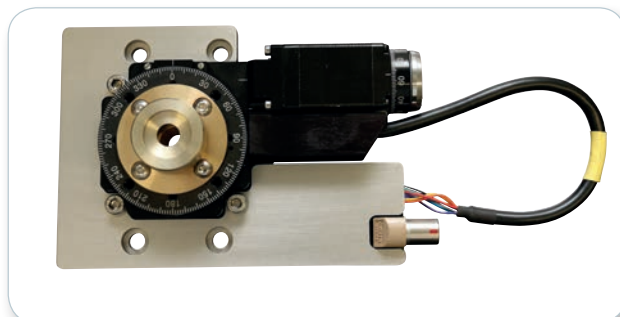
For temperature stabilization of biological systems like tissue samples. Temperature range: RT to 60°C

Autosampler



Automated handling of up to 23 samples in quartz tubes 3 – 6 mm diameter, precise height positioning within resonator for highest reproducibility.

Automated Goniometer

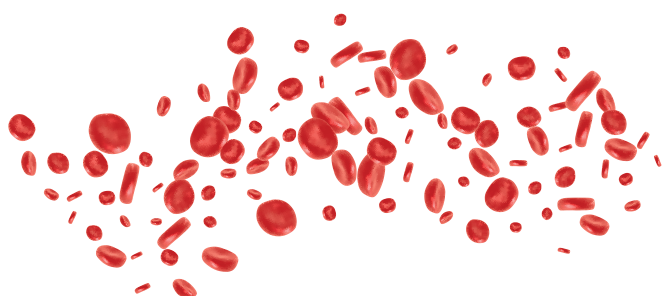


Fully automated angular rotation of sample, step size 0.1° to 180° . Automatic readjustment of the spectrometer before every measurement.

Rack for Horizontal Orientation



Specialized mounting for horizontal orientation for use with viscous media and tissues



Glassware for dedicated applications

50 μ l capillaries, sample tubes, finger dewar, flat cell, tissue cell, and special holder.

Flat Cell



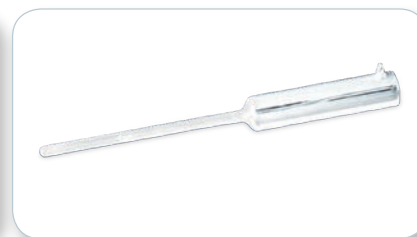
Optimize sensitivity for samples that are in water or other polar solvents.

Tissue Cell



Accommodates thin water containing samples e.g. tissues

Dewar

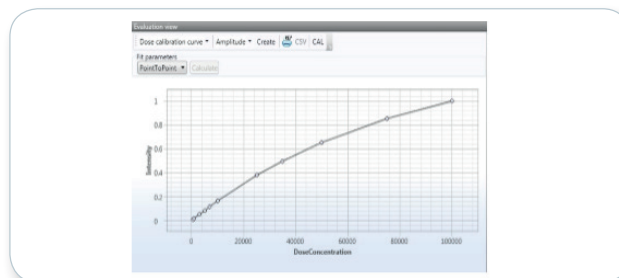
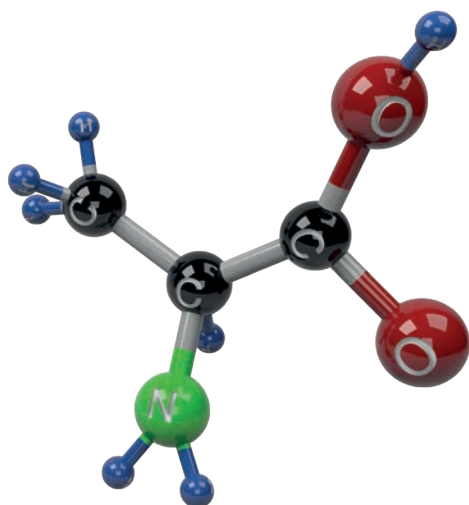


Keep sample at constant temperature of 77K

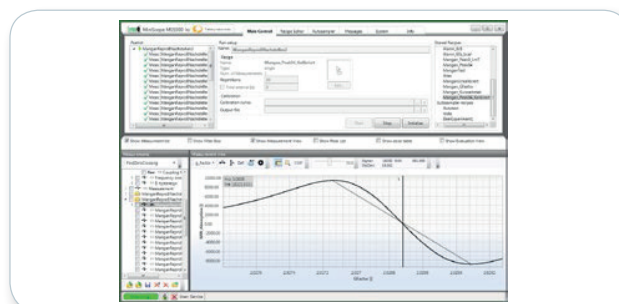
Software – ESRStudio

ESRStudio is a modern and dynamic software for EPR measurements with workflow-based user interfaces.

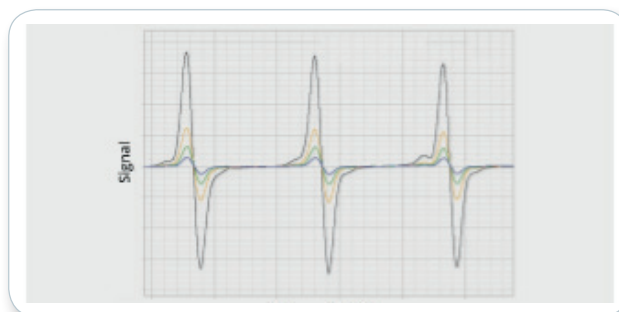
- Advanced operating and data evaluation software
- User friendly interface
- User/application-based customization
- Workflow for automated spectrum analysis
- Automated report generation
- Versatile optimization of parameters like phase and amplitude of magnetic field modulation



Alanine irradiation dose calibration curve



Software ESRStudio



TEMPOL-solutions with different concentrations



Technical specification

Operating frequency	X-band
Sensitivity	5×10^{10} spins/mT (5×10^9 spins/G)
Microwave power	1 μ W – 100 mW
Concentration sensitivity	50 pM
Field homogeneity	± 5 μ T (50 mG) within sample region
Field stability	1.0 μ T/h (10 mG/h)
Sweep resolution (field and time)	$\geq 125,000$ points
Magnetic field range	0 to 650 mT (0 to 6500 G)
Modulation frequency	10 kHz and 100 kHz