RADANGEL

Low-cost spectrometry for schools

kromek

detect image identify

RadAngel for Schools™
Highest Resolution Entry-level Room Temperature Gamma-Ray Spectrometer

RadAngel for Schools™ (RA4S™) is an ideal and portable gamma-ray spectrometer that can be utilised for educational purposes in teaching concepts of radiation as well as for training in the use of radiation sensors.

Its compact size and quick set-up time makes it ideally suited for individual or small group projects, laboratory-based teaching, classroom demonstrations and field studies.

The RA4S™ makes technology available for the first time, in an advanced lightweight, high performance radiation detector, that was previously only available to Defense Agencies and Homeland Security personnel. This unique instrument utilizes a Cadmium Zinc Telluride (CZT) solid state detector, which enables room temperature operation with excellent energy resolution.

The unit is completely self-contained, with a built-in detector, amplifiers, power supply and communications. The digitized detector signals are sent to a PC via the mini-USB which also powers the unit, so no external supply is required.

The RA4S™ also contains an internal rechargeable (via USB) Lithium ion battery which enables extended use for field studies.

A green battery level indicator LED displays the current state of charge of the battery. The blue LED radiation indicator shows each event, and when used in conjunction with external speakers, an audio indicator can be heard.

The RA4S™ is easy to use and connects directly to any Windows 7 or 8 based PC or tablet for operation and requires no consumables or re-calibration. It comes with K-Spect™, Kromek's entry-level acquisition and analysis software, which is available to download, free of charge, from the Kromek website.

K-Spect™ receives the data and performs the spectrum acquisition, display, analysis and storage function. Signals from the CZT solid-state detector are processed and digitised, and the pulse height data is transferred to the computer via the mini-USB.

Main features:

- Room temperature operation, no cooling required
- High efficiency
- High spectral resolution
- Compact size
- Simple to use
- CZT solid state detector
- USB and rechargeable lithium Ion battery powered
- <1W power consumption

Specifications:

Detector	5x5x5mm CZT detector
Energy range	40 keV to 1500 keV
Energy resolution	<3.5% FWHM @ 662 keV
Electronic noise	<0.1 (events/second)
Maximum throughput (USB)	30,000 cps
Number of channels	4096 (12 bit)
Power consumption	880 mW (175mA at 5V)
Primary supply	Via USB
Secondary supply	Long-life rechargeable Lithium Ion battery. 4 hrs charging. 12 hours operation
Audio indicator	Yes, indicates each event. External speakers required
Visual indicator	Yes, integrated LED , indicates each event
Dimensions	90mm x 55mm x 25mm
Weight	135 gram
Temperature range	10°C - 40°C

All specifications are typical values & valid at 21 +-2C unless otherwise stated

Acquisition & analysis software

Feature	K-Spect
Spectral acquisition from single unit	✔
Energy calibration facility	✔
Display single detector information only + 5 saved Spectra	✔
Compatible with K102 Multichannel Analyser	✔
Ability to save spectra in SPE or CSV formats	✔
Ability to export data	✔
Ability to save detector calibration information	✔

K-Spect™ - Acquisition and analysis software

RA4S™ is supported by K-Spect™, Kromek's entry-level software which is available to download, free of charge from: www.kromek.com (click on the downloads tab, and follow the on-screen instructions).

K-Spect™ allows users to acquire live spectra from the detector, as well as the ability to display, analyse, load and store data through a mini-USB connection to a computer.

Example applications of the RA4S™ for classroom teaching can be found opposite.

Warranty
RA4S is sold with 12-months manufacturer's warranty.

What's in the box
- RA4S spectrometer
- USB cable

Tested by the UK National Physical Laboratory (NPL) in accordance with the **NPL Good Practice Guide No. 14** "The examination, testing and calibration of portable radiation protection instruments"

Support

The RA4S User Guide and the K-Spect acquisition, display and analysis software can be downloaded from www.kromek.com

Currently all documentation and support is in English. For support requests in other languages, please contact Kromek.

RA4S - the ideal teaching tool

K-Spect™ allows users to acquire live spectra from the detector, as well as the ability to display, analyse, load and store data through a mini-USB connection to a computer.

Its unrivalled portability and ease of operation makes the RA4S™ the ideal tool to assist teaching the concepts of radiation and spectrometry, radiation safety, as well as introduction to radiation sensors.

RA4S™ is a fully featured radiation spectrometer, which Kromek supports with a number of teaching ideas based on the UK Key Stage 4 curriculum, GCSE, AS and A level studies.

Teaching materials with guides for students are available at www.kromek.com

Example applications of the RA4S for classroom teaching:

- **Everyday uses** of radiation including Americium isotope in smoke alarms
- **Environmental studies.** Examples include background and natural radiation; Radon; radio tracer uptake in plants; responding to nuclear accidents including Fukushima and Chernobyl; radio carbon dating
- **Radiation in food.** Salt replacer; irradiation to lengthen the shelf life of packaged food; determining the banana equivalent dose; natural radioactivity in Brazil nuts; Radium in Lima Beans
- **Medical radiation** including sterilization of sticking plasters
- **Radiation in industry** including radiation in coal power station ash; x-ray source for weld inspection; Non-Destructive Testing; oil exploration
- **Nuclear power.** Monitoring; decommissioning;
- **Isotopes and decay**
- **Maths topics** including logarithms; ½ life; digital vs analogue data; statistics; inverse square law; computation of dose
- **Radiation safety** and moderation of radiation dose through shielding

RAD ANGEL
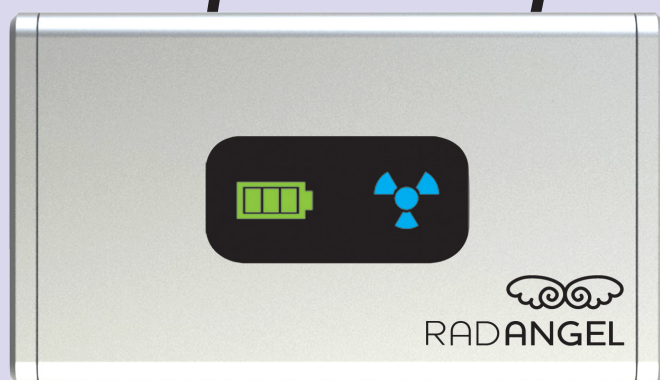
High Spectral Resolution

CZT Solid-state detector

Accurate Dose Rate

Identifies sources of radiation

Free acquisition & analysis software

RAD ANGEL

RA4S A4E SPF-DOC-1223 Rev3