

10 Who can help me select the spectrometer package I need?

Spectral Evolution can help geologists, mining engineers, exploration managers, and operations managers to make the right selection based on their specific applications and requirements.

Using Spectral Evolution's field spectrometers, mining professionals are identifying:

- Iron oxide minerals - hematite, goethite, magnetite
- Al(OH) group minerals - paragonite, muscovite, phengite, illite, pyrophyllite, kaolinite, halloysite, dickite, smectite varieties, gibbsite, and more
- Sulphates - alunite, jarosite, gypsum
- Si(OH) group minerals - opaline silica and hydrothermal quartz with fluid inclusions, ammonium bearing minerals such as NH-alunite, buddingtonite, illite
- Fe(OH) group minerals - saponite, nontronite
- Mg(OH) group minerals - chlorites (Mg/Fe), biotite, phlogopite, antigorite, tremolite, actinolite, talc, hornblende, brucite
- Carbonate group minerals - calcite, dolomite, Fe-dolomite, magnesite, ankerite, siderite, malachite, Cu carbonates
- Selected OH-bearing silicates - epidote, prehnite, tourmaline, topaz
- Selected Zn silicates/phosphates - sauconite, tarbutite
- Selected zeolites - laumontite
- Selected rare earth elements (REE)

While there will be plenty of other factors in your field spectrometer decision, these ten tips can help you to establish a baseline before you actually write something into your grant or your budget.

For more information or a quote to help you decide, please contact us at:
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TEN TIPS

For Selecting the Appropriate Field Portable Spectrometer for Mining Exploration & Mineral Identification.

Field spectrometers are increasingly essential for mining exploration and mineral identification applications. They can confirm what hyperspectral and multispectral imaging may have indicated in advance of field work, they can detail minerals that have not been identified, and they can analyze both qualitatively and quantitatively – describing what is there and how much.



Using reflectance spectroscopy, field personnel can obtain practical information from the visible, near-infrared, and short-wave infrared regions of spectra, beyond just simple mineral identification. Field spectrometers can add valuable data to routine mining applications such as core logging, field reconnaissance, pit mapping, and remote sensing ground truth. Selected alteration systems for gold, porphyries, diamonds, unconformity uranium, IOCGs, and skarns can be examined from a spectral perspective.



Using a spectrometer in the lab is easy – taking an instrument into a remote and usually inhospitable field environment is something completely different.

As you investigate and prepare to select a field spectrometer that will work for your application, here are ten quick questions to keep in mind during the process.



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1 What spectral range do I need? VIS? NIR?

Reflectance spectroscopy can be defined as a technique that uses the energy in the Visible (0.4-0.7), Near-Infrared (0.7-1.0) and Short-Wave Infrared (1.0-2.5 μm) wavelength regions of the electromagnetic spectrum to analyze minerals. In mining exploration and mineral identification, it is useful to have a field spectrometer that offers both Vis and NIR capability to identify clays, mica, carbonates, sulphates, jarosites, iron oxides, hydroxides, alunites, rare earth elements, amphiboles, tourmalines, topaz, epidotes, hydrous silicates, pyrophyllite, serpentine, chlorites, phosphates, carbonates and many others. Minerals have various absorption bands across the VIS-NIR range and selecting a spectrometer that works in all these ranges is critical. These requirements would point toward a spectrometer with multiple array detectors for high performance and flexibility.

2 Can I get the spectrometer up and running immediately?

In the field, you don't want to wait around for ten, fifteen, or thirty minutes while your spectrometer warms up. If you have limited time, limited daylight, and limited favorable weather conditions, you don't want to waste any time warming up. Your spectrometer should feel the same way.

3 How fast is it in operation?

In operation, you'd want a one-touch, auto-shutter, auto-exposure, auto-dark correction instrument that doesn't require lengthy initial set-up optimization or time consuming, tedious optimization steps to synchronize the detectors periodically during operation. In addition, spectrometers that have diode array detectors and no moving parts, are inherently fast, with even dark samples analyzed in a one second scan time. The ability to store spectra on the spectrometer itself and not just an attached computer, is also a consideration.

4 How reliable is it? What kind of performance can I count on?

For any field equipment, reliability and dependable performance are key attributes. You don't want to go to a remote area only to have your spectrometer break down or fail to perform. Ideally, your field spectrometer should have no moving parts so there is less chance of breakage. Your fiber optic cable and probe should be firmly attached, but easy to remove for field replacement in case of breakage. In fact, if something went wrong, you could bring a spare fiber optic cable, swap it out in the field, and get back to work. In addition, a rugged, stainless-steel jacketed cable is recommended. You will also want to ensure that your probe is rugged and can take readings from outcrops, RC chip trays, core powders, coarse rejects, and hand samples. Internal optics that use a beam splitter optical path, ensure a better transition area data integrity as the spectrum shifts between the multiple detectors for multiple minerals.

5 How portable is the spectrometer?

If you're out covering a good sized area all day, you would want to consider a lightweight instrument that can be used with a backpack or at least a shoulder strap for comfortable carrying. A spectrometer that weighs 7-8 pounds and fits snugly in a small backpack would be fine. The unit would need some lightweight batteries for power, for example Li-Ion batteries, and if they were small and light enough, you could even take the backpack as a carry-on for the plane trip. A handheld personal digital assistant (PDA) with storage for thousands of scans, built-in GPS, a camera, and voice recorder would be much easier to use than a laptop in the field. You could trigger scans with the PDA in one hand.

6 How easy is it to use?

The spectrometer hardware and software should be very easy and intuitive to use. The hardware should all function at a single touch. The software should be robust to handle your data and scan capture, but easy to understand and follow. You should have the ability to do some data analysis, comparison versus spectral libraries, and plotting with single or multiple spectra in one plot.

7 How many scans can I take and store? Do I need a computer?

The spectrometer itself should have some storage capabilities for at least a couple of hundred scans. There should be no limits on storage when connected to the laptop or a PDA.

8 What software can I use with the scan data for analysis?

Once you have collected your spectra and you're ready to analyze it, the data should be easily used with other analysis software, for example SpecMIN, GRAMS, and The Spectral Geologist (TSG). The collected scan data could be stored in an ASCII file format so there's no need for additional file conversions. SPECMIN provides libraries of spectral data for a wide range of minerals. This will help you identify which minerals you might have. GRAMS can help you discover how much of each mineral is there. In this way you can make decisions based on both qualitative and quantitative analysis.

9 Are accessories I may need available?

There should be a range of options for the spectrometer that are well thought out and easy to use, so you don't have a nest of wires connected between the spectrometer and different probes.