APPLICATION NOTE - 30

X-MET8000

HITACHI
Inspire the Next

X-MET8000 SERIES HANDHELD X-RAY FLUORESCENCE (HHXRF) ANALYSERS

X-ray fluorescence (XRF) is a proven, non-destructive technique that provides reliable and rapid analysis (results are available in seconds), and can be used by any operator with minimal training. This makes it the technique of choice for the rapid testing of treated wood.

Hitachi High Tech's X-MET8000 handheld XRF analyser offers many advantages for the identification and analysis of treated wood:

- Easy to use: simple point and shoot operation. Minimal user training is required
- Fast: reliable results chemistry in seconds, for high testing throughput
- Rugged: its IP54 rating ensures durability and low cost of ownership. Ideal for use outdoors
- Compact and lightweight (1.5kg with battery), the X-MET8000 is fully portable and is supplied in a small and rugged case for easy transportation from site to site
- User-defined results: only see the information that's important to you (e.g. elements, compounds)

Rapid, on-site analysis of treated wood

BACKGROUND

Because of its cost-effectiveness against rot, fungi and insects, Chromated Copper Arsenate (CCA) has been widely used for decades as a wood preservative in residential and commercial structures such as decking or utility poles. Since the late 1990's, the use of CCA-treated products has declined because of its potential risks to health, with many manufacturers voluntarily discontinuing CCA-treated wood products for homeowner uses, and replacing them with other wood preservative treatments (e.g. containing chlorine, or copper).

CCA is still used in commercial and industrial applications where the risks of exposure are low (e.g. utility poles, railway sleepers). The content of CCA retained by wood products is often determined after the initial treatment, at time of delivery before the treated timber is used, and at the product end of life to ensure proper disposal.

SAMPLE PRESENTATION AND MEASUREMENT

There is no sample preparation required. For field analysis, simply place the nose of the analyser on the piece of wood to be tested, and press the trigger to start the analysis. Initial results are displayed on the analyser's large (4.3") integrated touchscreen within 2 seconds, and are updated until the end of the measurement. A typical analysis time for CCA-treated wood is 30 seconds.

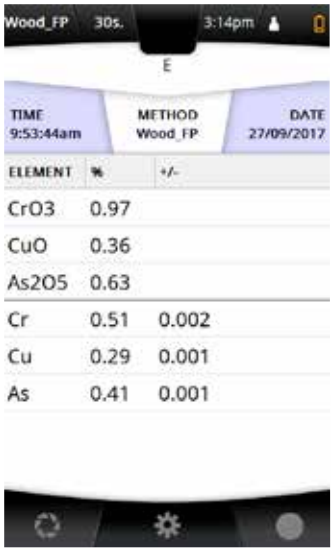
Treated wood can also be analysed as sawdust. In this case, pour the sawdust in a sample cup fitted with polyester film, and measure the cup in the light stand (see picture). The light stand fits in the case, for complete portability.

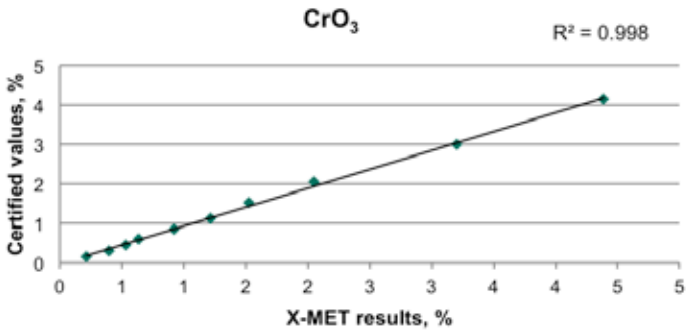
PERFORMANCE AND RESULTS

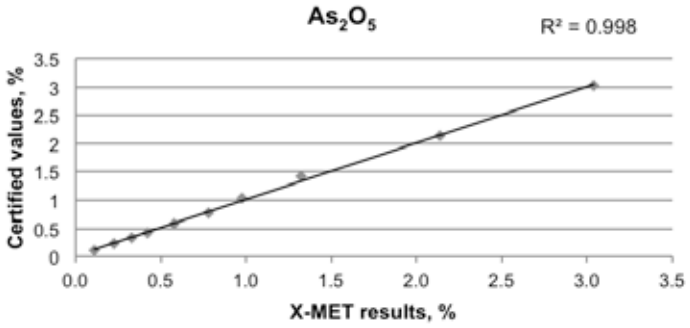
The X-MET8000 is factory-calibrated for wood analysis. Its Wood Fundamental Parameters (FP) calibration is a semi-quantitative method that has been optimised for the analysis of treated wood. The calibration can be used to analyse wood treated with chemicals other than CCA (e.g. copper-based or chlorine-based).

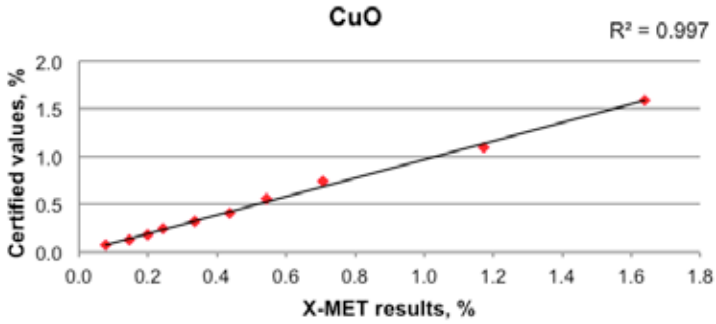
The Wood FP calibration includes the following elements: Ag, As, Au, Ba, Bi, Br, Ca, Cl, Cr, Cd, Cu, Fe, Hg, Mn, Ni, Pb, Se, Sn, Sb, Sr, Ta, Ti, Zn, Zr.

The graphs below show the excellent agreement between the X-MET's results and the known values for a series of CCA-treated reference materials (sawdusts). Each was measured in a sample cup for 30 seconds.







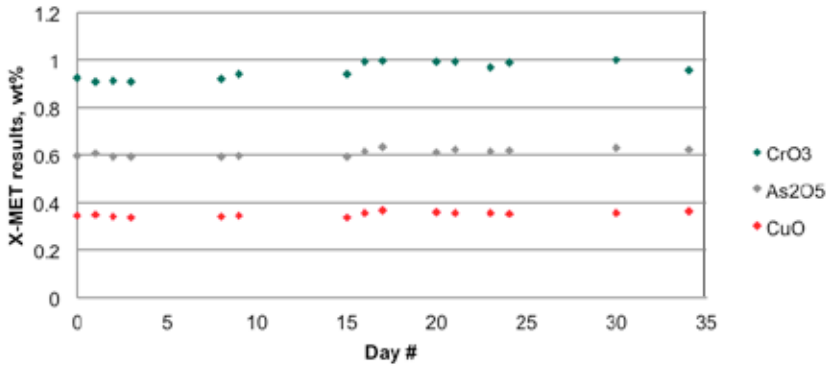


To demonstrate the X-MET8000's outstanding short-term and long-term precision, 10 repeats measurements of a reference sample were carried out within a short period of time. Another sample was also tested at regular intervals regularly for over a month, with no restandardisation or recalibration.

Short-term repeatability results:

	CrO3, %	CuO, %	As_2O_5, %
G 1	1.46	0.52	0.96
G 2	1.44	0.52	0.95
G 3	1.48	0.53	0.96
G 4	1.49	0.54	0.98
G 5	1.49	0.54	0.97
G 6	1.49	0.54	0.98
G 7	1.44	0.51	0.94
G 8	1.46	0.52	0.94
G 9	1.51	0.54	0.98
G 10	1.48	0.52	0.95
Given	1.52	0.56	1.04
Average	1.48	0.53	0.96
Precision (95% confidence)	0.05	0.02	0.03

Long-term stability results:



Note: The X-MET8000 offers total versatility. For example, wood preservative solutions can also be analysed. To do this, users can create their own calibrations by measuring a set of calibration standards (solutions with known elements' concentrations). Calibrations can also be added by our Applications Support teams on request.

SUMMARY

Designed to withstand the harshest environments, the X-MET8000 is the tool of choice for the rapid testing of treated wood throughout its life. Portable and easy to use, the X-MET enables users to verify that wood products have been treated according to specification, ensuring the wood's long-term protection and integrity.

Visit **www.hitachi-hightech.com/hha** for more information.

ORDERING INFORMATION

To test treated wood, the Wood FP calibration (P/No. 51-3063434) needs to be added to the X-MET8000 Optimum (P/No. 54-4106496). The analyser will be delivered with the waterproof, rugged carrying case, a lanyard, a wrist strap, 2 Li-ion batteries, a battery charger, the light radiation shield to minimise scattered radiations, a USB cable to connect to a PC/ laptop, 5 replacement thin film windows, Bluetooth and Wifi connectivity, and user manuals.

Optional extras are:

- Holster (P/No. 54-4106296) for hands-free transportation in the field
- Required for sawdust analysis:
  - Sample cups (P/No. 4106018 for a bag of 100)
  - 3.5µm polyester film (P/No. 3882096 for a roll of 100 m)
  - Light stand and safety shield (P/No. 54-4106255)

Hitachi High-Tech Analytical Science

Part number: 206/1017

Science for a better tomorrow