Sample Handling Guidelines for the Orbis

The Orbis micro-XRF elemental analyzer can be used for a wide variety of sample analyses. When analyzing any sample in the Orbis, the user must first assess the general properties (for example, solid, liquid, loose powder, etc.) and potentially hazardous properties (for example, corrosive, toxic, volatile, etc.) associated with the sample. Like any instrument equipped with a vacuum sample chamber, the Orbis sample chamber and the components contained within can become contaminated or damaged by exposure to various chemicals or debris. The user must assess any associated risk factors involved in analyzing potentially hazardous samples and take the appropriate course of action. The operator should consider the following:

- The Orbis is typically equipped with a small diameter X-ray beam for analysis. The hazard associated with a particular sample can be reduced by minimizing the amount of sample to that amount required for the analysis. (Both sample diameter and thickness should be considered when deciding the amount required for an analysis.) For example, if the X-ray beam diameter is 300 μm (FWHM) and the user requires a single point analysis, the amount of hazardous sample generally required is no greater than the diameter of the X-ray beam.

- The hazard associated with a particular sample can be reduced by minimizing the analysis time to only that which is required. When the analysis is complete, the sample should be removed immediately from the Orbis chamber and stored in an appropriate container.

- For analysis of small quantities of sample, particles or “paper-thin” samples, background noise from X-ray scattering can generally be reduced by suspending the sample a few centimeters away from the stage table top. A paper sample can be supported on one or more plastic XRF cups keeping the support away from the analysis area. Particles and small samples can be fixed on double-sided carbon tape, stretched over a plastic XRF cup.

- Using a vacuum atmosphere, may or may not be appropriate (or necessary) for a particular analysis of a sample. The user should consider the nature of the sample (for example, the potential for outgassing under vacuum and hazardous properties of the sample) before using a vacuum atmosphere. Applying vacuum to a liquid sample is not appropriate as this will rapidly evaporate or “boil” the sample. Please take note that particulates and vapors originating from the sample can collect in the vacuum pump oil and trap absorbent (if present) and may be exhausted from the pump. If the material is hazardous, due caution should be exercised. Please follow your local regulations for venting the vacuum pump exhaust. Also, please follow the pump manufacturer’s instructions for contaminated oil clean up and follow your local regulations on disposal of used pump oil and trap absorbents.
• Applying vacuum to loose powders is not appropriate. Loose powders should be fixed to double-sided carbon tape (for example) or pelletized. Care should be taken to remove loose particles and debris before placing in vacuum.

• Hazardous samples in paste or powder form can be handled by sandwiching between two sheets of thin-film XRF window plastic and analyzing the sample with an air atmosphere. The sandwich can be sealed by mounting on an XRF cup and locking the “snap-ring” in place. This type of sample cell is not intended for use under vacuum, as the manufacturers of these components do not certify the integrity of the seal under vacuum. An appropriate window film should be evaluated and tested based on strength, purity, X-ray transmission and susceptibility to chemical attack.

Two US manufacturers of XRF plastic windows and sample accessories are:

SPEX Certiprep, Inc.
203 Norcross Avenue
Metuchen, NJ 08840 USA

Ph +1-732-549-7144
E-mail: sampleprep@spexcsp.com
Website: http://www.spexcsp.com

Chemplex Industries, Inc.
3091 SE Waaler Street
Stuart, FL 34997-5923 USA

Ph +1-561-283-2700
E-mail: info@chemplex.com
Website: http://www.chemplex.com

Following these general guidelines will help to reduce the possibility of contamination and/or damage from potentially hazardous materials. If there are any questions, please contact your local EDAX representative for applications support. The user should always follow good laboratory and safety practices. EDAX warranties the Eagle against defects in workmanship and components only.