Geochemical Sample Analysis by Microwave Plasma Atomic Emission Spectrometry

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We present the results for a wide range of geochemical Certified Reference Materials (CRM) analyzed using a novel Microwave Plasma - Atomic Emission Spectrometer (MP-AES) developed by Agilent Technologies. This instrumental technique uses microwaves to generate an atmospheric pressure N_2-plasma and a conventional ICP-OES sample introduction system. Emission line measurement is performed using a Czerny-Turner monochromator and charge-coupled device system.

We have successfully analyzed base metals (Ag, Cu, Ni, Mo, Pb, and Zn) and platinum group metals (Au, Pd, and Pt). Figure 1 depicts a comparison of Certified and MP-AES results for the determination of Au in geochemical CRMs.

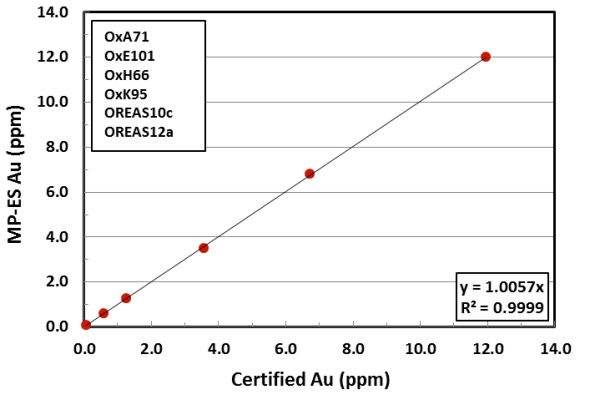

Figure 1 Comparison of Certified and MP-AES results for geochemical CRMs indicates excellent correlation.

The above results indicate that MP-AES is a very powerful technique for a wide variety of geochemical sample analysis. A highly robust atmospheric pressure plasma is generated by using N_2 and therefore the running cost is considerably lower compared with alternative techniques. MP-AES uses no flammable gases making the routine operation much safer than flame atomic absorption spectrometry.

Power of a new ICP-MS, ICP-QQQ: Application of the MS/MS reaction cell to two challenging analysis

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A new type of ICP-MS, the Triple Quadrupole ICP-MS (ICP-QQQ) was applied to two challenging analysis. The ICP-QQQ provides MS/MS reaction cell that outperforms existing reaction cell ICP-MS. The MS/MS configuration unique to ICP-QQQ solves a problem of conventional reaction cell, complexity of chemical reaction in cell, allowing use of full potential power of reaction cell to remove spectra interference. The first quadrupole placed in front of cell removes undesired ions, allowing only ions having selected mass to enter the cell. It makes chemical reaction in cell simple and hence consistent regardless of sample matrix.

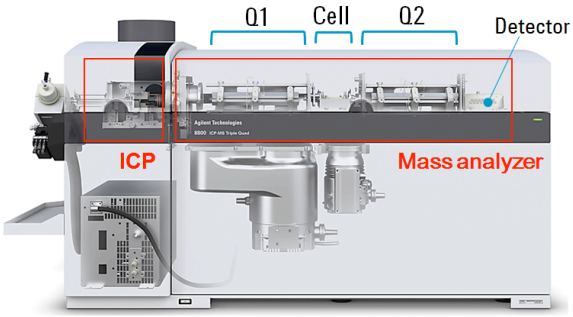

Figure 1: Configuration of ICP-QQQ

One analysis we applied ICP-QQQ is trace rare earth elements (REEs) measurement in REE materials such as gadolinium oxide, where interferences of GdH^+ with Tb^+ and GdO^+ with Yb^+ are problem. The other analysis is trace analysis of noble metals, Ru, Rh, Pd, Ag, Os, Ir, Pt and Au in complex matrix such as Cu, Zn, Ni, Sr, Rb, Zr, Nb, Mo, REE, Ta, W, Hf and Hg. Oxide, argide, atomic and double charged ions of the matrix elements interfere with isotopes of analyte. MS/MS mass shift method was used: analyte ions converted to molecular ions such as oxide ions via chemical reaction is detected on the different mass free from interference. The method successfully measured analyte at trace level in matrix, demonstrating excellent analytical performance of the ICP-QQQ.

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