

## ON-LINE XRF ELEMENTAL ANALYSIS IN LIQUIDS

The C-QUAND is the latest Hobré on-line XRF analyzer. The C-QUAND is an ideal on-line solution for elemental analysis in liquids. The C-QUAND is capable of measuring multiple elements, from silicon (Z=14) to uranium (Z=92), and from ppm to percentage levels. It is a continuous, non-destructive, low-maintenance analyzer without the need for additional reagents. C-QUAND also offers considerable savings in analysis time and operational costs compared to alternative analytical techniques.

### X-Ray Fluorescence principle

The C-QUAND has a powerful 15 watt, 0-50 kV X-ray source, with a silver (Ag) anode. The X-rays knock an electron out of the K or L orbit of the atom, a void. The now unstable atom will fill the void with an electron from the outer orbits. The difference in energy is emitted as a photon with a distinct energy level, unique to the element. The fluorescence is collected by the silicon drift detector (SDD). The detector collects these events as counts, which are directly proportional to the concentration of the element of interest.

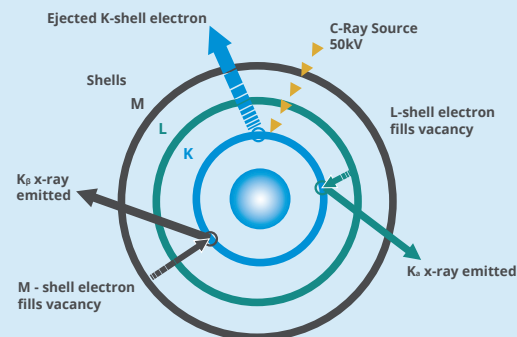


Figure 1. X-ray fluorescence principle

### Measuring cell

The measuring cell is constantly flushed with fresh samples. The X-rays generated by the source are first filtered by one of six different optical filters. The X-rays then travel through a thin window before hitting the actual sample.

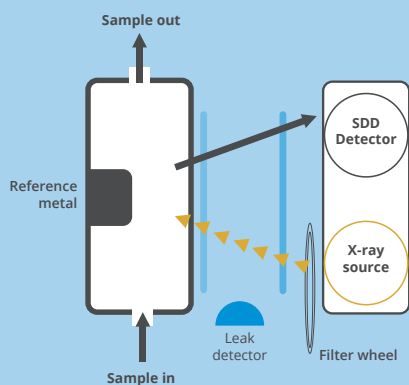


Figure 2. Measuring cell

### Relevant Industries

- Oil & Gas
- Metals & refining
- Mining & minerals
- Petrochemicals
- Polymers
- Environmental
- Food & Pharmaceuticals
- Drilling and wells
- Steel industry
- Waste water

### Applications

- Pipeline monitoring (total sulfur & metals measurement)
- Fuel Blending (total sulfur measurement)
- Sulfur and/or metals in all Refinery processes
- Salt, metals and sulfur in crude oil
- Sulphate in injection water
- Catalyst monitoring for PTA and PIA plants
- Metals in mining and minerals
- Fe, Ni, Zn and Sn in metal plating
- Fe, Co, Ni, Cu, S, Cl, As, Mo & PGM in metal refining/recycling
- Cu, Ni, Mo, V, W, Fe & Co in metal recycling
- Waste water monitoring
- Metal extraction

Index

1	H Hydrogen 1	He Helium 2																
2	Li Lithium 3	Be Beryllium 4																
3	Na Sodium 11	Mg Magnesium 12																
4	K Potassium 19	Ca Calcium 20	Sc Scandium 21	Ti Titanium 22	V Vanadium 23	Cr Chromium 24	Mn Manganese 25	Fe Iron 26	Co Cobalt 27	Ni Nickel 28	Cu Copper 29	Zn Zinc 30	Ga Gallium 31	Ge Germanium 32	As Arsenic 33	Se Selenium 34	Br Bromine 35	Kr Krypton 36
5	Rb Rubidium 37	Sr Strontium 38	Y Yttrium 39	Zr Zirconium 40	Nb Niobium 41	Mo Molybdenum 42	Tc Technetium 43	Ru Ruthenium 44	Rh Rhodium 45	Pd Palladium 46	Ag Silver 47	Cd Cadmium 48	In Indium 49	Sn Tin 50	Sb Antimony 51	Te Tellurium 52	I Iodine 53	Xe Xenon 54
6	Cs Caesium 55	Ba Barium 56	La-Lu Lanthanum-Lutetium 57-71	Hf Hafnium 72	Ta Tantalum 73	W Tungsten 74	Re Rhenium 75	Os Osmium 76	Ir Iridium 77	Pt Platinum 78	Au Gold 79	Hg Mercury 80	Tl Thallium 81	Pb Lead 82	Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
7	Fr Francium 87	Ra Radium 88	Ac-Lr Actinium-Lawrencium 89-103	Rf Rutherfordium 104	Db Dubnium 105	Sg Seaborgium 106	Bh Bohrium 107	Hs Hassium 108	Mt Meitnerium 109	Ds Darmstadtium 110	Rg Roentgenium 111	Cn Copernicium 112	Nh Nihonium 113	Fl Flerovium 114	Mc Moscovium 115	Lv Livermorium 116	Ts Tennessine 117	Og Oganesson 118

Atomic Number

Relative Atomic Weight

$K_\alpha^1$   $K_\beta^1$

$L_\alpha^1$   $L_\beta^1$

$Z^x$  Element: Measured using K-lines

$Z^x$  Element: Measured using L-lines

1	H Hydrogen 1 1.01	He Helium 2 4.00																
2	Li Lithium 3 6.94	Be Beryllium 4 9.01																
3	Na Sodium 11 22.99	Mg Magnesium 12 24.31																
4	K Potassium 19 39.10	Ca Calcium 20 40.08	Sc Scandium 21 44.96	Ti Titanium 22 47.87	V Vanadium 23 50.94	Cr Chromium 24 52.00	Mn Manganese 25 54.94	Fe Iron 26 55.85	Co Cobalt 27 58.93	Ni Nickel 28 58.69	Cu Copper 29 63.55	Zn Zinc 30 65.38	Ga Gallium 31 69.72	Ge Germanium 32 72.61	As Arsenic 33 74.92	Se Selenium 34 78.96	Br Bromine 35 79.90	Kr Krypton 36 83.80
5	Rb Rubidium 37 85.47	Sr Strontium 38 87.62	Y Yttrium 39 88.91	Zr Zirconium 40 91.22	Nb Niobium 41 92.91	Mo Molybdenum 42 95.94	Tc Technetium 43 98.91	Ru Ruthenium 44 101.07	Rh Rhodium 45 102.91	Pd Palladium 46 106.42	Ag Silver 47 107.87	Cd Cadmium 48 112.41	In Indium 49 114.82	Sn Tin 50 118.71	Sb Antimony 51 121.76	Te Tellurium 52 127.60	I Iodine 53 126.90	Xe Xenon 54 131.29
6	Cs Caesium 55 132.91	Ba Barium 56 137.33	La-Lu Lanthanum-Lutetium 57-71	Hf Hafnium 72 178.49	Ta Tantalum 73 180.95	W Tungsten 74 183.84	Re Rhenium 75 186.21	Os Osmium 76 190.23	Ir Iridium 77 192.22	Pt Platinum 78 195.08	Au Gold 79 196.97	Hg Mercury 80 200.59	Tl Thallium 81 204.38	Pb Lead 82 207.2	Bi Bismuth 83 208.98	Po Polonium 84	At Astatine 85	Rn Radon 86 222.02
7	Fr Francium 87 223.02	Ra Radium 88 226.03	Ac-Lr Actinium-Lawrencium 89-103	Rf Rutherfordium 104 261.11	Db Dubnium 105 262.11	Sg Seaborgium 106 263.12	Bh Bohrium 107 262.12	Hs Hassium 108 277.15	Mt Meitnerium 109 276.15	Ds Darmstadtium 110 281.16	Rg Roentgenium 111 280.16	Cn Copernicium 112 285.17	Nh Nihonium 113 288	Fl Flerovium 114 289.15	Mc Moscovium 115 288.00	Lv Livermorium 116 293.00	Ts Tennessine 117 292	Og Oganesson 118 294.00