

Determination of K, Na, Ca, Mg, Fe Content in SiO₂

1 Sample solution preparation :

0.5g sample (precision to one ten thousandth) was weighed and placed in a PTFE can, added with 10mL hydrofluoric acid, 3mL nitric acid, then placed on a hot plate and heated on low heat to digest for 30min. 10mL hydrofluoric acid, 2mL perchloric acid were added, then heated to evaporate to paste form. Can inner wall was rinsed with deionized water, 1mL perchloric acid was added, heated until perchloric acid stops to smoke. Then it was added with 4 mL hydrochloric acid (1+1) and 5 mL of deionized water, heated for few minutes until the residue is completely dissolved, cooled down. It was then transferred to a 50mL plastic volumetric flask with deionized water, shaken and kept for later use.

2 Experimental equipment and reagents :

Atomic absorption spectrophotometer (with K, Na, Ca, Mg, Fe hollow cathode lamp, EWAI Inc.)

Temperature-controlled hot plate

PTFE beaker

Nitric acid (HNO₃): excellent grade purity

Hydrofluoric acid (HF): excellent grade purity

Perchloric acid (HClO₄): excellent grade purity

Hydrochloric acid (HCl): excellent grade purity

K standard solution (National Reference Materials Research Center)

Na standard solution (National Reference Materials Research Center)

Ca standard solution (National Reference Materials Research Center)

Mg standard solution (National Reference Materials Research Center)

Fe standard solution (National Reference Materials Research Center)

3 Instrument conditions

Parameter	Wavelength (nm)	Slit width (nm)	Burner height (mm)	Fuel gas flow rate (L/min)	Lamp current (mA)	Flame type
K	766.5	0.2	9	1.5	3	Air – acetylene
Na	589.0	0.2	9	1.5	3	Air – acetylene
Ca	422.7	0.2	9	1.5	2	Air – acetylene
Mg	285.2	0.2	9	1.5	2	Air – acetylene

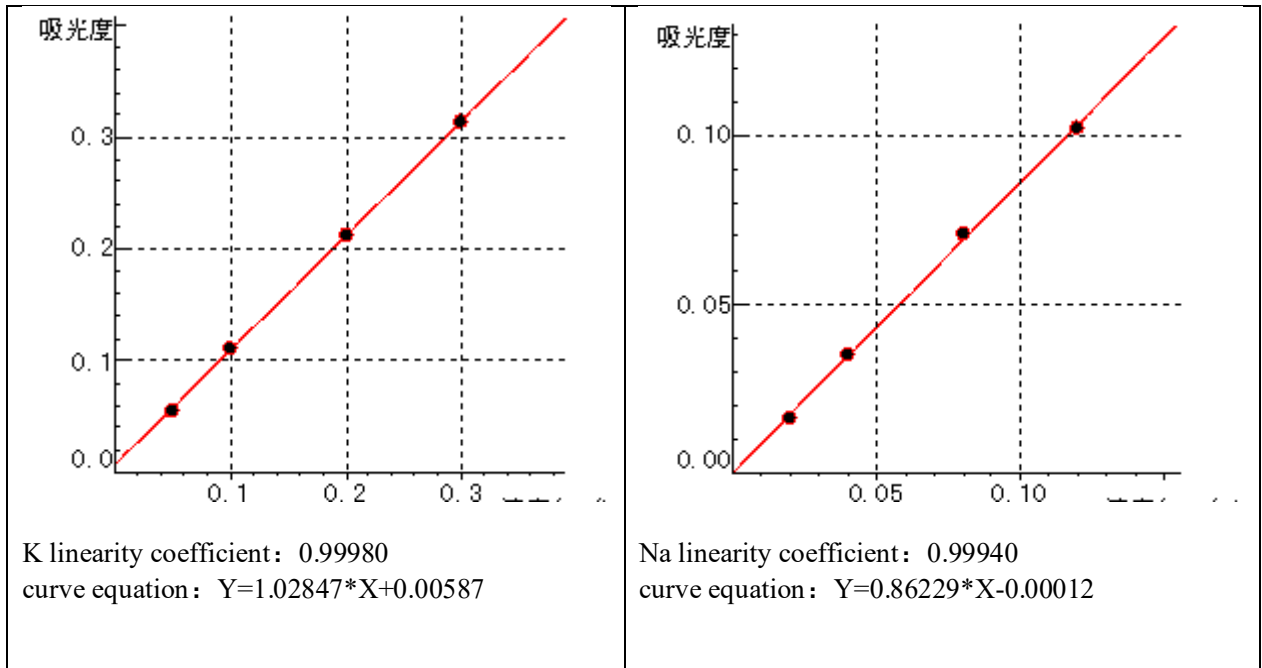
Fe	248.3	0.2	9	1.5	3	Air - acetylene
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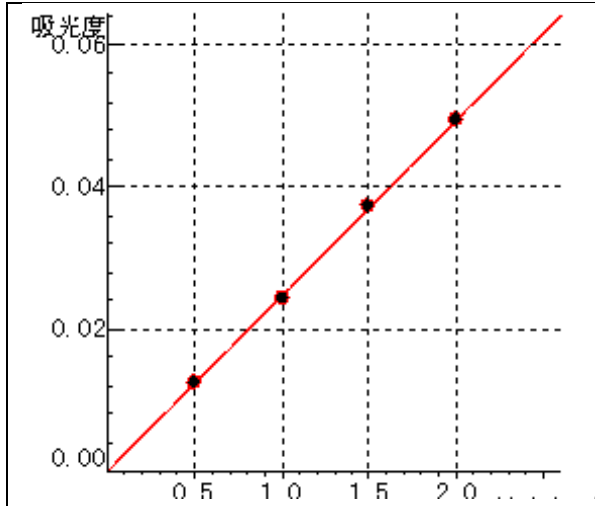
4 Standard solution preparation

For each 100mL standard solution, 1.5 mL 100 g/L strontium chloride solution is required to be added.

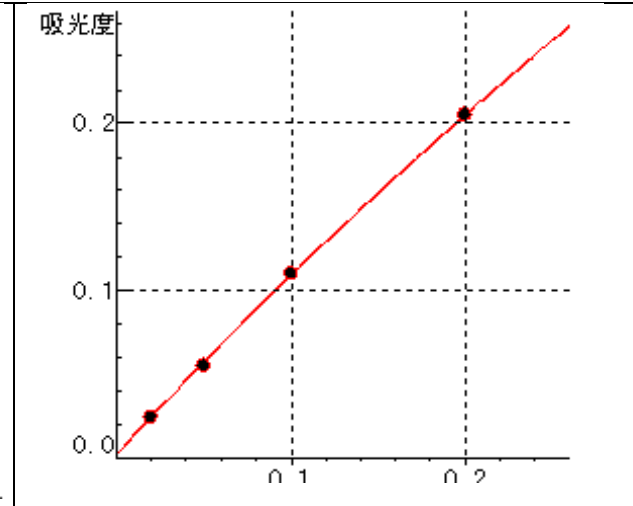
Element	Concentration (μg/mL)				
K	0	0.05	0.1	0.2	0.3
Na	0	0.02	0.04	0.08	0.12
Ca	0	0.5	1	1.5	2
Mg	0	0.02	0.05	0.1	0.2
Fe	0	0.5	1	1.5	2

5 Standard curve

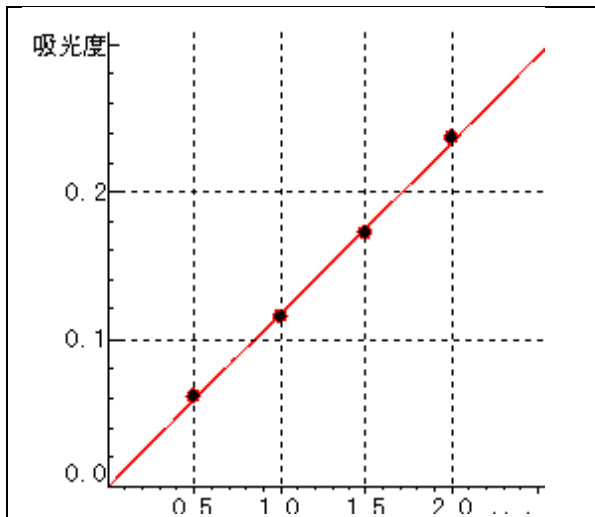




Ca linearity coefficient: 0.99990
curve equation: $Y=0.02478*X-0.00010$



Mg linearity coefficient: 0.99990
curve equation: $Y=-0.54546*X^2+1.12618*X+0.00177$



Fe linearity coefficient: 0.99920
curve equation: $Y=0.11704*X+0.00010$