

## Standards

Die im Mikrosondenlabor des GZG genutzten Standards und Referenzmaterialien:

pure elements

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table { }td { padding-top: 1px; padding-right: 1px; padding-left: 1px; color: windowtext; font-size: 10pt; font-weight: 400; font-style: normal; text-decoration: none; font-family: Arial; vertical-align: bottom; border: medium none; white-space: nowrap; }.xl24 { font-size: 8pt; font-family: Times; }.xl25 { font-size: 8pt; font-weight: 700; font-family: Times; }
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Name
Formula
Reference

Beryllium
Be
Koch Chemicals Ltd., Hertford, England, P&H Developments

Boron
B
Aldrich Chemical Company, Gillingham, Dorset, England, P&H D.

Carbon
C
NewMet Ltd., P&H Developments

Diamond
C
unknown

Aluminium
Al
Johnson Matthey GmbH, Karlsruhe, Germany, P&H Developments

Silicon
Si
Johnson Matthey GmbH, Karlsruhe, Germany, P&H Developments

Scandium
Sc
Koch Chemicals Ltd., Hertford, England, P&H Developments

Titanium
Ti
Koch Chemicals Ltd., Hertford, England, P&H Developments

Vanadium
V
Johnson Matthey GmbH, Karlsruhe, Germany, P&H Developments

Chromium

Cr

Johnson Matthey GmbH, Karlsruhe, Germany, P&H Developments

Manganese

Mn

Koch Chemicals Ltd., Hertford, England, P&H Developments

Iron

Fe

Johnson Matthey GmbH, Karlsruhe, Germany, P&H Developments

Cobalt

Co

Johnson Matthey GmbH, Karlsruhe, Germany, P&H Developments

Nickel

Ni

Johnson Matthey GmbH, Karlsruhe, Germany, P&H Developments

Copper

Cu

Johnson Matthey GmbH, Karlsruhe, Germany, P&H Developments

Zinc

Zn

Koch Chemicals Ltd., Hertford, England, P&H Developments

Germanium

Ge

Koch Chemicals Ltd., Hertford, England, P&H Developments

Arsenic

As

Koch Chemicals Ltd., Hertford, England, P&H Developments

Selenium

Se

Koch Chemicals Ltd., Hertford, England, P&H Developments

Zirconium

Zr

Johnson Matthey GmbH, Karlsruhe, Germany, P&H Developments

Niobium

Nb

Koch Chemicals Ltd., Hertford, England, P&H Developments

Molybdenum

Mo

Koch Chemicals Ltd., Hertford, England, P&H Developments

Ruthenium

Ru

Johnson Matthey GmbH, Karlsruhe, Germany, P&H Developments

Rhodium

Rh

Johnson Matthey GmbH, Karlsruhe, Germany, P&H Developments

Palladium

Pd

Koch Chemicals Ltd., Hertford, England, P&H Developments

Silver

Ag

Koch Chemicals Ltd., Hertford, England, P&H Developments

Cadmium

Cd

Koch Chemicals Ltd., Hertford, England, P&H Developments

Indium

In

Koch Chemicals Ltd., Hertford, England, P&H Developments

Tin

Sn

Koch Chemicals Ltd., Hertford, England, P&H Developments

Antimony

Sb

Koch Chemicals Ltd., Hertford, England, P&H Developments

Tellurium

Te

Koch Chemicals Ltd., Hertford, England, P&H Developments

Hafnium

Hf

Johnson Matthey GmbH, Karlsruhe, Germany, P&H Developments

Tantalum

Ta

Alpha Products, P&H Developments

Tungsten

W

Koch Chemicals Ltd., Hertford, England, P&H Developments

Rhenium

Re

Johnson Matthey GmbH, Karlsruhe, Germany, P&H Developments

Osmium  
Os  
Micro-Analysis Consultants Ltd.

Iridium  
Ir  
Koch Chemicals Ltd., Hertford, England, P&H Developments

Platinum  
Pt  
Koch Chemicals Ltd., Hertford, England, P&H Developments

Gold  
Au  
Koch Chemicals Ltd., Hertford, England, P&H Developments

Bismuth  
Bi  
Koch Chemicals Ltd., Hertford, England, P&H Developments

Thorium  
Th  
Astimex

Uranium  
U  
Astimex

minerals, glasses, synthetic materials

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table { }td { padding-top: 1px; padding-right: 1px; padding-left: 1px; color: windowtext; font-size: 10pt; font-weight: 400; font-style: normal; text-decoration: none; font-family: Arial; vertical-align: bottom; border: medium none; white-space: nowrap; }.xl24 { font-size: 8pt; font-family: Times; }.xl25 { font-size: 8pt; font-weight: 700; font-family: Times; }.xl26 { font-size: 9pt; font-family: Times; }.xl27 { color: black; font-size: 8pt; font-family: Times; }
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Name  
Formula  
Reference

Albite  
NaAlSi<sub>3</sub>O<sub>8</sub>  
Amelia Co., Virginia, USA, P&H Developments

Andradite-glass

(Ca<sub>3</sub>Fe<sub>2</sub>[SiO<sub>4</sub>]<sub>3</sub>)  
synthetic, P&H Developments

Anorthite  
CaAl<sub>2</sub>Si<sub>2</sub>O<sub>8</sub>  
Great Sitkin Island, AL, USNM 137041

Anorthoclase  
(Na,K)AlSi<sub>3</sub>O<sub>8</sub>  
Kakanui, New Zealand, USNM 133868

Apatite  
Ca<sub>5</sub>(OH,Cl,F)(PO<sub>4</sub>)<sub>3</sub>  
Willberforce, Ontario, Canada, P&H Developments

Barite  
BaSO<sub>4</sub>  
Cow Green Mine, Harwood Fell, Teesdale, England, P&H D.

Ba-Titanate  
BaTiO<sub>3</sub>  
Micro-Analysis Consultants Ltd.

Cd-Sulphide  
CdS  
synthetic, P&H Developments

Calcite  
CaCO<sub>3</sub>  
USNM 136321

Cassiterite  
SnO<sub>2</sub>  
Hemerdon open cast, nr. Plympton, Devon, Engl., P&H D.

Celestine  
SrSO<sub>4</sub>  
Yate, Bristol, England, P&H Developments

Celsiane  
BaAl<sub>2</sub>Si<sub>2</sub>O<sub>8</sub>  
synthetic, Micro-Analysis Consultants Ltd.

Cerussite  
PbCO<sub>3</sub>  
Tsumeb, mineral collection GZG

Chalcopyrite  
CuFeS<sub>2</sub>  
Carbonatite complex, Palabora, Rep. of South Africa, P&H D.

Chromium Oxide

Cr<sub>2</sub>O<sub>3</sub>  
synthetic, Earth Jewelry Co. Japan, P&H Developments

Cinnabar  
HgS  
Caonedo M. Leon, Spain, P&H Developments

Corundum  
Al<sub>2</sub>O<sub>3</sub>  
synthetic, P&H Developments

Cs-Chloride  
CsCl  
synthetic

Cs-Iodide  
CsI  
synthetic

Cuprite  
Cu<sub>2</sub>O  
J. Zang, Idar-Oberstein, Germany

Diopside  
CaMgSi<sub>2</sub>O<sub>6</sub>  
Shinners Limestone, Loch Shin, Scotland, P&H Developments

Dolomite  
CaMg(CO<sub>3</sub>)<sub>2</sub>  
USNM 10057

Fayalite  
Fe<sub>2</sub>SiO<sub>4</sub>  
Rockport, MA, USNM 85276

Fluorite  
CaF<sub>2</sub>  
County Durham, England, P&H Developments

F-Phlogopite  
KMg<sub>3</sub>[F<sub>2</sub>/AlSi<sub>3</sub>O<sub>10</sub>]  
synthetic, T. Hammouda et al.: EurJMin, 7, 1381-1387, 1995

Gahnite  
ZnAl<sub>2</sub>O<sub>4</sub>  
Brazil, USNM 145883

Galena  
PbS  
Derbyshire England, P&H Developments

Ga-Arsenide

AsGa  
synthetic, Alpha Products, P&H Developments

Garnet  
(Ca,Mg,Fe)<sub>3</sub>(Al,Fe)<sub>2</sub>(SiO<sub>4</sub>)<sub>3</sub>  
Kakanui, New Zealand, USNM 143968

Garnet  
(Ca,Mg,Fe)<sub>3</sub>(Al,Fe)<sub>2</sub>(SiO<sub>4</sub>)<sub>3</sub>  
Roberts Victor Mine, South Africa, USNM 110752

Hematite (Specularite)  
Fe<sub>2</sub>O<sub>3</sub>  
Rio Marina, Elba, P&H Developments

In-Antimonide  
InSb  
synthetic, Koch Chemicals Ltd., Hertford, England, P&H D.

Jadeit  
NaAlSi<sub>2</sub>O<sub>6</sub>  
Astimex

K-Bromide  
KBr  
synthetic, Merck

K-Iodide  
KI  
synthetic, Merck

Lorandite  
TlAs<sub>2</sub>  
Mineral Collection GZG

Microcline  
(K,Na)AlSi<sub>3</sub>O<sub>8</sub>  
location unknown, USNM 143966

Mn-Titanate  
MnTiO<sub>3</sub>  
Micro-Analysis Consultants Ltd.

Na-Chloride  
NaCl  
synthetic, Merck

Ni-Oxide  
NiO  
synthetic, Earth Jewelry Co. Japan, P&H Developments

Olivine

(Fe, Mg) $2\text{SiO}_4$   
San Carlos, Gila Co., USNM 111312/444

Olivine  
(Fe, Mg) $2\text{SiO}_4$   
Springwater meteorite, USNM 2566

Orthoclase  
 $\text{KAlSi}_3\text{O}_8$   
Lucerne, Switzerland, P&H Developments

Orthoclase  
 $\text{KAlSi}_3\text{O}_8$   
Madagascar, Arnaut & Kelley, GCA Vol. 61, 3227-3255, 1997

Periclase  
 $\text{MgO}$   
synthetic, P&H Developments

Pollucite  
 $\text{Cs}[\text{AlSi}_2\text{O}_6]$   
Astimex

Pyrite  
 $\text{FeS}_2$   
Hunsrück, Germany, A. Kronz

Rb-Bromide  
 $\text{RbBr}$   
synthetic, Merck

Rb-Iodide  
 $\text{RbI}$   
synthetic, Merck

Rhodonoite  
(Mn,Ca) $\text{SiO}_3$   
North Mine, Broken Hill, NSW, Australia, P&H Developments

Sanidine  
 $\text{KAlSi}_3\text{O}_8$   
Eifel, Germany, G. Wörner

Siderite  
 $\text{FeCO}_3$   
USNM R 2460

Ag-Telluride  
 $\text{Ag}_2\text{Te}$   
synthetic, Alpha Products, P&H Developments

Si-Nitride



Si<sub>3</sub>N<sub>4</sub>  
Börder, Kontron 07/95

SiO<sub>2</sub>-glass  
(SiO<sub>2</sub>)  
synthetic

Sr-Titanate  
SrTiO<sub>3</sub>  
Micro-Analysis Consultants Ltd.

Strontianite  
SrCO<sub>3</sub>  
USNM R 10065

Th-Oxide  
ThO<sub>2</sub>  
Micro-Analysis Consultants Ltd.

Ti-Oxide  
TiO<sub>2</sub>  
synthetic, Earth Jewelry Co. Japan, P&H Developments

Topas  
Al<sub>2</sub>F<sub>2</sub>SiO<sub>4</sub>  
Thomas Mountains, Utah, USA

Tugtupite  
Na<sub>8</sub>[Cl<sub>2</sub>/(BeAlSi<sub>4</sub>O<sub>12</sub>)<sub>2</sub>]  
Astimex

U-Oxide  
UO<sub>2</sub>  
Micro-Analysis Consultants Ltd.

Willemite  
Zn<sub>2</sub>SiO<sub>4</sub>  
Franklin, New Jersey, USA, P&H Developments

Wollastonite  
CaSiO<sub>3</sub>  
Willsboro, New York, USA, P&H Developments

YAG  
Y<sub>3</sub>Al<sub>5</sub>O<sub>12</sub>  
synthetic, L.Ackermann, FEE Idar-Oberstein

Zn-Sulphide  
ZnS  
synthetic, Alpha Products, P&H Developments

Zircon

ZrSiO<sub>4</sub>  
Kuehl Lake, Kanada, 91500 Wiedenbeck et al. GeoStdNL 19

Zircon  
ZrSiO<sub>4</sub>  
USNM 117288-3

#### rare earth Standards

Name comment Reference

Y <sub>2</sub> O <sub>3</sub>	12 % in CAS-glass	synthetic, P&H Developments
La <sub>2</sub> O <sub>3</sub>	12 % in CAS-glass	synthetic, P&H Developments
CeO <sub>2</sub>	12 % in CAS-glass	synthetic, P&H Developments
Pr <sub>6</sub> O <sub>11</sub>	12 % in CAS-glass	synthetic, P&H Developments
Nd <sub>2</sub> O <sub>3</sub>	12 % in CAS-glass	synthetic, P&H Developments
Sm <sub>2</sub> O <sub>3</sub>	12 % in CAS-glass	synthetic, P&H Developments
Eu <sub>2</sub> O <sub>3</sub>	12 % in CAS-glass	synthetic, P&H Developments
Gd <sub>2</sub> O <sub>3</sub>	12 % in CAS-glass	synthetic, P&H Developments
Tb <sub>4</sub> O <sub>7</sub>	12 % in CAS-glass	synthetic, P&H Developments
Dy <sub>2</sub> O <sub>3</sub>	12 % in CAS-glass	synthetic, P&H Developments
Ho <sub>2</sub> O <sub>3</sub>	12 % in CAS-glass	synthetic, P&H Developments
Er <sub>2</sub> O <sub>3</sub>	12 % in CAS-glass	synthetic, P&H Developments
Tm <sub>2</sub> O <sub>3</sub>	12 % in CAS-glass	synthetic, P&H Developments
Yb <sub>2</sub> O <sub>3</sub>	12 % in CAS-glass	synthetic, P&H Developments
Lu <sub>2</sub> O <sub>3</sub>	12 % in CAS-glass	synthetic, P&H Developments
CAS-blank	CAS-blank	synthetic, P&H Developments
REEG-1	Y,Pr,Dy,Er, 4 % each in CAS-glass	synthetic, P&H Developments
REEG-2	Ce,Eu,Ho,Tm, 4 % each in CAS-glass	synthetic, P&H Developments
REEG-3	La,Sm,Gd,Yb, 4 % each in CAS-glass	synthetic, P&H Developments
REEG-4	Nd,Tb,Lu, 4 % each in CAS-glass	synthetic, P&H Developments
REEG-5	all REE, 0.5 % each in CAS-glass	synthetic, P&H Developments
REEG-6	CAS-blank	synthetic, P&H Developments

ScPO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA  
YPO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA  
LaPO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA  
CePO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA  
PrPO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA  
NdPO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA  
SmPO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA  
EuPO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA  
GdPO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA  
TbPO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA  
DyPO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA  
HoPO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA  
ErPO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA  
TmPO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA  
YbPO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA  
LuPO<sub>4</sub> synthetic Smithsonian Institution, Washington DC, USA