

CORUNDUM MATERIALS COR-1 TO COR-6: SIX NEW CANDIDATES FOR CHEMICAL CHARACTERIZATION AS »INDUSTRIAL-MINERALOGICAL« STANDARD REFERENCE MATERIALS

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»Aluminum oxide is by far the most important single substance in the abrasive industry and is probably destined to hold that position through the foreseeable future« (L. COES Jr).

Chemical analysis of corundum materials as an ongoing routine tool for product quality assurance and product quality enhancement in abrasive industry is still lacking of standard reference materials.

In cooperation with one of the world-wide biggest corundum producers (Treibacher Schleifmittel/Austria) and Europe's biggest abrasive product manufacturer (Tyrolit-Schleifmittelwerke/Austria) five synthetic corundum powders have been produced (COR-1 to COR-5) at the Institute of Mineralogy & Petrography/University of Innsbruck; additionally a sixth sample (COR-6) was manufactured, that is natural corundum material (a mixture of sapphire and ruby).

All materials have been ground to give a fraction < 44 µm; a total of 50 kg for each batch was produced; the material is bottled in 100 g-units in a six-pack (a detailed description of the production scheme, homogeneity testing etc. will be given in an international announcement 1997).

Table 1 presents preliminary data (except the natural material) for some major, minor and trace components. This raw dataset was achieved by using a combination of ICP-AES (LiBO₂-flux-technique), WDXRFA (SemiQuant-Method) and EDXRFA (Fundamental Parameter Method) using powder pellets (Note: special care has to be taken when pressing powder pellets for XRF-analysis, since corundum is a strong abrasive material the pressing tool is easily attacked; the powder pellets are easily contaminated with the metals of the pressing tool!).

Besides the chemical characterization of the samples it is also intended to characterize the materials for physical-mineralogical-crystallographical properties (grain size distribution, mineralogical minor/trace components, d-values, specific surface etc. etc.)

Concerning the chemical characterization especially the elements listed in the table are of interest, but also C, S, P, K, REE etc. are important elements;

Everyone who is interested to take part in an ongoing international collaborative work on these rather unusual (and possibly for chemical analysts challenging) reference materials will be provided with the six-pack of corundum materials free of charge, but with the condition to produce chemical and/or physical data of these materials.

The preliminary dead-line for submitting data for a first international report will be June/July 1998.

	COR-1	COR-2	COR-3	COR-4	COR-5	COR-6
	synthetic corundum	synthetic corundum	synthetic corundum	synthetic corundum	synthetic corundum	natural corundum
	"precious- white"	"precious- pink"	"precious- pink spec."	"semi- precious"	"normal"	"ruby/ sapphire"
Al ₂ O ₃	-	-	-	-	-	-
CaO	209	184	168	319	347	-
Cr ₂ O ₃	74	2270	1260	148	177	-
Cu	14	12	3	5	1	-
Fe ₂ O ₃	287	482	616	1480	1720	-
MgO	49	20	33	749	2100	-
MnO	12	9	17	143	150	-
Na ₂ O	3410	1540	1200	372	175	-
Nb	3	4	2	3	3	-
NiO	< 5	< 5	< 5	< 5	< 5	-
Sc	1	1	1	35	32	-
SiO ₂	175	77	105	2920	4370	-
Sr	10	5	6	20	36	-
TiO ₂	22	< 5	2290	16200	25000	-
V ₂ O ₅	10	3	18	33	48	-
Y ₂ O ₃	36	3	1	67	65	-
Zn	19	12	14	4	3	-
ZrO ₂	1	1	1	1100	1100	-

*Table 1:
Preliminary data (except the natural material) for some major, minor and trace components.*