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CHEMICAL ANALYSES OF GRANITOIDS OF THE WEST CARPATHIANS

(Tabs. 4)

Method of silicate analysis

One of the coauthors (Ing. E. Walzel) carried out silicate analyses of granitoid rocks and calculated statistical values mentioned in Tables 1, 2, 3. The applied analytical method was as follows:

The components of SiO_2 (main portion), H_2O^-, loss by annealing were established by gravimetry. Al_2O_3 total Fe as well as Fe_2O_3, CaO, MgO were determined chelatometrically. FeO was determined oxidometrically, Na_2O and K_2O by flame photometry, SiO_2 (relicts) TiO_2, MnO, Fe_2O_5 by colorimetry.

Brief description of working approach. The precise weighed portion of about 1 kg is dried in Pt-crucible at 105—110 °C to a constant weight (H_2O^-). By annealing the sample within the range of temperature 950—1050 °C the loss by annealing is established. After laying 5 g Na_2CO_3 the sample is melt above a gas burner (decomposition of sample). The melt is then leached and dissolved in HCl diluted 1 : 1. Silico dioxide is established according to the method described by E. Walzel (1973). The main portion of SiO_2 is established after adding gelatine without evaporation into dry state by gravimetry, and residual SiO_2 is determined by colorimetry from supplying (stock) solution with application of ammonium molybdenate and after reduction of silicomolybdate by 1-amino-2-hydroxy-naphtosulphon acid (Eikonogen). In 200 ml of supplying (stock) solution the aliquot portion of sesquioxides is determined by precipitation by urotropine (hexamethylenetetramine). After filtration the residue on the filter is dissolved in 1 + 1 H_2SO_4 and the volume is adjusted to a definable value. From the filtrate after R_2O_3 aliquot portions are pipetted for determination of MnO, CaO and the sum CaO + MgO. From solution R_2O_3 (sesquioxides) aliquot portious are pipetted for determination of Al_2O_3 and total iron, TiO_2 and eventual oxidimetric checking determination of total iron.

P_2O_5, FeO and alkalies (Na_2O and K_2O) were determined from particular weighed portions, 0.25 g, 0.60 g or 0.25 g.

Phosphorus was determined after decomposition by hydrofluoric and nitric acid by colorimetry. By adding of colorimetric agent a complex compound of phosphovanadomolybdate is formed yellow colouration of which is proportional to the content of phosphorus.

Bivalent iron is determined from particular weighed portion. The sample is decomposed by mixture of HP + H_2SO_4. The formed iron sulphate is titrated by potassium permanganate.

For determination of alkalies the method of flame photometry has proved well for our conditions. The sample is decomposed by hydrofluoric acid. The

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fluorides are converted into chlorides by multiple sprinkling and evaporation with HCl. The disturbing influence of calcium is eliminated by its adding into homogeneous level respectively by adding buffer solution according to Schuhknecht and Schinkel (Caesium chloride-aluminium nitrate). Essentially, besides some exceptions, chemical analyses are carried out by us according to the methods described in W. F. Hillebrand et al. (1951) and J. Jarkovský (1960). These exceptions comprise the already described precipitation of R_2O_3 by urotropine, complexometric determination of total iron for salicylic acid and aluminium for PAN. MnO is determined by colorimetry after transformation of Mn into coloured complex by formaldoxime in ammonium medium. CaO and CaO + MgO are determined chelatometrically to a mixture of. indicators fluorexone + thymolphthalein, or to thymolphthalexone.

Colorimetrical determination of TiO_2 according to description of J. Jarkovský (1960) is realized in the way that by the action of hydrogen peroxide a peroxide anion originates. The intensity of yellow colour is proportional to the Ti content. The disturbing influence of iron is eliminated by adding phosphoric acid.

Controlling determination of the sum Fe_2O_3 is carried out manganometrically, using $SnCl_2$ as reducing agent by Reinhardt—Zimmermann's method.

Division and treatment of groups

The group consists of 186 chemical analyses of granitoids. 6 of which belong to granitoids taken in Hungary (from the Velence mountains and Mecsek massif).

The principles of taking samples are mentioned in the first article of this group of articles (author B. Cambel). The tables of analyses have in their headings symbols and codes which make possible diverse classifications of the group and statistical-mathematical treatment of samples and can serve as a scheme and methodical proposal also for general application of principles of division of samples, mainly in works within the frame of international correlation. It would by possible to use still further petrochemical, geochemical, mineralogical and petrographical parameters as criteria for division of groups. All analyses have ordinal numbers and numbers of laboratory treatment, which are added to symbol "ZK". This number is in agreement with the order as the samples were gradually given for chemical and petrographical-mineralogical and geochemical treatment. The ordinal number and number of laboratory treatment of ZK samples do not agree.

A further symbol of sorting according to regional standpoints, according to individual core mountains indicated by abbrevations of their names or groups of mountains or their competence to a larger regional-tectonic unit, to which the granitoids belong. The groups of mountains are indicated with letter A to F (see explanations to tables). A further important sign of sorting are symbols A and H, which are ranged to working numbers in the column of ZK symbols. These letters indicate whether the chemical analysis is carried out from averaged homogenized and quartered material from rubble of 10 kg sample (symbol A = average sample) or from individual piece of sample (from rubble 1—2 kg, or also less), from which petrographical investigation and planimetric analysis were made as well as modal classification of rocks (symbol H = hand sample). The average analysis from crushed, quartered and homogenized 10 kg sample sometimes differs from piece analysis even if it was taken from the same place, as it represents the average of various varieties of granitoid rocks, which were found in the area of sampling. There were usually quarries or artificial exposures on roads or natural outcrops of rocks, etc.

The classification according to modal composition was carried out according to principles approved by the international commission IUGS (1973) and according to this classification the rocks are divided into 8 groups as is evident from the explanations to tables. In order to divide the chemical analyses of samples, which have no planimetric analysis, into comparable groups with groups sorted according to modal composition (see passage no. 2 of this work, author Petrík) the chemical classification according to Streckeisen–Le Maitre (1979) with application of Mielke–Winkler's (1979) mesonorm was used – for more details see the work of Vilinovič–Petrík (1982). The symbols of this classification are also particularly mentioned in the headings of tables of chemical analyses. Because the mesonormative classification was carried out in a great majority of cases only in analyses of individual piece samples and not from averages of 10 kg samples, in little analytical differences we transferred this classification automatically also to samples taken from the same locality and analysed from 10 kg crushed rock. These estimations of classification are given in parentheses in the tables. In cases when the mesonormative classification could not be carried out for difficulties of recalculation (negative values of An, Bi) the rule was applied, that in such a case the analyses were ranged into groups according to modal classification system, according to the following rules:

1/1 leucogranite 3/1 biotite granite	aG + sG
2/1 two-mica granite 1/3 leucogranodiorite	mG
2/2 two-mica granodiorite 3/2 biotite granodiorite	GD
4/1 leucotonalite 4/2 biotite tonalite	T

It should be remarked that this rule is of conventional character as the chemical classification often shows other results than modal. This concerns mainly granodiorites (2/2), which often have a higher content of SiO_2 (more than 70 %) and are shown in chemical classification as monzogranites (mG). (See in more detail Vilinovič–Petrík, 1982.) The mentioned chemical characters are typical of the West Carpathian Variscan palingenic granitoids. There-fore our proposal of approximate equivalence of modal and mesonormative division need not be valid for other groups of granitoids from other regions. It is necessary to point out that there are only abount 5 samples, in which it was necessary do decide about classifying into mesonorm according to modal classification.

One of the tasks of compiling the table of average analyses was to compare average chemical analyses divided according to modal and mesonormative classifications, in order to see which differences these two classifications show in average chemical composition. We remark that already before comparison of modal and mesonormative classifications was carried out by Vilinovič – Petrík (1981) and they established here considerable agreement and correlability of both sytems of classification (mineralogical and chemical). As on the whole relatively little analyses were carried out by us from the individual the whole relatively little analyses were carried out by us core mountains were calculated without sorting of rocks according to their basicity (degree of differentiation). The names of mountains groups as well as the information which mountains belong to these groups are mentioned in explanations to Table 1.

Tables of average contents

The average analyses on the left side of Table 2, which shows average analyses according to the group of mountains, concern the average calculated only from samples, which represent average analyses from 10 kg sample and analyses of piece samples were used for calculation of average only in the case when the average analysis from 10 kg homogenized sample was not from this locality. Therefore the number of samples included in the averages is less (121) than the number of all analyses, which are 186. This approach removed duplicity of values in analyses of samples coming from one place.

Another group of average calculations mentioned in Tab. 2 are the total averages of rocks undivided according to mountain ranges but only according to modal classification. In the table of averages they are designated with classification numbers 1 to 4 (see explanations).

In statistical treatment of the groups divided according to mesonorm (Tab. 3) we included in the calculations of averages only those analyses, which have determined in Table 1 symbols of classification according to mesonorm. Not included are here those, in which such a classification is mentioned in parenthesis, i. e. is only transferred from individual piece sample to sample from 10 kg average from the same locality.

Mesonormative division of rocks is mentioned in explanations with Tab. 1.

Statistical treatment of analyses of the West Carpathian granitoids and evaluation of data in tables of average analyses

In the West Carpathian literature there is almost no work, which is dealing with statistical evaluation of chemical-analytical data of the West Carpathian granitoids. An exception is the work by D. Hovorka, 1982 (Acta geol. geogr. Univ. Comen., in press). The information about conclusions of this work follows from the membership of one of the authors (B. Cambel) in the editorial board of this periodical. When the author will have no objections (we suppose, that the work will come out earlier than the work we prepare) I take the liberty to point out some main results of this work, mainly because our conclusions agree in many points. In the mentioned work D. Hovorka cites statistical evaluation of chemical analyses published so far, but mainly of those documented in his catalogue from the year 1972 (D. Hovorka, 1972), as well as those published until the year 1978. In this work, in which the author treated around 500 analyses he mentions arithmetic means as well as further statistical data (standard deviation, measure of dispersion, variation coefficient) for the individual mountains in granitoids of the West Carpathians, or for some rock types. Previously the authors Macek – Kamenický (1979) were oriented to characterize and standardize composition and chemical characters of granitoids not on the basis of calculation of fundamental statistical values of existing analyses, but they completed some petrographical data on samples determined e. g. by J. Koutek, V. Zoubek, and E. Krist as samples representative of individual repeating rock types in individual mountain ranges. (The authors Acad. J. Koutek, Acad. V. Zoubek delivered also samples for them.) The chemical analyses of these types described by the authors (J. Koutek, 1931; V. Zoubek, 1936; E. Krist, 1960) as representative, should express their chemical representativeness. In the cited work D. Hovorka has proved that even if we begin to determine chemical characteristics of granitoid rock types by means of statistics, mainly by means of arithmetic means, these typified standard samples are in their chemical characters actually closer to the averages obtained in form of arithmetic means of numerous samples and thus it is a certain confirmation of representativeness of the mentioned piece samples also from the viewpoint of their chemical representation. They are the Ďumbier, Prašivá, Sihla, Hrončok and Tríbeč types. It is necessary to stress that the statement of D. Hovorka about statistical data of the individual Tatride and Veporide granitoids only little different are in agreement with our results. These little differences are according to D. Hovorka resulting mainly from the fact that differentiation of anatectic melt of crustal origin was little distinct and also the fundamental primary material, from which the granitoid magma originated in the Tatrides and Veporides, had a relatively close composition of sediments or metamorphites. Our up to present investigations confirm these conclusions and we fully agree with them. It is evident from the tables of average analysesnos. 2 and 3. So, for instance, in Tab. 2, in which the average analyses of granitoids from 4 main groups of mountains are mentioned, where granitoids are not distinguished according to basicity, confirm similar conclusions. There are only little differences in average chemical characters between the regions with the exception of Gemeride granitoids and granitoids from Hungary. It is necessary to remark that Gemeride granitoids have lower values (SiO_2, or K_2O etc.), because granitoids from Rochovce and Turčok, which have not the chemical characters of Gemeride granites, were included here and also because the samples analysed by us do not represent the apical parts of granitoid bodies from where samples of Gemeride granites are usually taken, but deeper parts from boreholes at depth more than 1000 m were analysed. When we divide all samples treated by us according to modal classification of differentiation trends of changes, then for 3 groups of granites to granodiorites very close values result. The individual groups also display only little differences of differentiation and are relatively close to one another with the exception of tonalites.

All groups of Table 2 have more sodium than potassium, the North Slovakian pluton has relatively least potassium and in all groups, except the samples of the Spišsko-gemerské rudohorie Mts. and tonalites, there is a little difference in the content of SiO_2 and other elements in the fundamental types of Variscan granitoids of the West Carpathians.

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Table 1
Chemical analyses, modal, mesonormative and regional symbols of selected granitoid rocks of the West Carpathians

Analysis no.	1	2	3	4	5	6	7	8	9	10	11
Sample no. ZK	1 A	1 H	2 A	2 H	3 A	3 H	4 A	4 H	5 H	5 A	6 A
Mountain range	T/C	T/C	V/D	V/D	NT/C	NT/C	NT/C	NT/C	MK/A	MK/A	V/D
Modal code	(4/3)	4/3	(2/1)	2/1	(3/1)	3/1	(2/2)	2/2	4/1	(4/1)	(2/1)
Mesonorm. classif.	GD	T	mG	sG	GD	GD	mG	GD	GD	GD	mG
SiO_2	62.60	62.44	71.18	71.08	71.39	69.25	73.31	70.77	66.83	66.47	74.06
TiO_2	0.82	0.81	0.34	0.32	0.31	0.42	0.08	0.33	0.66	0.71	0.17
Al_2O_3	14.89	15.88	14.35	13.80	13.75	13.82	14.07	14.07	14.70	16.54	13.80
Fe_2O_3	4.45	2.12	1.12	1.19	1.38	1.72	1.35	1.43	3.27	1.26	1.38
FeO	2.66	2.94	1.81	1.46	2.37	2.87	0.73	1.85	1.78	2.01	1.38
MnO	0.12	0.13	0.09	0.08	0.10	0.10	0.06	0.07	0.09	0.07	0.04
CaO	3.73	4.12	1.54	2.30	1.86	2.47	1.10	2.10	2.68	2.68	1.59
MgO	2.10	2.12	0.91	0.71	1.10	1.40	0.55	0.67	1.47	1.51	0.11
K_2O	2.56	2.12	3.88	3.70	3.58	3.28	3.70	3.52	2.84	2.85	3.68
Na_2O	4.36	4.66	4.00	4.36	3.68	3.78	4.00	3.62	4.46	4.40	4.20
H_2O^-	0.07	0.09	0.09	0.08	0.06	0.08	0.04	0.08	0.09	0.06	0.03
H_2O^+	1.60	2.02	0.83	1.23	0.60	0.92	1.32	1.84	1.38	1.26	0.32
P_2O_5	0.33	0.32	0.13	0.14	0.10	0.13	0.16	0.10	0.20	0.15	0.02
Total	100.29	99.77	100.27	100.45	100.28	100.24	100.47	100.45	100.45	99.97	100.05

Analysis no.	12	13	14	15	16	17	18	19	20	21	22
Sample no. ZK	6 H	7 A	7 H	8 A	8 H	9 H	9 A	10 A	10 H	11 A	11 H
Mountain range	V/D	V/D		MK/A		V/D		V/D		ČH/D	
Modal code	2/1	(4/2)	4/2	(1/1)	1/1	1/3	(1/3)	(3/2)	3/2	(3/2)	3/2
Mesonorm. classif.	mG	T	GD	sG	aG	GD	GD	mG	GD	GD	T
SiO_2	75.95	65.95	66.64	72.41	73.30	76.62	74.43	70.42	67.55	66.16	67.18
TiO_2	0.12	0.63	0.59	0.12	0.02	0.20	0.37	0.59	0.76	0.57	0.56
Al_2O_3	13.09	16.56	16.66	13.56	12.34	12.06	12.87	12.73	14.85	15.20	15.51
Fe_2O_3	0.39	1.19	0.04	2.43	3.44	0.66	1.62	2.43	2.00	2.86	1.27
FeO	1.25	2.20	2.11	0.88	0.91	1.03	0.14	0.92	1.31	1.34	1.86
MnO	0.04	0.03	0.05	0.06	0.04	0.04	0.04	0.02	0.02	0.09	0.03
CaO	1.10	3.35	2.86	0.89	0.88	1.92	1.92	2.71	3.02	3.63	3.23
MgO	0.11	1.56	1.22	0.34	0.34	0.34	0.82	1.13	1.49	1.72	1.53
K_2O	4.07	2.40	2.75	4.16	3.68	3.20	3.48	3.24	3.16	2.86	2.74
Na_2O	3.62	4.12	4.32	4.00	4.56	3.20	3.48	3.70	3.70	4.10	4.14
H_2O^-	0.05	0.06	0.03	0.10	0.03	0.09	0.13	0.13	0.13	0.22	0.12
H_2O^+	0.23	1.72	2.46	0.97	0.82	0.47	0.90	1.46	1.58	1.42	1.57
P_2O_5	0.05	0.11	0.17	0.24	0.16	0.06	0.07	0.34	0.34	0.31	0.19
Total	100.07	99.88	99.90	100.16	100.52	99.89	100.07	99.82	99.91	100.48	99.93

Analysis no.	23	24	25	26	27	28	29	30	31	32	33
Sample no. ZK	12 A	12 H	13 A	13 H	14 A	14 H	15 A	15 H	16 A	16 H	17 A
Mountain range	ČH/D		G/E		NT/C		PI/A		G/E		PI/A
Modal code	(4/2)	4/2	—	—	(3/1)	(1/3)	(1/3)	1/3	(3/1)	3/1	(2/1)
Mesonorm. classif.	T	T	gtQ	gtQ	GD	GD	mG	GD	mG	mG	mG
SiO_2	63.71	66.15	76.35	74.66	72.06	70.48	73.00	72.75	75.11	75.62	75.75
TiO_2	1.03	0.76	0.18	0.22	0.40	0.44	0.18	0.14	0.21	0.20	0.20
Al_2O_3	15.07	15.00	13.53	15.02	13.44	14.40	14.28	14.63	12.40	12.26	12.97
Fe_2O_3	4.82	3.04	1.03	0.23	1.29	1.29	1.40	0.98	1.82	1.73	0.91
FeO	1.48	1.23	0.38	0.14	0.82	0.91	0.53	0.26	0.27	0.42	0.37
MnO	0.07	0.02	0.01	0.02	0.05	0.05	0.05	0.04	0.03	0.03	0.03
CaO	3.59	3.49	0.54	0.68	2.18	2.32	1.63	1.86	0.84	0.81	0.96
MgO	1.91	1.82	0.54	1.68	0.92	1.11	0.40	0.44	0.38	0.46	0.46
K_2O	2.50	1.82	3.86	4.12	3.80	3.60	3.32	2.96	2.56	2.76	2.76
Na_2O	4.25	4.40	0.23	0.31	3.36	3.64	3.92	4.88	4.88	4.44	4.44
H_2O^-	0.12	0.12	0.20	0.08	0.12	0.07	0.11	0.07	0.11	0.05	0.09
H_2O^+	1.46	2.07	2.78	2.45	1.21	1.38	0.92	0.68	1.16	1.02	0.84
P_2O_5	0.39	0.27	0.21	0.26	0.17	0.15	0.14	0.11	0.04	0.03	0.04
Total	100.40	100.19	99.85	99.87	99.82	99.84	99.88	99.80	99.81	99.83	99.82

Analysis no.	34	35	36	37	38	39	40	41	42	43	44
Sample no. ZK	17 H	18 H	19	19 A	20 A	20 H	21 A	21 H	22 A	22 H	23 A
Mountain range	PI/A	PI/A	V/D		VF/C		MF/B		VT/B		VT/B
Modal code	2/1	2/2	(2/1)	2/1	(4/2)	4/2	(3/2)	3/2	(2/2)	2/2	(1/3)
Mesonorm. classif.	mG	mG	mG	mG	T	T	GD	mG	GD	GD	mG
SiO_2	76.21	72.92	74.69	77.65	65.65	63.96	70.94	71.81	71.55	71.38	71.86
TiO_2	0.20	0.23	0.30	0.25	1.02	0.92	0.36	0.24	0.30	0.30	0.25
Al_2O_3	12.42	14.16	12.68	10.95	16.23	15.58	14.32	13.60	14.79	15.07	14.67
Fe_2O_3	1.35	1.25	1.58	1.57	1.35	2.66	0.91	2.22	0.71	0.50	0.90
FeO	0.30	0.60	0.34	0.27	3.10	3.30	1.87	1.50	1.29	1.62	1.30
MnO	0.02	0.05	0.03	0.03	0.03	0.09	0.03	0.06	0.05	0.08	0.05
CaO	1.08	1.69	1.51	1.25	3.05	3.21	2.28	2.24	2.10	2.02	1.93
MgO	0.42	0.54	0.42	0.42	1.55	1.88	0.54	0.54	0.67	0.60	0.48
K_2O	2.76	3.46	4.60	4.24	2.68	2.60	3.43	3.17	3.27	3.00	3.64
Na_2O	4.32	3.64	2.96	2.48	4.06	4.20	4.12	4.28	4.12	4.46	3.92
H_2O^-	0.08	0.08	0.05	0.06	0.03	0.04	0.11	0.01	0.10	0.01	0.11
H_2O^+	0.76	1.00	0.86	0.71	1.08	1.15	0.85	0.76	0.88	1.00	0.77
P_2O_5	0.04	0.15	0.11	0.10	0.14	0.27	0.05	0.07	0.07	0.09	0.10
Total	99.96	99.77	100.13	99.98	99.97	99.86	99.81	100.49	99.90	100.16	99.98

Analysis no.	45	46	47	48	49	50	51	52	53	54	55
Sample no. Zk	23 H	24 A	24 H	25 A	25 H	26 A	26 H	27 A	27 H	28 A	28 H
Mountain range		NT/C		NT/C		V/D		V/D		V/D	
Modal code	1/3	(2/2)	2/2	(3/2)	3/2	(2/1)	2/1	(1/1)	1/1	(4/2)	4/2
Mesonorm. classif.	GD	mG	GD	GD	GD	mG	sG	sG	sG	T	GD
SiO_2	71.84	71.15	70.72	66.91	70.58	73.21	71.98	74.56	73.61	65.81	64.53
TiO_2	0.21	0.38	0.40	0.76	0.36	0.32	0.37	0.17	0.11	0.87	0.75
Al_2O_3	14.81	14.08	14.45	15.29	14.30	13.34	12.84	13.93	14.28	15.71	14.87
Fe_2O_3	0.96	0.97	0.89	1.55	1.51	0.81	1.81	0.10	0.56	2.13	4.06
FeO	1.39	1.69	1.86	2.36	1.73	1.78	1.90	1.35	0.88	2.09	1.92
MnO	0.07	0.07	0.06	0.09	0.04	0.05	0.12	0.04	0.05	0.07	0.11
CaO	2.02	1.84	1.91	3.31	1.95	1.81	2.09	0.93	0.98	3.75	3.70
MgO	0.40	0.76	0.92	1.56	0.89	0.44	0.60	0.37	0.28	1.61	1.69
K_2O	3.40	3.94	3.52	3.04	3.46	4.42	4.32	4.72	4.52	2.61	2.67
Na_2O	4.20	3.80	4.10	3.92	4.10	3.34	3.38	3.40	3.86	4.06	4.28
H_2O^-	0.02	0.10	0.02	0.07	0.02	0.04	0.03	0.02	0.01	0.04	0.03
H_2O^+	0.84	1.12	1.00	1.05	0.87	0.57	0.94	0.71	0.76	0.96	1.13
P_2O_5	0.11	0.08	0.13	0.11	0.15	0.05	0.12	0.12	0.11	0.25	0.31
Total	100.27	99.98	99.97	99.97	100.02	100.18	100.50	100.42	100.01	99.96	100.16

Analysis no.	56	57	58	59	60	61	62	63	64	65	66
Sample no. ZK	29 A	29 H	30 A	31 A	31 H	32 H	33 A	33 H	34 H	34/35 A	35 H
Mountain range	V/D		VT/B	MK/A		MK/A	G/E		G/E	G/E	G/E
Modal code	(3/2)	3/2	(2/2)	—	—	—	(1/2)	1/2	2/1	(2/1)	2/1
Mesonorm. classif.	GD	mG	GD	—	—	—	mG	sG	mG	—	sG
SiO_2	72.44	71.16	70.66	62.41	71.51	73.46	75.99	75.04	72.45	75.01	75.88
TiO_2	0.39	0.35	0.44	0.69	0.14	0.38	0.12	0.30	0.45	0.20	0.13
Al_2O_3	13.60	13.53	14.64	17.72	15.59	14.43	12.20	12.77	13.28	9.35	12.74
Fe_2O_3	1.03	2.78	0.97	0.91	1.10	0.54	1.38	0.58	0.88	4.24	0.20
FeO	1.49	1.18	2.09	0.98	1.08	1.33	1.45	1.53	1.95	1.85	1.37
MnO	0.04	0.06	0.01	0.05	0.10	0.07	0.04	0.08	0.08	0.06	0.08
CaO	2.26	2.38	2.82	2.47	1.59	2.35	0.77	0.79	2.19	1.00	0.88
MgO	0.64	0.68	0.84	1.34	0.43	0.49	0.08	0.23	0.06	0.42	0.13
K_2O	3.60	3.28	2.58	8.96	0.76	0.82	4.24	4.46	4.32	4.36	4.60
Na_2O	3.56	4.10	4.00	3.34	6.88	5.44	3.08	3.68	3.46	3.08	3.54
H_2O^-	0.03	0.00	0.10	0.11	0.10	0.05	0.01	0.04	0.05	0.06	0.04
H_2O^+	0.84	0.89	0.76	0.86	0.56	0.29	0.31	0.67	1.08	0.65	0.57
P_2O_5	0.02	0.10	0.06	0.10	0.16	0.08	0.14	0.16	0.16	0.17	0.14
Total	99.94	100.49	99.97	99.94	100.00	99.73	99.81	100.33	100.41	100.45	100.30

Analysis no.	67	68	69	70	71	72	73	74	75	76	77
Sample no. ZK	36 H	37 H	38 A	39 H	40 A	40 H	41 A	41 H	42 A	42 H	43 H
Mountain range	MF/B	MF/B	MF/B	VT/B	VT/B		T/C		T/C		VF/C
Modal code	3/2	4/2	(4/2)	1/2	(3/2)	3/2	(1/2)	1/2	(1/2)	1/2	1/3
Mesonorm. classif.	—	T	T	—	T	T	sG	aG	mG	mG	mG
SiO_2	66.86	67.35	68.74	72.16	70.54	68.76	74.36	74.46	75.95	73.95	74.17
TiO_2	0.54	0.57	0.58	0.25	0.38	0.50	0.23	0.25	0.23	0.25	0.11
Al_2O_3	15.31	16.00	15.19	14.64	15.26	16.44	12.85	14.21	13.31	13.23	14.44
Fe_2O_3	1.38	0.77	0.78	0.98	0.98	0.22	1.87	0.28	0.79	1.05	0.66
FeO	2.60	2.90	2.62	1.12	2.08	2.31	0.85	0.61	1.18	1.34	0.99
MnO	0.10	0.08	0.07	0.08	0.05	0.04	0.03	0.02	0.03	0.07	0.04
CaO	5.15	3.37	3.40	1.84	3.15	3.21	0.93	0.54	0.81	1.12	1.00
MgO	0.24	1.11	1.12	0.40	0.79	0.97	0.30	0.21	0.28	0.39	0.26
K_2O	2.66	1.65	2.48	3.82	1.85	1.88	4.07	4.33	2.92	4.40	3.64
Na_2O	4.36	4.84	3.50	4.10	4.20	4.60	4.32	4.32	3.90	3.94	4.10
H_2O^-	0.10	0.08	0.06	0.07	0.03	0.06	0.03	0.03	0.04	0.07	0.10
H_2O^+	0.88	0.91	1.06	0.82	0.62	0.66	0.58	0.64	0.52	0.57	0.89
P_2O_5	0.22	0.21	0.21	0.09	0.05	0.17	0.01	0.08	0.00	0.09	0.10
Total	100.36	99.84	99.81	100.37	99.98	99.82	100.43	99.98	99.96	100.47	100.50

Analysis no.	78	79	80	81	82	83	84	85	86	87	88
Sample no. ZK	44 A	44 H	45 A	46 A	46 H	47 A	47 H	48 A	49 H	50 H	51 H
Mountain range	VF/C		VF/C	VT/B		VT/B		MK/A	MK/A	MK/A	MK/A
Modal code	(1/2)	1/2	(1/2)	(4/2)	4/2	(2/2)	2/2	(2/2)	—	2/2	2/2
Mesonorm. classif.	—	sG	mG	T	T	T	GD	GD	—	GD	aG
SiO_2	74.44	73.76	75.35	69.58	68.25	70.96	68.65	67.79	77.02	72.40	74.05
TiO_2	0.17	0.17	0.12	0.37	0.40	0.44	0.42	0.43	0.34	0.28	0.34
Al_2O_3	9.23	14.43	13.09	14.72	16.22	15.48	14.43	16.68	13.48	14.49	13.14
Fe_2O_3	2.61	0.73	1.02	1.92	0.67	0.99	2.59	0.68	0.26	1.09	1.48
FeO	0.94	0.60	0.85	1.81	2.02	2.05	2.09	1.92	1.03	1.53	1.49
MnO	0.02	0.03	0.03	0.05	0.08	0.04	0.08	0.04	0.02	0.05	0.04
CaO	0.89	0.86	1.31	3.38	3.45	3.21	3.36	2.64	0.37	2.00	0.37
MgO	2.41	0.16	0.21	0.79	0.92	0.78	0.88	1.90	0.58	0.43	1.07
K_2O	5.00	4.95	4.00	1.96	2.04	1.94	1.98	3.14	4.47	3.07	2.95
Na_2O	3.16	3.62	3.40	4.40	4.74	3.74	4.74	4.40	0.20	4.06	4.12
H_2O^-	0.13	0.07	0.03	0.06	0.06	0.05	0.09	0.08	0.07	0.05	0.14
H_2O^+	0.97	0.85	0.49	0.86	0.78	0.04	1.00	0.62	2.08	0.54	0.68
P_2O_5	0.12	0.11	0.05	0.15	0.16	0.17	0.16	0.12	0.08	0.15	0.09
Total	100.09	100.34	99.95	100.05	99.79	99.89	100.47	100.44	100.00	100.14	99.96

Analysis no.	89	90	91	92	93	94	95	96	97	98	99
Sample no. ZK	52 H	53 H	54 H	55 A	55 H	56 A	56 H	57 A	57 H	58 A	58 H
Mountain range	MK/A	MK/A	MK/A	B/B		V/D		V/D		V/D	
Modal code	—	2/1	1/3	(1/2)	1/2	(3/2)	3/2	(4/2)	4/2	(3/2)	3/2
Mesonorm. classif.	—	mG	mG	sG	aG	mG	GD	T	T	GD	GD
SiO_2	68.30	70.84	74.05	72.87	73.57	70.22	68.62	65.82	64.12	71.87	70.78
TiO_2	0.30	0.39	0.33	0.10	0.13	0.40	0.53	0.68	0.76	0.35	0.42
Al_2O_3	15.37	15.23	13.77	14.22	14.24	11.98	15.04	14.58	15.92	14.28	15.04
Fe_2O_3	2.68	0.17	0.53	0.60	0.42	1.45	0.82	2.16	1.85	1.57	0.85
FeO	2.67	1.97	0.87	1.08	0.83	2.38	2.31	2.78	2.93	0.53	1.66
MnO	0.09	0.02	0.09	0.03	0.02	0.06	0.04	0.11	0.09	0.03	0.05
CaO	0.14	2.12	1.23	0.75	0.68	2.28	2.38	3.89	3.65	2.18	2.12
MgO	0.67	0.66	0.67	0.52	0.28	2.90	1.02	1.70	1.83	0.98	0.72
K_2O	2.25	3.90	4.06	5.32	5.28	3.80	4.04	2.84	3.14	3.04	3.43
Na_2O	4.75	3.74	3.54	3.36	3.56	3.36	3.77	3.40	3.92	4.00	4.06
H_2O^-	0.20	0.04	0.69	0.10	0.11	0.12	0.02	0.09	0.04	0.11	0.04
H_2O^+	2.52	0.59	0.03	0.76	0.85	1.03	1.09	1.26	1.26	0.89	0.79
P_2O_5	0.12	0.14	0.18	0.13	0.07	0.32	0.21	0.49	0.27	0.16	0.04
Total	100.06	99.81	100.04	99.84	100.05	100.30	99.89	99.80	99.78	99.99	100.00

Analysis no.	100	101	102	103	104	105	106	107	108	109	110
Sample no. ZK	59 A	59 H	60 A	60 H	61 A	61 H	62 A	62 H	63 A	63 H	64 A
Mountain range	SV/A		MK/A		G/E		Ž/C		PI/A		PI/A
Modal code	(1/3)	1/3	(2/1)	2/1	(1/2)	1/2	(2/1)	2/1	(1/1)	1/1	(2/1)
Mesonorm. classif.	sG	mG	sG	mG	aG	sG	mG	mG	—	—	—
SiO_2	73.16	74.69	74.47	71.54	75.46	75.26	71.54	71.59	74.12	73.68	74.55
TiO_2	0.10	0.08	0.25	0.40	0.18	0.13	0.36	0.38	0.15	0.14	0.24
Al_2O_3	13.56	14.95	12.48	14.93	11.87	12.79	13.54	13.94	13.18	12.67	12.40
Fe_2O_3	2.20	0.28	1.40	0.11	1.64	1.35	2.59	2.50	1.00	1.08	1.49
FeO	0.84	0.67	0.78	1.79	0.18	0.46	0.18	0.21	0.18	0.18	0.39
MnO	0.07	0.05	0.08	0.04	0.03	0.06	0.06	0.06	0.02	0.02	0.03
CaO	0.72	0.78	0.60	1.24	0.71	0.79	1.65	1.61	0.67	0.75	1.01
MgO	0.21	0.09	0.00	0.55	0.35	0.30	0.65	0.67	0.30	0.19	0.62
K_2O	3.28	3.30	3.50	4.68	4.50	4.48	3.95	3.88	3.90	3.95	3.68
Na_2O	4.68	4.40	4.75	3.45	3.70	3.60	3.95	3.80	5.95	6.90	4.75
H_2O^-	0.11	0.01	0.28	0.05	0.14	0.16	0.06	0.18	0.06	0.08	0.04
H_2O^+	0.82	0.74	1.36	0.80	0.84	0.78	1.28	1.36	0.72	0.64	0.68
P_2O_5	0.16	0.04	0.08	0.15	0.25	0.26	0.23	0.20	0.14	0.13	0.06
Total	99.93	100.09	99.98	99.73	99.85	100.42	100.41	100.38	100.39	100.41	99.94

Analysis no.	111	112	113	114	115	116	117	118	119	120	121
Sample no. ZK	64 H	65 A	65 H	66 A	66 H	67 A	67 H	68 A	69 A	70 H	71 H
Mountain range		MK/A		V/D		V/D		NT/C	V/D	VT/B	VT/B
Modal code	2/1	(1/3)	1/3	(3/1)	3/1	(2/2)	2/2	(1/2)	(1/2)	2/2	2/2
Mesonorm. classif.	—	aG	aG	mG	aG	mG	mG	aG	aG	T	GD
SiO_2	75.29	73.32	72.57	73.18	72.52	74.01	71.69	74.65	76.17	70.59	72.38
TiO_2	0.24	0.14	0.13	0.28	0.35	0.28	0.35	0.05	0.12	0.45	0.40
Al_2O_3	12.09	13.87	14.24	13.36	13.35	12.56	13.07	14.35	12.50	15.01	14.67
Fe_2O_3	1.61	1.00	1.40	1.72	1.73	1.61	2.48	0.67	0.61	2.34	1.54
FeO	0.35	0.18	0.18	0.32	0.46	0.85	0.21	0.11	0.21	0.35	0.41
MnO	0.03	0.07	0.06	0.05	0.04	0.07	0.07	0.04	0.03	0.04	0.03
CaO	0.90	1.08	1.12	1.42	1.68	1.79	1.94	0.46	0.09	2.92	1.94
MgO	0.46	0.27	0.30	0.51	0.62	0.70	0.78	0.27	0.50	1.10	0.62
K_2O	3.05	3.55	4.05	4.57	4.23	3.68	3.78	4.42	4.62	2.26	3.20
Na_2O	5.25	5.35	4.55	3.40	4.15	3.45	4.45	3.25	4.46	3.76	3.60
H_2O^-	0.02	0.04	0.12	0.20	0.30	0.04	0.12	0.18	0.14	0.15	0.06
H_2O^+	0.88	0.88	1.02	0.72	0.92	0.76	0.78	1.34	0.58	0.87	0.93
P_2O_5	0.06	0.15	0.17	0.11	0.06	0.15	0.14	0.11	0.00	0.20	0.14
Total	100.23	99.90	99.91	99.89	100.41	99.95	99.85	99.80	100.03	99.97	99.92

Analysis no.	122	123	124	125	126	127	128	129	130	131	132
Sample no. ZK	72 H	73 H	74 H	75 H	76 H	77 H	78 H	79 H	80 H	81 H	82 A
Mountain range	V/D	V/D	V/D	V/D	V/D	V/D	NT/C	NT/C	VF/C	MF/B	V/D
Modal code	2/2	3/2	3/2	4/2	2/2	2/1	4/2	3/2	3/2	3/2	(4/2)
Mesonorm. classif.	GD	GD	GD	T	mG	mG	T	mG	GD	T	T
SiO_2	69.84	74.40	69.62	63.99	72.14	73.83	67.45	71.41	64.48	70.21	64.38
TiO_2	0.45	0.47	0.45	1.01	0.36	0.18	0.56	0.38	0.76	0.54	0.54
Al_2O_3	15.17	13.09	14.98	15.34	13.75	13.36	15.16	13.99	16.31	15.17	16.41
Fe_2O_3	2.45	1.65	2.27	4.15	2.24	1.52	3.75	2.32	4.51	2.76	2.87
FeO	0.76	0.90	0.25	1.30	0.14	0.14	0.14	0.28	0.32	0.60	1.75
MnO	0.03	0.02	0.05	0.06	0.04	0.03	0.05	0.05	0.06	0.03	tr.
CaO	2.43	2.17	2.32	3.66	1.31	1.27	3.07	1.72	3.55	2.73	3.95
MgO	1.13	0.70	0.89	2.04	0.65	0.27	1.56	0.75	1.45	1.24	1.94
K_2O	3.00	2.12	3.55	2.05	4.48	5.15	2.50	3.82	2.62	1.84	2.09
Na_2O	3.22	3.28	4.30	4.25	3.65	3.33	4.15	3.75	4.55	3.48	3.31
H_2O^-	0.11	0.06	0.18	0.20	0.08	0.06	0.04	0.02	0.02	0.05	0.52
H_2O^+	1.09	0.83	1.08	1.50	0.94	0.68	1.42	1.20	0.94	0.97	1.98
P_2O_5	0.42	0.19	0.15	0.35	0.14	0.07	0.18	0.17	0.36	0.29	0.50
Total	100.10	99.88	100.09	99.90	99.92	99.89	100.03	99.86	99.93	99.91	100.24

Analysis no.	133	134	135	136	137	138	139	140	141	142	143
Sample no. ZK	83 A	84 A	85 H	86 A	87 H	88 H	89 H	90 H	91 H	92 A	93 H
Mountain range	V/D	V/D	V/D	V/D	V/D	ČH/D	B/B	VF/C	NT/C	NT/C	Ž/C
Modal code	(4/3)	(2/2)	2/2	(3/2)	2/1	4/2	3/2	3/1	1/2	(3/2)	2/2
Mesonorm. classif.	T	aG	mG	GD	mG	T	T	mG	aG	mG	mG
SiO_2	63.70	72.75	72.78	71.16	68.90	64.48	67.27	73.98	74.72	70.14	74.95
TiO_2	0.84	0.49	0.31	0.44	0.38	0.87	0.36	0.31	0.12	0.34	0.20
Al_2O_3	16.92	15.07	13.94	14.59	15.28	16.46	15.34	14.65	13.04	14.23	14.08
Fe_2O_3	2.00	1.53	1.96	1.65	1.77	0.41	2.12	0.84	0.68	1.86	0.79
FeO	1.89	0.50	0.11	2.16	0.86	2.83	2.76	0.32	0.11	0.49	0.37
MnO	0.09	0.01	0.04	0.03	0.04	0.04	0.04	0.02	0.02	0.03	0.03
CaO	3.52	0.34	1.31	0.93	2.24	3.24	1.16	0.90	0.79	1.94	1.31
MgO	2.02	0.86	0.56	1.81	0.81	2.01	2.98	0.30	0.30	0.75	0.32
K_2O	2.18	3.30	2.62	2.09	4.22	1.70	2.25	3.60	5.60	4.66	3.00
Na_2O	4.50	3.04	4.75	4.14	3.75	4.21	3.25	3.56	3.70	3.55	3.56
H_2O^-	0.34	0.15	0.18	0.00	0.02	0.60	0.00	0.15	0.10	0.18	0.11
H_2O^+	1.50	1.72	1.18	0.84	0.96	3.22	2.32	1.10	0.56	1.62	0.91
P_2O_5	0.42	0.25	0.11	0.17	0.17	0.42	0.05	0.14	0.06	0.15	0.21
Total	99.92	100.01	99.85	100.01	99.99	100.49	99.90	99.87	99.80	99.94	99.84

Analysis no.	144	145	146	147	148	149	150	151	152	153	154
Sample no. ZK	94 H	95 A	96 A	97 A	97 H	98 A	99 A	100 A	102 A	103 A	104 A
Mountain range	MK/A	V/D	VT/B	MF/B		MF/B	MF/B	T/C	SV/A	SV/A	SV/A
Modal code	2/2	(2/1)	(2/2)	(3/2)	3/2	(3/2)	(3/2)	(1/3)	(4/1)	(3/2)	(3/2)
Mesonorm. classif	mG	aG	mG	—	GD	mG	mG	mG	—	mG	mG
SiO_2	75.06	69.88	73.44	72.22	67.68	72.31	72.67	77.20	76.58	75.37	76.44
TiO_2	0.15	0.30	0.35	0.42	0.49	0.44	0.34	0.07	0.10	0.33	0.19
Al_2O_3	14.45	14.70	14.28	14.05	15.03	13.71	13.51	13.28	12.23	12.86	12.88
Fe_2O_3	0.77	1.18	1.28	1.54	1.20	1.53	0.83	0.88	0.19	0.58	0.44
FeO	0.53	1.10	0.90	1.15	1.19	1.27	1.54	0.16	0.51	1.27	0.78
MnO	0.04	0.03	0.03	0.06	0.08	0.05	0.05	0.02	0.06	0.03	0.01
CaO	0.00	2.12	0.79	0.61	2.77	0.65	0.56	0.42	0.09	0.56	0.84
MgO	0.80	0.76	1.02	1.24	1.75	1.51	1.27	0.30	0.44	1.00	0.80
K_2O	3.14	3.72	2.88	2.76	2.89	2.85	3.04	1.55	5.09	2.18	2.85
Na_2O	4.35	3.63	3.77	4.57	4.25	4.12	4.34	5.25	3.39	4.70	3.32
H_2O^-	0.00	1.46	0.06	0.16	0.28	0.14	0.16	0.02	0.12	0.16	0.16
H_2O^+	0.62	1.06	1.14	1.16	1.92	1.26	1.60	0.84	0.88	0.85	1.12
P_2O_5	0.12	0.10	0.06	0.11	0.43	0.13	0.08	0.03	0.06	0.08	0.21
Total	100.03	100.09	99.98	100.05	99.96	99.97	99.99	100.02	99.94	99.98	100.04

Analysis no.	155	156	157	158	159	160	161	162	163	164	165
Sample no. ZK	105 A	106 A	107 A	107 H	108 A	109 A	110 A	110 H	111 A	112 A	113 A
Mountain range	F	F	F		F	F	F	F	VT/B	G/E	MF/B
Modal code	(3/1)	(3/1)	(3/1)	3/1	—	(3/1)	(3/1)	3/1	(2/1)	(3/1)	(4/1)
Mesonorm. classif	aG	aG	aG	aG	GD	mG	sG	GD	mG	sG	GD
SiO_2	74.80	74.17	76.63	75.50	57.66	70.51	71.66	65.86	75.54	73.74	68.68
TiO_2	0.26	0.25	0.05	0.09	0.73	0.53	0.52	0.73	0.13	0.29	0.34
Al_2O_3	12.36	12.54	12.07	12.09	12.90	13.99	14.37	15.23	12.59	12.66	16.43
Fe_2O_3	0.71	1.18	0.62	0.43	1.38	0.68	0.13	1.14	0.86	1.65	1.53
FeO	1.19	0.87	0.09	0.22	4.81	2.03	2.00	2.31	0.48	0.84	1.25
MnO	0.04	0.05	0.01	0.03	0.06	0.05	0.05	0.00	0.05	0.07	0.04
CaO	0.14	0.47	0.37	1.24	4.00	1.16	0.70	3.15	0.65	0.74	1.89
MgO	0.64	0.77	0.54	0.25	7.86	1.85	1.20	2.10	0.84	1.10	1.06
K_2O	4.86	4.86	5.33	5.00	4.08	4.75	4.62	3.61	3.29	4.20	2.07
Na_2O	3.32	3.25	2.98	3.30	2.30	3.00	3.05	3.45	4.18	3.15	5.35
H_2O^-	0.28	0.28	0.26	0.72	0.44	0.20	0.62	0.52	0.14	0.34	0.34
H_2O^+	1.40	1.32	0.98	1.22	3.50	1.24	0.98	1.82	1.22	1.06	0.96
P_2O_5	0.04	0.05	0.01	0.15	0.26	0.11	0.12	0.48	0.07	0.14	0.11
Total	100.04	100.06	99.91	100.24	99.98	100.01	100.02	100.40	100.04	99.98	100.05

Analysis no.	166	167	168	169	170	171	172	173	174	175	176
Sample no. ZK	113 H	114 A	114 H	115 A	115 H	116 A	116 H	117 A	117 H	118 A	118 H
Mountain range	MF/B	MF/B		MF/B		MF/B		NT/C		V/D	T/C
Modal code	4/1	(4/1)	4/1	(4/1)	4/1	(1/3)	1/3	(3/2)	3/2	(4/2)	4/2
Mesonorm. classif.	T	GD	T	GD	GD	mG	GD	GD	mG	T	T
SiO_2	68.96	67.34	67.37	68.50	68.88	69.99	70.24	67.54	64.80	66.12	63.50
TiO_2	0.38	0.38	0.42	0.41	0.38	0.36	0.30	0.45	0.57	0.72	0.95
Al_2O_3	15.68	16.79	16.04	16.16	14.88	15.54	15.09	15.92	16.70	15.59	16.04
Fe_2O_3	1.07	1.61	0.86	1.50	1.18	1.45	0.30	1.50	0.99	2.79	2.83
FeO	1.38	1.46	1.78	1.42	1.57	0.72	1.61	1.70	1.99	1.32	1.78
MnO	0.04	0.04	0.06	0.03	0.06	0.03	0.06	0.04	0.00	0.08	0.02
CaO	2.46	1.62	2.31	1.85	2.46	1.66	2.02	1.98	2.48	2.77	2.64
MgO	1.53	1.03	1.64	1.19	1.23	0.73	1.02	1.49	1.43	1.66	2.65
K_2O	1.67	2.21	1.47	2.21	2.28	3.08	2.38	3.18	3.81	2.21	2.04
Na_2O	4.83	5.50	4.97	5.08	4.37	5.22	4.71	4.60	4.01	4.48	4.37
H_2O^-	0.92	0.32	0.98	0.20	0.56	0.20	1.26	0.34	0.30	0.42	0.56
H_2O^+	0.78	1.54	1.76	1.36	1.70	1.02	0.92	1.30	2.22	1.50	2.08
P_2O_5	0.24	0.14	0.25	0.10	0.25	0.10	0.18	0.21	0.43	0.27	0.40
Total	99.94	99.98	99.91	100.01	99.80	100.10	100.09	99.95	99.73	99.93	99.86

Analysis no.	177	178	179	180	181	182	183	184	185	186
Sample no. ZK	120 A	120 H	121 A	121 H	122 A	122 H	124 A	124 H	125 A	125 H
Mountain range	NT/C		V/D		V/D		V/D		NT/C	
Modal code	(3/2)	3/2	(4/2)	4/2	(1/2)	1/2	(1/3)	1/3	(1/2)	1/2
Mesonorm. classif.	mG	GD	—	T	aG	aG	GD	GD	sG	sG
SiO_2	67.89	70.56	60.11	62.86	74.31	75.36	69.71	68.99	74.05	73.93
TiO_2	0.42	0.46	0.75	0.86	0.09	0.08	0.38	0.46	0.09	0.13
Al_2O_3	15.63	14.01	18.38	16.30	13.66	13.26	15.20	15.31	14.61	14.71
Fe_2O_3	1.95	1.28	3.10	2.83	0.62	0.54	2.42	2.61	0.82	0.54
FeO	1.22	1.26	2.46	1.71	0.26	0.19	0.69	0.85	0.19	0.26
MnO	0.05	0.04	0.05	0.09	0.02	0.01	0.04	0.04	0.02	0.01
CaO	1.52	1.73	2.63	2.42	0.51	0.46	1.52	1.66	0.65	0.60
MgO	1.33	1.55	2.46	3.39	0.23	0.20	1.23	1.46	0.36	0.40
K_2O	4.05	3.40	2.89	2.28	5.38	4.82	2.80	2.55	3.75	4.49
Na_2O	4.26	3.70	5.08	4.25	4.23	4.16	4.16	3.96	3.57	3.49
H_2O^-	0.26	1.00	0.32	0.60	0.22	0.20	0.16	0.18	0.42	0.26
H_2O^+	1.24	1.00	1.56	1.88	0.46	0.58	1.62	1.72	1.34	1.18
P_2O_5	0.12	0.24	0.19	0.39	0.04	0.05	0.12	0.16	0.11	0.10
Total	99.94	100.23	99.98	99.85	100.06	99.91	100.05	99.95	99.98	100.10

Explanations to Tab. 1

In the line "ZK": A — average specimen
H — hand specimen

In the line "Mountain range":

MK	Malé Karpaty Mts.	A — West Slovakian pluton
PI	Považský Inovec Mts.	
SV	Strážovské vrchy Mts. (Suchý and Malá Magura crystalline)	
VT	Vysoké Tatry Mts.	B — North Slovakian pluton
MF	Malá Fatra Mts.	
B	Branisko Mts.	
NT	Nízke Tatry Mts.	C — Central Slovakian pluton
VF	Veľká Fatra Mts.	
Ž	Žiar Mts.	
T	Tríbeč Mts.	
V	Slovenské rudohorie Mts. — Veporides	D — Vepor pluton
ČH	Čierna hora Mts.	
G	Slovenské rudohorie Mts. — Gemerides	E — Gemer pluton
F	Mecsek and Velence Mts., Hungary	

In the line "Modal code":

1/1 aplitoid granitoids
1/2 leucocratic granites
1/3 leucocratic granodiorites
2/1 two-mica granites
2/2 two-mica granodiorites
3/1 biotite granites
3/2 biotite granodiorites
4/1 leucotonalites
4/2 biotite tonalites
4/3 hornblende-biotite tonalites

Symbols in parentheses: supposed modal classification for average samples. Dash (—) denotes indeterminable code.

In the line "Mesonorm classification":

gtQ — granitoid rich in quartz
aG — alkalic granite
sG — syenogranite
mG — monzogranite
GD — granodiorite
T — tonalite
Dash (—) denotes incalculable value

Chemical classification according to A. Streckeisen — R. W. Le Maitre (1979), mesonormative calculation according to P. Mielke — H. G. F. Winkler (1979).

Table 2

Average analyses of groups distinguished according to regional criteria

	Groups according to regional									
	A		B		C		D		E	
	n = 23		n = 25		n = 25		n = 36		n = 6	
	$\overline{x}$	s_x	$\overline{x}$	s_x	$\overline{x}$	s_x	$\overline{x}$	s_x	$\overline{x}$	s_x
SiO_2	72.78	3.53	70.61	2.19	71.49	3.93	70.00	4.13	75.28	0.91
TiO_2	0.28	0.16	0.38	0.12	0.35	0.26	0.47	0.24	0.20	0.06
Al_2O_3	14.08	1.43	14.90	0.94	14.14	1.42	14.58	1.42	12.00	1.42
Fe_2O_3	1.07	0.68	1.31	0.55	1.70	1.13	1.85	0.96	1.96	1.15
FeO	1.03	0.65	1.48	0.74	0.97	0.88	1.17	0.83	0.73	0.73
MnO	0.05	0.02	0.05	0.02	0.05	0.03	0.05	0.02	0.04	0.02
CaO	1.18	0.85	2.10	1.16	1.68	0.98	2.18	1.05	0.77	0.15
MgO	0.67	0.44	0.96	0.52	0.87	0.64	1.14	0.70	0.48	0.34
K_2O	3.54	1.46	2.74	0.81	3.59	0.87	3.34	0.98	3.95	0.72
Na_2O	4.14	1.10	4.20	0.62	3.91	0.48	3.85	0.51	3.02	1.53
H_2O^-	0.12	0.05	0.12	0.08	0.11	0.10	0.19	0.26	0.14	0.12
H_2O^+	0.93	0.52	1.02	0.41	1.06	0.33	1.14	0.53	1.13	0.86
P_2O_5	0.12	0.05	0.12	0.06	0.14	0.09	0.20	0.14	0.16	0.07
Total	99.99	0.17	99.99	0.14	100.04	0.22	100.05	0.18	99.96	0.25
Σ	99,99		99.99		100.06		100.16		99.86	

and modal classification (IUGS 1973). For explanations see Tab. 1

criteria		Groups according to modal classification							
F		1		2		3		4	
n = 6		n = 27		n = 32		n = 35		n = 21	
$\overline{x}$	s_x	$\overline{x}$	s_x	$\overline{x}$	s_x	$\overline{x}$	s_x	$\overline{x}$	s_x
70.91	6.85	73.93	1.71	72.57	2.02	71.33	2.98	66.33	3.28
0.39	0.25	0.18	0.09	0.31	0.10	0.40	0.15	0.66	0.25
13.04	0.93	13.54	1.23	13.96	1.32	13.99	1.17	15.78	1.21
0.78	0.44	1.19	0.66	1.43	0.76	1.53	0.83	2.13	1.32
1.83	1.63	0.68	0.46	0.93	0.67	1.24	0.78	1.90	0.79
0.04	0.02	0.04	0.02	0.04	0.02	0.05	0.02	0.06	0.03
1.14	1.44	1.03	0.49	1.57	0.79	1.74	1.14	2.98	0.94
2.14	2.84	0.47	0.45	0.70	0.34	1.11	0.62	1.54	0.50
4.75	0.41	3.94	0.88	3.47	0.71	3.37	0.95	2.46	0.70
2.98	0.36	4.05	0.72	3.84	0.48	3.80	0.54	4.32	0.62
0.35	0.16	0.13	0.14	0.13	0.25	0.16	0.12	0.19	0.17
1.57	0.96	0.78	0.33	0.90	0.31	1.12	0.33	1.41	0.52
0.10	0.09	0.10	0.06	0.13	0.08	0.15	0.09	0.25	0.14
100.00	0.05	100.05	0.20	100.03	0.19	99.99	0.15	100.02	0.18
100.02		100.06		99.98		99.99		100.01	

Table 3

Average analyses of rock groups distinguished according to chemical classification. For explanations see Tab. 1

	aG		sG		mG		GD		T	
	n = 15		n = 10		n = 34		n = 32		n = 22	
	$\bar{x}$	s_x	$\bar{x}$	s_x	$\bar{x}$	s_x	$\bar{x}$	s_x	$\bar{x}$	s_x
SiO_2	73.90	1.56	73.61	1.60	73.49	2.15	69.65	3.24	66.32	2.35
TiO_2	0.20	0.13	0.24	0.14	0.28	0.12	0.43	0.15	0.65	0.20
Al_2O_3	13.43	0.97	13.53	0.84	13.70	0.92	14.65	0.89	15.77	0.59
Fe_2O_3	1.09	0.80	0.90	0.58	1.20	0.72	1.56	0.93	2.08	1.22
FeO	0.60	0.44	1.12	0.62	0.81	0.58	1.53	0.87	1.91	0.86
MnO	0.03	0.01	0.06	0.03	0.04	0.02	0.05	0.02	0.06	0.03
CaO	0.76	0.57	1.08	0.60	1.24	0.57	2.35	0.64	3.13	0.63
MgO	0.49	0.28	0.71	0.67	0.62	0.39	1.30	1.28	1.73	0.60
K_2O	4.38	0.74	4.35	0.39	3.60	0.80	3.06	0.52	2.17	0.40
Na_2O	3.83	0.53	3.58	0.37	3.88	0.54	3.92	0.80	4.19	0.49
H_2O^-	0.28	0.37	0.18	0.21	0.11	0.12	0.18	0.28	0.25	0.30
H_2O^+	1.05	0.43	0.92	0.24	0.92	0.34	1.15	0.56	1.45	0.48
P_2O_5	0.10	0.06	0.14	0.05	0.11	0.05	0.18	0.10	0.26	0.11
Total	100.05	0.20	100.23	0.21	100.03	0.21	100.07	0.21	99.96	0.18
Σ	100.14		100.42		100.00		100.01		99.97	

Table 4

Granitoid samples divided according to mountain ranges

M. Karpaty (A)	9	5H	4/1	GD	85	48A	(2/2)	GD	102	60A	(2/1)	sG
	10	5A	(4/1)	GD	86	49H	—	—	103	60H	2/1	mG
	15	8A	(1/1)	sG	87	50H	2/2	GD	112	65A	(1/3)	aG
	16	8H	1/1	aG	88	51H	2/2	aG	113	65H	1/3	aG
	59	31A	—	—	89	52H	—	—	144	95H	2/2	mG
	60	31H	—	T	90	53H	2/1	mG				
	61	32H	—	—	91	54H	1/3	mG				
Inovec (A)	29	15A	(1/3)	mG	34	17H	2/1	mG	109	63H	1/1	—
	30	15H	1/3	GD	35	18H	2/2	mG	110	64A	(2/1)	—
	33	17A	(2/1)	mG	108	63A	(1/1)	—	111	64H	2/1	—
Strážov. vrchy (A)	100	59A	(1/3)	sG	152	102A	(4/1)	—	154	104A	(3/2)	mG
	101	59H	1/3	mG	153	103A	(3/2)	mG				
V. Tatry (B)	42	22A	(2/2)	GD	71	40A	(3/2)	T	120	70H	2/2	T
	43	22H	2/2	GD	72	40H	3/2	T	121	71H	2/2	GD
	44	23A	(1/3)	mG	81	46A	(4/2)	T	146	96A	(2/2)	mG
	45	23H	1/3	GD	82	46H	4/2	T	163	111A	(2/1)	mG
	58	30A	(2/2)	GD	83	47A	(2/2)	T				
	70	39H	1/2	—	84	47H	2/2	GD				
M. Fatra (B)	40	21A	(3/2)	GD	147	97A	(3/2)	—	167	114A	(4/1)	GD
	41	21H	3/2	mG	148	97H	3/2	GD	168	114H	4/1	T
	67	36H	3/2	—	149	98A	(3/2)	mG	169	115A	(4/1)	GD
	68	37H	4/2	—	150	99A	(3/2)	mG	170	115H	4/1	GD
	69	38A	(4/2)	T	165	113A	(4/1)	GD	171	116A	(1/3)	mG
	131	81H	3/2	T	166	113H	4/1	T	172	116H	1/3	GD
N. Tatry (C)	5	3A	(3/1)	GD	47	24H	2/2	GD	142	92A	(3/2)	mG
	6	3H	3/1	GD	48	25A	(3/2)	GD	173	117A	(3/2)	GD
	7	4A	(2/2)	mG	49	25H	3/2	GD	174	117H	3/2	mG
	8	4H	2/2	GD	118	68A	(1/2)	aG	177	120A	(3/2)	mG
	27	14A	(3/1)	GD	128	78H	4/2	T	178	120H	3/2	GD
	28	14H	(1/3)	GD	129	79H	3/2	mG	185	125A	(1/2)	sG
	46	24A	(2/2)	mG	141	91H	1/2	aG	186	125H	1/2	sG
Branisko (C	92	55A	(1/2)	sG	93	55H	1/2	aG	139	89H	3/2	T
Velká Fatra (C)	38	20A	(4/2)	T	78	44A	(1/2)	—	130	80H	3/2	GD
	39	20H	4/2	T	79	44H	1/2	sG	140	90H	3/1	mG
	77	43H	1/3	mG	80	45A	(1/2)	mG				
Žiar (C)	106	62A	(2/1)	mG	107	62H	2/1	mG	143	93H	2/2	mG

Continuation of Tab. 4.

Tribeč (C)	1	1A	(4/3)	GD	74	41H	1/2	aG	151	100A	(1/3)	mG
	2	1H	4/3	T	75	42A	(1/2)	mG	176	118H	4/2	T
	73	41A	(1/2)	sG	76	42H	1/2	mG				
Veporides (D)	3	2A	(2/1)	mG	55	28H	4/2	GD	125	75H	4/2	T
	4	2H	2/1	sG	56	29A	(3/2)	GD	126	76H	2/2	mG
	11	6A	(2/1)	mG	57	29H	3/2	mG	127	77H	2/1	mG
	12	6H	2/1	mG	94	56A	(3/2)	mG	132	82A	(4/2)	T
	13	7A	(4/2)	T	95	56H	3/2	GD	133	83A	(4/3)	T
	14	7H	4/2	GD	96	57A	(4/2)	T	134	84A	(2/2)	aG
	17	9H	1/3	GD	97	57H	4/2	T	135	85H	2/2	mG
	18	9A	(1/3)	GD	98	58A	(3/2)	GD	136	86A	(3/2)	GD
	19	10A	(3/2)	mG	99	58H	3/2	GD	137	87H	2/1	mG
	20	10H	3/2	GD	114	66A	(3/1)	mG	145	95A	(2/1)	aG
	36	19H	(2/1)	mG	115	66H	3/1	aG	175	118A	(4/2)	T
	37	19A	2/1	mG	116	67A	(2/2)	mG	179	121A	(4/2)	—
	50	26A	(2/1)	mG	117	67H	2/2	mG	180	121H	4/2	T
	51	26H	2/1	sG	119	69A	(1/2)	aG	181	122A	(1/2)	aG
	52	27A	(1/1)	sG	122	72H	2/2	GD	182	122H	1/2	aG
	53	27H	1/1	sG	123	73H	3/2	GD	183	124A	(1/3)	GD
	54	28A	(4/2)	T	124	74H	3/2	GD	184	124H	1/3	GD
Čierna hora (D)	21	11A	(3/2)	GD	23	12A	(4/2)	T	138	88H	4/2	T
	22	11H	3/2	T	24	12H	4/2	T				
Gemerides (E)	25	13A	—	gtQ	62	33A	(1/2)	mG	66	35H	2/1	sG
	26	13H	—	gtQ	63	33H	1/2	sG	104	61A	(1/2)	aG
	31	16A	(3/1)	mG	64	34H	2/1	mG	105	61H	1/2	sG
	32	16H	3/1	mG	65	34/35A	(2/1)	—	164	112A	(3/1)	sG
Hungary (F)	155	105A	(3/1)	aG	158	107H	3/1	aG	161	110A	(3/1)	sG
	156	106A	(3/1)	aG	159	108A	—	GD	162	110H	3/1	GD
	157	107A	(3/1)	aG	160	109A	(3/1)	mG				

Explanations:
Column 1. — Indication of mountain range — symbol of the wider region.
Column 2. — Order number used at Tab. 1.
Column 3. — Working numbers of ZK sample and denomination whether hand (H) or average (A) specimen from 10 kg of rock average is concerned.
Column 4. — Modal classification of sample.
Column 5. — Classification according to mesonorm.