MINERALOGIA POLONICA

Volume 7 No1 1976

JERZY FIJAŁ, ANDRZEJ JASIŃSKI, WITOLD ŻABIŃSKI

INVESTIGATIONS OF ACID ACTIVATION PRODUCTS MONTMORILLONITE BY NMR AND IR SPECTROSCOPIC METHODS

The acid activation product of montmorillonite was investigated by MRJ and lR absorption spectroscopic methods and compared with untreated montmorillonite and synthetic silica gel. It has been found that the second moment M_2 of the MRJ, line of the montmorillonite activation product is closed to the M_2, value. of silica gel than to M_2 of untreated montmorillonite. The authors presume that this is due, to the partial removal of Al and Mg from the octahedral layer during acid activation and to the binding of some protons bv oxygen atoms coordinated by Si atoms in the form of Si-OH. This results in an increase of the average proton-proton distances and therefore in a decrease in the force of their interactions which is reflected in the M_2 value. The bands ascribed to Si-OH groups (950 and 1420 cm^{-1}) appear in the infrared absorption spectra of activated montmorillonite.

BOŻENA POPIEL, MIECZYSLAW ŻYŁA

SORPTION OF NON-POLAR SUBSTANCES BY TRANSITION METAL CATIONS MODIFIED MONTMORILLONITE

The adsorption investigations of argon, n-hexane and benzene vapours were carried out to find out the influence of exchangeable cations of specific chemical properties (Cr^{3+}, Fe^{3+}, Zn^{2+} Cu^{2+} Co^{2+}, Ni^{2+}, Fe^{2+} and Cd^{2+}) on the sorption capacity of montmorillonite in relation to non-polar substance vapours. The results have shown that saturation of montmorillonite with Cr^{3+} cation increases remarkably the sorption of non-polar substance vapours. The polarizing power of cation determines the sorption capacity of n-hexane vapours. Benzene sorption depends on the kind of cation. Cu^{2+}, Cr^{3+}, Ni^{2+} and Fe^{2+} cations take presumable active part in the formation of benzene-montmorillonite complexes through P -electrons from benzene aromatic rings.

L. GEREI M. REMENYI

TRANSFORMATION OF CLAY MINERALS IN Na-SALT SOLUTIONS

Thc effect of Na_2CO_3 and Na_2S0_4 solutions on the transformation of clay substances has been investigated. It has been found that in the kaolin sample well crystallized aluminium hydroxide forms at the cost of amorphous substances. In the structure of montmorillonite, mixed layers of the hydromica type arise. In the case of clay fraction of soil, an increase in the content of minerals with mixed-layer illite/montmorillonite structures has been noted.

MACIEJ PAWLIKOWSKI

PRELIMINARY MINERALOGICAL CHARACTERISTIC OF KAOLINITIC ROCKS IN WADI SHATTI REGION, LIBYA

This paper deals with preliminary results of mineralogical investigations of samples of mudstones and claystones underlaing Galmoia ore beds. They were collected from five different boreholes and examined using X-ray thermal and microscopic methods. It was found that the samples in question consist of kaolinite, quartz and muscovite. Because of high kaolinitc content in them these rocks can be used in ceramic industry.

PIOTR WYSZOMIRSKI

EXPERIMENTAL STUDIES OF THE TERNARY Fe-Co-S SYSTEM IN THE TEMPERATURE RANGE 500-700°C

The Fe-Co-S system is a part of the five-component Fe-Co-Ni-Cu-S system. Its through study is essential for the interpretation of the conditions of formation of some liquid-magmatic deposits which are important both from the geological and economic point of view. Incomplete solid solution FeS_2-CoS_2 occurs in the Fe-Co-S system. The solubility of CoS_2 in FeS_2 is very limiited (below 2 wt%) whereas that of FeS_2 in CoS_2 is significant incrcasing evidently with temperature (500°C 37 wt% FeS_2, 600°C - 60 wt% FeS_2, 700°C - 75 wt% FeS_2). The solubility of FeS_2. in CoS_2 attains a maximum value (of 80 wt. % at 735 ° C. At this temperature, an invariant reaction also takes place:

py+ct+ V po+L +V.

In contradistinction to this, the solubility of iron sulphide in Co_3S_4 decreases with temperature. With an increase in temperature the solubility of cobalt sulphide in iron monosulphide along the FeS-Co_9S_8 join increases substancially.At 500°C FeS takes 16 wt.% Co_9S_8 in its structure, at 600° C- 30 wt.% , At 700° C - 38 wt.%. On the other hand the solubility of FeS in Co_9S_8 does not change with temperature, amounting to app. 20 wt.% FeS. A precise determination of the phase boundaries in the metal -rich portion of the Fe-Co-S system by means of X-ray microscopic and thermal methods is impossible and requires further investigations.

HENRYK KUCHA, ADAM PIESTRZYŃSKI

MINERALOGICAL AND GEOCHEMICAL STUDY OF SOME SPINELS AND ILMENITES FROM BASIC ROCKS OF NE POLAND

X-ray examinations of magnetites occurring within basic rocks of NE Poland, have shown the presence of ulvospinel, manifested by reflections from 531 and 662 planes. Unit

cell dimension of this mineral was found to be: a=8,418 + ? 0,025. Chemical composition of ilmenites in question is close to stoichiometric one. The main admixtures in them are Mg (1,7 wt%) and Mn (0,6 wt%). Correlation analysis of covariance of indyvidual elements in ilmenites suggests that magnesium replaces iron whilst manganese-titanium.Spinels are usually represented here by minerals of a continuous spinel-hercynite series. Correlation data indicate this series to by connected with magnesioferrite.

MAREK ZAKRZEWSKI

ULLMANNITE FROM NOWA RUDA

Ullmannite has been found among pholerites occurring in the Carboniferous sandstones near Nowa Ruda in the Sudetes. It forms idiomorphic cubic crystals with an edge up to 3 mm. The X-ray data are in agreement with the standard. The parameter a_0 is 5.925 A . The composition of ullmannite is: 27,3% Ni, 56.5% Sb, 1,3% As, 15,1% S.

ANDRZEJ SZYMAŃSKI, JANUSZ M. SZYMANSKI

CALCULATION OF MOHS HARDNESS SCALE OF MINERALS FROM IMPACT ABRASIONHARDNESS

Basing on the abrasion hardness tests of Mohs scale minerals, the authors worked out a formula that permits plotting a corrected curve of dependence of the depth of abrasion with a sand grain on hardness. From the rectilinear dependence the formula was derived which makes it possible to recalculate abrasion hardness to the generally accepted Mohs hardness scale for the materials with continuous structure. The results evidence that impact abrasion hardness can be used to determine Mohs scale hardness of minerals.