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### **SIMPLIFIED NOTATION OF SYMMETRY OPERATIONS**

A new simplified notation of symmetry operations is proposed. Simplified symbols of all point symmetry operations met with in crystallography can be easily traduced into corresponding matrices with aid of the generalized matrix of symmetry operations published in one of former papers. All known point symmetry operations are discussed from the view-point of simplified symbols.

JÓZEF NEDOMA, JADWIGA POBOŻNIAK

### **COEXISTENCE OF SYMMETRY OPERATIONS FROM THE VIEW-POINT OF SIMPLIFIED MATRIX NATION PART I**

Groups of symmetry operations corresponding to simple rotation and inversion axes in terms of simplified matrix symbols are derived.

MIROŚLAW HANDKE, WITOLD ŻABIŃSKI

### **FAR-INFRARED STUDIES OF SOME TETRAHEDRITES AND TENNANTITES**

Fourier transform spectrometer was used to record far-infrared absorption spectra of 3 tetrahedrites and 2 tennantites. Absorption bands in the range of wave numbers 155-170 and 245-265  $\text{cm}^{-1}$  were attributed to vibrations of the Cu sublattices, the bands 300-315 and 323-345  $\text{cm}^{-1}$  to the sublattices of S atoms. The bands corresponding to vibrations of the As and Sb sublattices lie above 350  $\text{cm}^{-1}$ .

HENRYK KUCHA, ADAM PIESTRZYŃSKI, WITOLD SALAMON

### **GEOCHEMICAL AND MNERALOGICAL STUDY OF SULPHIDE MINERALS OCCURRING IN MAGNETITE ROCKS OF NE POLAND**

Pyrrhotite is the main sulphide mineral of the rocks in question. It occurs both as monoclinic  $\text{Fe}_7\text{S}_8$  and as hexagonal variety ranging in composition from  $\text{Fe}_9\text{S}_{10}$  to  $\text{Fe}_{11}\text{S}_{12}$ . Smithite  $(\text{Fe}, \text{Ni})_9\text{S}_{11}$  containing up to 1.2 wt. % Ni was found to occur as exsolution product resulting from oxidation of monoclinic pyrrhotite. Nickel is usually connected with

monoclinic pyrrhotite whilst its hexagonal variety contains very negligible amounts of this element which cannot be detected using electron microprobe method. Pentlandite was found to occur here in two modifications: typical low in cobalt, and abnormal containing much Co. The oxidation of primary cobalt-bearing pentlandite resulted in its decomposition into normal pentlandite and thiospinel. This decomposition was accompanied by exsolution of mackinawite. Sometimes this process continued yielding cobaltic pyrite as final product. With decrease of temperature, pentlandite and (Fe, Ni) (Co, Ni)<sub>2</sub>S<sub>4</sub> are locally formed as decomposition product of monosulphide solid solution rich in Cu, Ni and Co, accompanied by exsolution of talnakhite and pyritic phases. Besides, the samples examined contained ilvaite and graphite formed during substitution of titanomagnetite by graphite-siderite association.

STEFAN ALEXANDROWICZ, BARBARA KWIECIŃSKA

### **AMBER FROM THE UPPER CRETACEOUS DEPOSITS OF SW POLAND**

Abundant small grains and aggregates of amber have been found in the Upper Cretaceous sediments of the North-Sudetic basin. They occur in a thin brown-coal seam within the Santonian coal-bearing formation. Amber was investigated using optical methods and IR absorption spectroscopy. IR spectra have revealed that amber from Bolesławiec is made up of aromatic rings with aliphatic branches consisting of carboxyl, phenol, alcohol and ester groups.

ZENON KŁAPYTA, MIECZYŚLAW ŻYŁA

### **MODIFICATION OF SORPTION PROPERTIES OF Cu-MONTMORILLONITE WITH HEXADECYLPYRIDINIUM CATIONS**

The paper presents the results of studies of sorption properties of Cu-montmorillonite modified with hexadecylpyridinium (HDP) cations. Samples of variable Cu<sup>2+</sup> and HDP<sup>+</sup> content on the exchange positions were obtained. The amount of HDP cations was determined from IR spectra whereas the mode of packing of organic substance in the interlayer spaces of montmorillonite was defined from X-ray diffraction patterns. The sorption properties of samples with respect to water, methyl alcohol, benzene and argon vapour were investigated.

JERZY FIJAŁ

### **THE EFFECT OF FLUORINE IN THE CRYSTAL LATTICE OF MONTMORILLONITE ON ITS SURFACE PROPERTIES**

A correlation was studied between the structure and morphological features of montmorillonite fluoroderivatives and their surface, specifically acid and catalytic, properties. The crystallochemical function of fluorine in the crystal lattice of silicates and its effect on their physico-chemical properties were determined. Fluorine enhances particularly the acid

properties of silicates. Its presence causes disturbances in the crystal field round Si-OH groups, leading to weakening of the bond energy of protons, which facilitates their displacement at elevated temperatures. Consequently, the samples show high activity in the reaction of cumene cracking. It seems most probable that fluorine present in the structure of the acid form of montmorillonite lowers the energy barrier for thermal motion of protons. Due to this, the samples acquire high surface (catalytic) activity at considerably lower temperatures compared with untreated samples.

BARBARA KWIECIŃSKA, GRAŻYNA CICHON

### **SOME REMARKS ON THE MORPHOLOGY OF SEPIOLITE AND PALYGORSKITE FROM RUDNO**

Electron micrographs were taken of sepiolite and palygorskite coexisting in fissures of the melaphyre from Rudno. It has been found that, despite similar structure and genesis, these minerals differ markedly in the morphology of crystallites. Electron micrographs have revealed that sepiolite has a lamellar, platy and lath-like form whereas palygorskite exhibits a fibrous, hair-like structure.

WITOLD ŻABIŃSKI, MIECZYŚLAW ŻYŁA, ANDRZEJ WŁODKOWSKI

### **SORPTION PROPERTIES OF HEULANDITE FROM RUDNO**

Investigations of sorption properties were carried out on a natural zeolite, heulandite, occurring in vacuoles of the melaphyres from Rudno near Cracow. Sorption isotherms for argon, water, methyl alcohol and benzene vapours were determined. It has been found that water and methyl alcohol sorption isotherms are above isotherms for benzene and argon. On the basis of isotherm shape analysis, the dominant pore radius has been defined.

HENRYK KUCHA, TADEUSZ RATAJCZAK, STANISŁAW WITCZAK

### **THE NATURE OF SULPHUR COMPOUNDS IN WELL-ENCRUSTING SEDIMENTS**

The nature of sulphur compounds in well-encrusting sediments was determined using chemical and thermal analyses, X-ray diffractometry, IR spectroscopy, microscopic examinations in reflected light and electron microprobe analysis. The sediments in question have been found to contain iron sulphides, elementary sulphur and presumably also hydrated iron sulphates besides iron oxides, hydroxides and carbonates. The chemical composition of sulphides is similar to that of pyrite,  $\text{Fe}_{0,34} \text{S}_{1,00} \cdot 1,12 \text{H}_2\text{O}$  or troilite,  $\text{Fe}_{0,85} \text{S}_{1,00} \cdot 0,18 \text{H}_2\text{O}$ . The sulphides generally have a collomorphous structure. Sulphate ions are largely adsorbed by iron oxides.