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**Zbornik apstrakata
XVIII Kongres geologa Srbije**



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KRISTALOGRAFSKE KARAKTERISTIKE MINERALA TENARDITA I ANKERITA IZ LIBIJE

Pavle Tančić

Geološki zavod Srbije, Beograd, Srbija

E-mail: pavletan@gmail.com

Ključne reči: tenardit, ankerit, rendgenska difrakcija praha, dimenzije jedinične ćelije, Libija

U okviru saradnje Geološkog zavoda Srbije (bivšeg Geoinstituta, Beograd, Srbija) sa Industrijskim istraživačkim centrom (Tripoli, Libija), u periodu od 2006. do 2010. godine su dobijeni mnogi polimineralni uzorci poreklom iz centralnih i južnih delova Libije čiji je tačan mineraloški sastav bio nepoznat, a koji su bili predviđeni za analizu metodom rendgenske difrakcije.

Metodom rendgenske difrakcije na sprasanim uzorcima utvrđeno je prisustvo brojnih mineralnih vrsta, kao što su: kvarc, gips, anhidrit, kalcit, aragonit, halit, dolomit, celestin, basanit, paligorskit, ankerit, tenardit, fluorit, hematit i getit; kao i raznih mineralnih grupa: gline (ilit, kaolinit, montmorionit), hloriti, liskuni, feldspati, serpentini, zeoliti i amfiboli.

U ovom radu je izvršena detaljnija kristalografska analiza tenardita (Na_2SO_4) i ankerita [$\text{Ca}(\text{Fe}^{2+}, \text{Mg})(\text{CO}_3)_2$], s obzirom na činjenicu da se ovi minerali prilično retko javljaju u prirodi, kao i da ukazuju na mogući način njihovog obrazovanja kao morskih evaporita. Ovi minerali su identifikovani kao dominantni u uzorku 1018/10/1 iz južnog dela Libije (List Wādi Eghei, NF 34-1), zajedno sa sporednim kalcitom, kvarcom i mineralima glina.

Izračunate dimenzije jedinične ćelije tenardita (prostorna grupa Fddd, N° 70): $a_0=9,820(3)$ Å; $b_0=12,312(3)$ Å; $c_0=5,867(1)$ Å; $\alpha=\beta=\gamma=90^\circ$; i $V_0=709,3(2)$ Å³ su u vrlo dobroj saglasnosti sa literaturnim podacima (ICDD-PDF 74-2036: $a_0=9,829$ Å; $b_0=12,302$ Å; $c_0=5,868$ Å; $\alpha=\beta=\gamma=90^\circ$; i $V_0=709,54$ Å³).

Izračunate dimenzije jedinične ćelije ankerita (prostorna grupa R-3, N° 148): $a_0=b_0=4,829(1)$ Å; $c_0=16,121(5)$ Å; $\alpha=\beta=90^\circ$; $\gamma=120^\circ$; i $V_0=325,5(2)$ Å³ su takođe u vrlo dobroj saglasnosti sa literaturnim podacima (ICDD-PDF 84-2066: $a_0=b_0=4,823$ Å; $c_0=16,122$ Å; $\alpha=\beta=90^\circ$; $\gamma=120^\circ$; i $V_0=324,78$ Å³; ICDD-PDF 84-2067: $a_0=b_0=4,831$ Å; $c_0=16,166$ Å; $\alpha=\beta=90^\circ$; $\gamma=120^\circ$; i $V_0=326,77$ Å³). S obzirom na to da je ankerit vrlo sličan dolomitu (prostorna grupa R-3, N° 148; ICDD-PDF 74-1687: $a_0=b_0=4,815$ Å; $c_0=16,119$ Å; $\alpha=\beta=90^\circ$; $\gamma=120^\circ$; i $V_0=323,64$ Å³), znatno veće izračunate dimenzije jedinične ćelije dokazuju da je došlo do značajne (preko 60%) izomorfne zamene manjeg Mg^{2+} jona sa većim Fe^{2+} .

CRYSTALLOGRAPHIC CHARACTERISTICS OF THENARDITE AND ANKERITE MINERALS FROM LIBYA

Pavle Tančić

Geological Survey of Serbia, Belgrade, Serbia

E-mail: pavletan@gmail.com

Key words: thenardite, ankerite, X-ray powder diffraction, unit-cell dimensions, Libya

Within the cooperation of the Geological Survey of Serbia (former Geoinstitute, Belgrade, Serbia) with the Industrial Research Center (Tripoli, Libya), during the period from 2006 to 2010 many polymineral samples were obtained from central and southern parts of Libya whose exact mineral composition was unknown, and which were intended for analysis by X-ray diffraction method.

With the X-ray diffraction method on powdered samples there were determined the presence of numerous mineral kinds, such as: quartz, gypsum, anhydrite, calcite, aragonite, halite, dolomite, celestine, bassanite, palygorskite, ankerite, thenardite, fluorite, hematite and goethite; as well as various mineral groups: clays (illite, kaolinite, montmorillonite), chlorites, micas, feldspars, serpentines, zeolites and amphiboles.

In this paper, a more detailed crystallographic analysis of thenardite (Na_2SO_4) and ankerite [$\text{Ca}(\text{Fe}^{2+}, \text{Mg})(\text{CO}_3)_2$] was performed, given the fact that these minerals are quite rare in nature, as well as to indicate the possible way of their formation as marine evaporites. These minerals were identified as dominant in sample 1018/10/1 from southern Libya (Sheet Wādi Eghei, NF 34-1), along with secondary calcite, quartz, and clay minerals.

Calculated unit-cell dimensions of thenardite (space group $Fddd$, $N^\circ 70$) of: $a_0=9.820(3) \text{ \AA}$; $b_0=12.312(3) \text{ \AA}$; $c_0=5.867(1) \text{ \AA}$; $\alpha=\beta=\gamma=90^\circ$; and $V_0=709.3(2) \text{ \AA}^3$ are in a very good agreement with the reference data (ICDD-PDF 74-2036: $a_0=9.829 \text{ \AA}$; $b_0=12.302 \text{ \AA}$; $c_0=5.868 \text{ \AA}$; $\alpha=\beta=\gamma=90^\circ$; and $V_0=709.54 \text{ \AA}^3$).

Calculated unit-cell dimensions of ankerite (space group $R-3$, $N^\circ 148$) of: $a_0=b_0=4.829(1) \text{ \AA}$; $c_0=16.121(5) \text{ \AA}$; $\alpha=\beta=90^\circ$; $\gamma=120^\circ$; and $V_0=325.5(2) \text{ \AA}^3$ are also in a very good agreement with the reference data (ICDD-PDF 84-2066: $a_0=b_0=4.823 \text{ \AA}$; $c_0=16.122 \text{ \AA}$; $\alpha=\beta=90^\circ$; $\gamma=120^\circ$; and $V_0=324.78 \text{ \AA}^3$; ICDD-PDF 84-2067: $a_0=b_0=4.831 \text{ \AA}$; $c_0=16.166 \text{ \AA}$; $\alpha=\beta=90^\circ$; $\gamma=120^\circ$; and $V_0=326.77 \text{ \AA}^3$). Since ankerite is very similar to dolomite (space group $R-3$, $N^\circ 148$; ICDD-PDF 74-1687: $a_0=b_0=4.815 \text{ \AA}$; $c_0=16.119 \text{ \AA}$; $\alpha=\beta=90^\circ$; $\gamma=120^\circ$; and $V_0=323.64 \text{ \AA}^3$), significantly larger calculated unit-cell dimensions prove that there was a significant (over 60%) isomorphic exchange of smaller Mg^{2+} ion with bigger Fe^{2+} .