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COMPOUNDS IN THE SYSTEM $M^{1+}M^{3+}As_2O_7$ (M^{1+} = Li, Na, K, Rb, Cs, Ag, Tl, NH_4; M^{3+} = Al, Ga, In, Sc, Cr, Fe): NOVEL REPRESENTATIVES AND AN OVERVIEW

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A number of new $M^{1+}M^{3+}As_2O_7$-compounds were synthesized hydrothermally from $M^{1+}{}_2CO_3$, $M^{3+}{}_2O_3$, H_3AsO_4 and H_2O at 220°C (7 d, pH 0.5-2) during an ongoing study of the system M^{1+}-M^{3+}-As-O (M^{1+} = Li, Na, K, Rb, Cs, Ag, Tl, NH_4; M^{3+} = Al, Ga, In, Sc, Cr, Fe). The crystal structures of these diarsenates were solved by single-crystal X-ray diffraction; four of the compounds are representatives of two previously unknown structure types.

Isotypic $TlInAs_2O_7$, $RbInAs_2O_7$, $(NH_4)InAs_2O_7$ all crystallize in $P\bar{1}$ (a = 7.827 / 7.845 / 7.858, b = 8.625 / 8.678 / 8.649, c = 10.494 / 10.492 / 10.515 Å, α = 88.83 / 88.85 / 88.96, β = 89.98 / 89.93 / 89.94, γ = 74.38 / 74.31 / 74.34, V = 682.1 / 687.5 / 688.0 Å^3, Z = 4) and have mixed T-O-framework structures.

$AgScAs_2O_7$ also crystallizes in $P\bar{1}$, but shows a completely different structure (a = 5.485, b = 6.951, c = 8.734 Å, α= 69.13, β = 88.15, γ = 88.14, V = 310.91 Å^3, Z = 2).

Both of these diarsenates represent new structure types, which are also unknown among the well-studied diphosphates or disilicates. Furthermore, there exists a third triclinic structure type within this system, namely $RbAlAs_2O_7$ (BOUGHZALA et al., 1993), but no new representatives of this type have been found so far.

A larger number of compounds in this system form monoclinic structures. $RbScAs_2O_7$ (SCHWENDTNER & KOLITSCH, 2004), $(NH_4)ScAs_2O_7$ (KOLITSCH, 2004) and $TlScAs_2O_7$ ($P2_1/c$, a = 7.809, b = 10.607, c = 8.722 Å, β = 106.29, V = 693.4 Å^3, Z = 4) are representatives of the common $KAlP_2O_7$–type (NG & CALVO, 1973).

$AgGaAs_2O_7$ crystallizes, like the above three diarsenates, in $P2_1/c$ (a = 7.049, b = 8.368, c = 9.735 Å´, β = 108.47, V = 544.65 Å^3, Z = 4) but adopts a different structure type, which was first described by DRISS & JOUINI (1994) for $NaAlAs_2O_7$.

The new compound $LiGaAs_2O_7$ (a = 6.638, b = 8.181, c = 4.696 Å, β = 104.01, V = 247.43 Å^3, Z = 2) is also monoclinic, but crystallizes in the non-centrosymmetric space group $C2$. This substance is isotypic to $LiFeAs_2O_7$ (WANG et al., 1994), and represents a structure type solely known from arsenates thus far.

FT-IR-spectroscopic studies are under way and will be discussed. Further research addressing possible zeolitic behaviour of these substances as well as their thermal stabilities is planned.

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