

substance: CoAsS

property: crystal structure, physical properties

low-temperature modification ($C_{2v}^5 - Pca2_1$): pronounced optical anisotropy [65G, 65K, 69B].

transition temperature

T_{tr}	823 K	sharp endothermal peak on DTA curve	65K
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Samples quenched from ≈ 1100 K are disordered ($T_h^6 - Pa3$) and optically isotropic [65G].

CoAs $_{1-x}$ S $_{1+x}$: $x \leq 0.58$ at 823 K [69B].
 $x \leq 1$ at 1100 K [71M, 74N, 76A].

energy gap for $x = 0.04$ (CoAs $_{0.96}$ S $_{1.04}$)

$E_{g,th}$	0.18 eV	from $\log \rho \propto E_g/2kT$	76A
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semiconductor \rightarrow metal transition at $x \approx 0.06$ (CoAs $_{0.94}$ S $_{1.06}$) [76A].

interatomic distances (in Å)

"CoAsS" (alloy):	Co	– 3As	2.282,	2.308,	2.309	76S
		3S	2.299,	2.309,	2.372	
	As	– S	2.311			

CoAs $_{1+x}$ S $_{1-x}$: $x < 0.05$ (range of existence) [74M].

Co $_{1-x}$ Fe $_x$ AsS: cubic up to $x = 0.47$ [65K].

Co $_{1-x}$ Ni $_x$ AsS: completely miscible, lattice parameter linear in x [65K].

For structure, chemical bond and comparative tables on crystallographic and physical properties of transition metal-V-VI compounds, see documents , , , .

References:

- 65G Giese, Jr., R. F., Kerr, P. F.: Amer. Mineral. 50 (1965) 1002.
- 65K Klemm, D. D.: Neues Jahrb. Mineral. Abhandl., 103 (1965) 205.
- 69B Bayliss, P.: Amer. Mineral. 54 (1969) 426.
- 71M Mikkelsen, J. C., Wold, A.: J. Solid State Chem. 3 (1971) 39.
- 74M Maurel, C., Picot, P.: Bull. Soc. Fr. Mineral. Cristallogr. 97 (1974) 251.
- 74N Nahigian, H., Steger, J., Arnott, R. J., Wold, A.: J. Phys. Chem. Solids 35 (1974) 1349.
- 76A Adachi, K., Togawa, E., Kimura, F.: J. Phys. (Paris) 37 (1976) C429.
- 76S Scott, J. D., Nowacki, W.: Can. Mineralogist 14 (1976) 561.