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## Phosphorus, Sulfur, and Silicon and the Related Elements

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### Regularities of Phosphides Formation on Phosphorus Interaction with Elements

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## REGULARITIES OF PHOSPHIDES FORMATION ON PHOSPHORUS INTERACTION WITH ELEMENTS

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During phosphide synthesis from elements in the evacuated tubes the reaction rate is controlled, as a rule, by the diffusion of element ions through solid phosphide layers. Such a synthesis takes a number of hours. During interaction under combustion regime (1) the reaction region spreads over the powder mixture of metal and phosphorus, the phosphorus evaporates and interacts with the heated metal. Then a liquid phase with composition close to the eutectic is formed, which dissolves metal particles and is simultaneously enriched with phosphorus with heat liberation. The liquid phase provides high reaction rates and the synthesis is finished after some seconds. During interaction in ternary systems, e.g. Ni-Fe, Cu, Mo, Ti, Cr, B-P, Fe-Mo-P, Cu-Zr-P, as a rule, solid solutions or mixtures of binary and ternary phosphides, seldom individual phosphides, are formed. A study of the interaction reactions under combustion regime between the red phosphorus and oxides of some metals (Cu, Fe, Co, Ni) resulting in phosphides and phosphates formation was carried out. In aqueous medium phosphorus interacts with Cu, Ag, Au ions, and those of platinoids. Interaction of copper sulphate with yellow phosphorus aqueous dispersion was studied in detail. As a result of ( $P^0$ ) phosphorus disproportioning copper phosphide  $Cu_3P$  ( $P^{3-}$ ) and ortho-phosphoric acid ( $P^{5+}$ ) are formed.

- (1) V.B.Chernogorenko, S.V.Muchnik, K.A.Lynchak et al.,  
Materials Res. Bull., 16, 1 (1981).