

and if so, into what? From the volume relationships listed in Table IV it becomes apparent that the further decomposition of CdAs into Cd and As is indeed possible and is more favourable than the other probable decomposition reaction of 3 CdAs \rightarrow Cd₃As₂III + As. At this point it is also relevant to note that, although volume relationships indicate possible decomposition reactions at high pressures, they are only indications. For example from Table IV it is apparent that the CdAs₂ \rightarrow Cd + 2 As decomposition reaction is favourable. However, it does not take place as is shown by the present results.

Table IV. Volume relationships of probable high pressure reactions.

High pressure reactions	$\Delta V/V_0$
CdAs ₂ \rightarrow CdAs + As	— 7.2%
CdAs \rightarrow Cd + As	— 8.1%
3 CdAs \rightarrow Cd ₃ As ₂ III + As	— 1.8%
CdAs ₂ \rightarrow Cd + 2 As	— 12.4%
ZnAs ₂ \rightarrow ZnAs + As	— 13.2%
ZnAs \rightarrow Zn + As	— 5.9%
3 ZnAs \rightarrow Zn ₃ As ₂ III + As	— 3.0%
ZnAs ₂ \rightarrow Zn + 2 As	— 16.6%

The volume relationships for ZnAs show the same tendencies, but the melting curve of ZnAs is still rising at 40 kbar. It is therefore possible that the melting curve of ZnAs will first pass through a maximum, and then at even higher pressure ZnAs might also decompose. This suggests that ZnAs might be stable over a longer pressure range than CdAs.

The composition temperature diagrams of Cd-As and Zn-As at high pressure can be expected to undergo many changes. Above ~20 kbar the compounds CdAs₂ and ZnAs₂ must disappear and

the compounds CdAs and ZnAs must appear. The Cd₃As₂-CdAs₂, CdAs₂-As, Zn₃As₂-ZnAs₂ and ZnAs₂-As eutectics also therefore no longer exist and are replaced by the Cd₃As₂-CdAs, CdAs-As, Zn₃As₂-ZnAs and ZnAs-As eutectics. However, if ZnAs and CdAs decompose at still higher pressures, then the composition-temperature diagrams change again and will only contain the compounds Cd₃As₂ and Zn₃As₂.

ZnAs was readily synthesized from mixtures of Zn₃As₂ and As at 40 kbar, 800–1000 °C. However, CdAs could not be synthesized from mixtures of Cd₃As₂ and As under the same pressure, temperature conditions. These problems are related to the shapes of the melting curves of CdAs and ZnAs. The melting curve of ZnAs rises with increasing pressure and this implies that the synthesis temperatures of 800–1000 °C used for ZnAs are only 50–250 °C above the melting temperature of ZnAs at 40 kbar. The maximum in the melting curve of CdAs forces the CdAs to melt at lower temperatures at 40 kbar than ZnAs. Thus at 800 °C, the lowest synthesis temperature used for ZnAs, we are already 200 °C above the melting temperature of CdAs. Phase D was found only 50 °C above the melting temperature of CdAs, and therefore ideally CdAs should be synthesized from Cd₃As₂ and As at ~450 °C at 40 kbar. However, at 40 kbar As and Cd₃As₂ melt at ~1000 °C and ~700 °C respectively, and so would not be molten. This would result in very long reaction time at 40 kbar, which presents problems as far as pressure application is concerned.

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