

Ag – H (Silver – Hydrogen)

Phase diagram

Subramanian et al. [91 Sub] have calculated and discussed results concerning equilibria between Ag and H.

The solubility of H in solid (Ag) expressed by $\log (H/Ag)$, is drawn in Fig. 1 as a function of $1/T$. Two different sets of data arise leading to two straight lines, both, 1 and 2. After discussion of the reliability of the results Subramanian [91 Sub] stated that the results obtained by Thomas [67 Tho] and by McLellan [73 McL] are the most realistic ones.

Solubility of H in liquid Ag has been determined experimentally by Bagshaw et al. [68 Bag]. The results have been used to draw a solubility diagram, which was taken to calculate Fig. 2.

Crystal structure

Lattice parameters of (Ag) solid solution at atmospheric pressure of H have been published by [91 Sub]. From the latter source information was taken for Table 1.

Table 1. Ag-H. Lattice parameter of (Ag) at atmospheric pressure of H.

Temperature [K]	Lattice parameter [nm]
288	0.40851
373	0.40916
413	0.40950

Thermodynamics

By evaluation of solubility data obtained by [68 Bag] enthalpies and entropies of solution of H in liquid Ag have been obtained. The values are, as published by [91 Sub]:

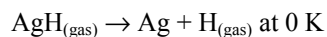
$$\begin{aligned}\Delta H_{\text{H}} &= 76.4 \text{ kJ mol}^{-1} \text{ of H} \\ \Delta S^{\text{ex}} &= -29.5 \text{ J K}^{-1} \text{ mol}^{-1} \text{ of H}\end{aligned}$$

Similarly by evaluation of solubility data obtained by [67 Tho] and [73 McL], enthalpies and entropies of solution have been calculated [91 Sub]. The results are:

$$\begin{aligned}\Delta H_{\text{H}} &= -62.1 \text{ kJ mol}^{-1} \text{ of H} \\ \Delta S^{\text{ex}} &= -48.5 \text{ J K}^{-1} \text{ mol}^{-1} \text{ of H}\end{aligned}$$

AgH

The gaseous hydride AgH forms, if Ag is heated in hydrogen [68 Sei]. The dissociation energy for the reaction



amounts to

$$\Delta H = 221.8 \pm 9.6 \text{ kJ mol}^{-1},$$

as [53 Gay] found.

Figures

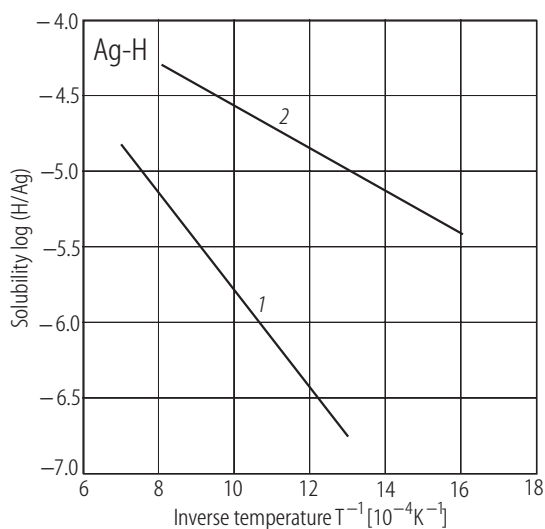


Fig. 1. Ag-H. Solubility diagram (solid state) [91 Sub].

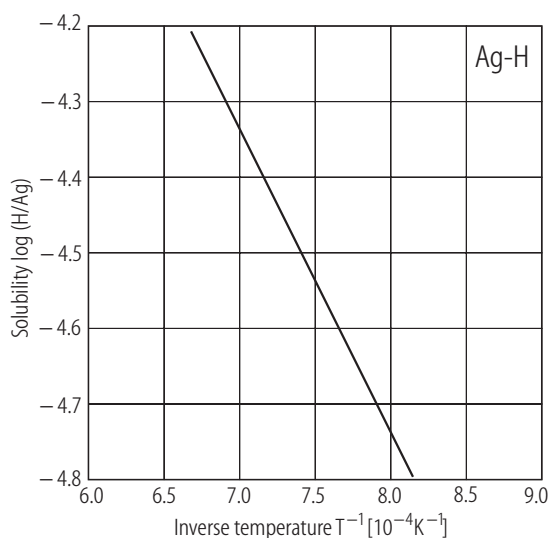


Fig. 2. Ag-H. Solubility diagram (liquid state) [68 Bag].

References

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