

Short Communications

CONTRIBUTION TO THE STUDY OF THE Al–Zn PHASE DIAGRAM

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Calorimetric measurements in the Al–Zn system rule out the existence of an  $\alpha''$ -phase and of a second monotectoid reaction at 340<sup>o</sup>.

Two types of phase diagrams have been published for the Al–Zn system [1]; they differ in the presence or absence of the  $\alpha''$  phase and of two reactions, a monotectoid one at 340<sup>o</sup> and a peritectic one at 443<sup>o</sup> (Fig. 1). For the second monotectoid reaction, two different temperatures are proposed : 275<sup>o</sup> or 236<sup>o</sup> [2]. The  $\alpha$ -phase is face-centred cubic and the  $\beta$ -phase hexagonal compact; the phases  $\alpha'$  and  $\alpha''$  are also fcc and differ in their lattice parameters by as little as 0.001 Å [3]. It is believed that due to this very minor difference the transformation at 340<sup>o</sup> cannot be observed, but many authors still use the diagram presented by Fig. 1 [4].

### Experimental

DSC studies have been carried out on an Al–Zn alloy (60 weight %) prepared from high purity elements. Chemical analysis has given the following: Zn 60 ± 2 %; Fe < 0.005 %; Si < 0.005 %; Cu < 0.001 %. A Du Pont thermal analyser model 990, has been used. Experiments were carried out from room temperature to 400<sup>o</sup> at heating rates between 1 deg/min and 50 deg/min. For slower heating and cooling rates and for isothermal studies at 30<sup>o</sup>, a Tian-Calvet microcalorimeter has been used.

### Results and discussion

Figure 2 shows the heat release which accompanies the isothermal ageing of the alloy homogenised at 400<sup>o</sup>, quenched into iced water and introduced into the microcalorimeter isothermed at 30<sup>o</sup>. A very strong initial heat release characterises the spinodal decomposition of the supersaturated solid solution and is superseded by a second one which rises to a maximum before slowly decaying over several days; the latter

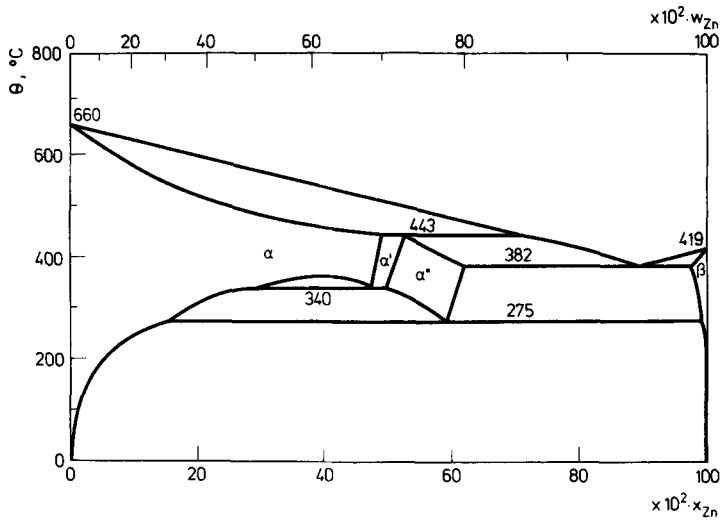


Figure 1 Phase diagram of the system Al-Zn according to [1]

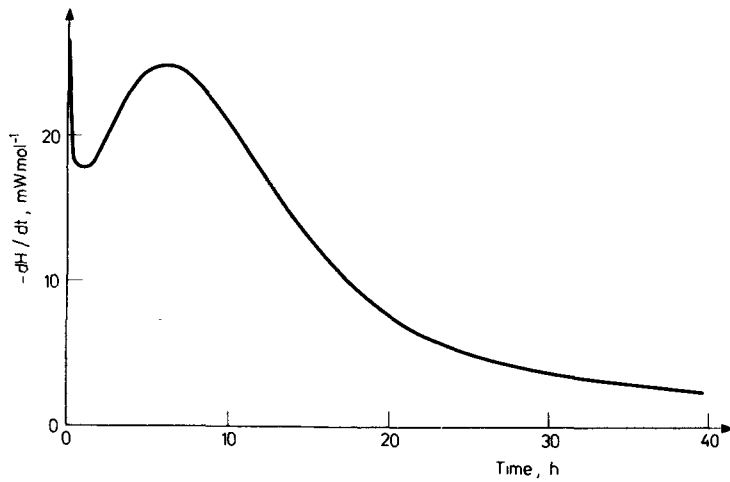


Figure 2 Heat release accompanying the ageing of an Al-60 % Zn alloy at 30°