

-II and Fig 6-D. In the case in hardness with solution strengthening.

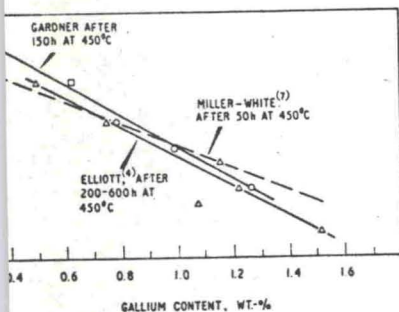
In the as-cast cored condition, however, the lower gallium content alloys contained alpha phase which resulted in higher hardnesses. In addition, alpha phase formation occurred during hardness testing and further increased the apparent hardness over that of the homogenized alloy. The plausibility of alpha phase formation can be examined from the standpoint of the pressures produced during hardness testing and the pressures required for alpha phase formation. King⁽⁸⁾ has reported that in cored Pu-1.0 wt.-% Ga alloy, measurable alpha phase formation occurred when the isostatic pressure applied exceeded 25,000 lb/in². The 32 kg/mm² DPH number for the homogenized Pu 0.37 wt.-% Ga alloy corresponds to a value of 45,000 lb/in². Realizing that an exact comparison cannot be made between this value and the 25,000 lb/in² isostatic pressure, it was nevertheless felt that the pressure imposed during a hardness test was of sufficient magnitude to form alpha phase.

3.3.2 Interestingly then, the following four factors influence a hardness versus gallium composition curve in cored alloys. As gallium content increases.

- a. hardness increases, because of solid solution strengthening,
- b. the amount of alpha phase present in the as-cast condition decreases,
- c. the tendency to form alpha phase upon application of pressure decreases,
- d. the pressure applied during a hardness test increases.

3.3.3 The observed hardness versus composition curve in cored alloys is the resultant of the combined influence of the above factors. It is expected that the hardness curves for as-cast, cored and the homogenized specimens will eventually coincide at the point where alpha formation no longer occurs in the cored area of minimum gallium content.

3.3.4 A comparison of the above data for homogenized alloys with those of Miller and White⁽⁷⁾, and Elliott and Gschneidner⁽⁴⁾ is illustrated in Fig 6-D. The Miller-White and Gardner data



6-C

nt on Lattice Parameter
nt on Density.

Deal ⁽²⁾	After Anneal ⁽²⁾ & Compression ⁽³⁾	
DPH ⁽⁴⁾	Density g/c.c.	% Alpha
32	18.11	62.0
36	17.08	35.0
38	16.40	17.0
40	15.92	4.5
44	15.75	-
46	15.78	1.0

150,000 lb/in²

2 kg load

nt on Density, Hardness