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REDUCED TEMPERATURE FOR HETEROGENEOUS NUCLEATION IN FLUXED MELT SYSTEMS

by

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Recently, a number of authors (1,2) have found experimentally that in fluxed system the absolute crystallization temperature, T_C is proportional to the absolute liquidus temperatures, T_L with a reduced temperature $T_r = \frac{T_C}{T_L} \cong 0.968$. The constancy of T_r has also been reported for other melts (cf' Table 2).

For the fluxed melt systems the observed T_r values have so far been explained qualitatively. In this paper an attempt is being made to explain the constancy of the reduced temperatures for fluxed melt systems by extending the present theory of the specific rate of nucleation in supercooled liquids (3, 4).

Basically, the nucleation of a crystal can occur in two ways involving either only the material being crystallized or involving also some foreign substrate. These are called homogeneous and heterogeneous nucleation respectively.

Taking into account the contributions of surface energy (σ) and the difference between the volume free energy of the liquid and the solid, $\triangle G_v$, a change in the total free energy ($\triangle G$) for homogeneous nucleation may be written by the well known expression.

$$\triangle G = \Sigma \{V \triangle G_v + \Sigma_i A_i \sigma_i\} \quad (1)$$

all centres

where V is the volume of the nucleus which has faces of area A_i . The volume free

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