orbit interaction and thereby induce spin-flip scattering. The measured cross sections are of the same magnitude as the cross section for Zn in Li[6] as might be expected qualitatively since it is the local change in spin-orbit interaction which causes the scattering. The "spin-orbit hole" effect will be considered in more quantitative detail in a subsequent publication.[7]

Using the above cross section for Si impurities, the experimental results of Fig. 1 for the residual linewidth ($\Delta H_R/C = 72$ G/% Si), $v_F = 1.56 \times 10^8$ cm/sec, and $\rho_S = 0.16$ states/eV atom in Eq. (9) we obtain $V_{dk}^2 = 1.1$ eV^2 implying a level width of 0.6 eV. The latter value is in good agreement with other somewhat less direct measurements of the virtual level width[8] for $3d$ impurities in metals. A similar calculation using the data for Al impurities leads to the same values for V_{dk}^2 and the virtual level width.

We conclude that the spin resonance provides detailed evidence of the extended nature of the magnetic impurity wave functions in the metal and allows a straightforward determination of the s-d admixture $V_{dk} \simeq 1$ eV.

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NOTE ON THE ORIGIN OF SOLVENT KNIGHT SHIFTS IN ALLOYS*

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It is shown that the good agreement between theory and experiment which Watson, Bennett, and Freeman claim in a recent paper on the origin of solvent Knight shifts in alloys does not exist and that consequently one cannot conclude that their results per se point to deficiencies in other methods of evaluating Knight shifts.

Watson, Bennett, and Freeman[1] (WBF) have recently utilized a theory proposed by Townes, Herring, and Knight[2] to obtain estimates of the relative Knight shifts in dilute nonmagnetic alloys. They claim (1) that a proper evaluation of the Fermi contact term, P_F, employing orthogonalized plane waves[2-4] leads to a vast improvement on previous estimates, and (2) that estimates of Knight shifts based on the Friedel oscillations alone[5,6] are significantly in error. The purpose of this note is to point out that the good agreement between theory and experiment which was claimed does not exist, and that consequently they do not have a firm basis on which to conclude that the model invoking only screening effects is deficient in the evaluation of Knight shifts.

WBF give the following prescription for the ratio of the Knight shift, $K + \Delta K$, in an alloy and that, K, in the solvent:

$$\frac{K+\Delta K}{K} = \frac{\gamma_A}{\gamma_S} P_F,$$

where γ_A and γ_S are the specific heats in the alloy and in the pure solvent, respectively, and ΔK is the change in the solvent Knight shift on alloying. If we adopt their values of P_F and the values of γ_A/γ_S[7] from Ref. 11 of their paper, we obtain the points shown in Fig. 1. Clearly, these points cannot be related in any possible way to the theory curve they present, where the deviation from experiment has somehow been reduced by a factor of 3 or more. We also find that for the whole range of alloys considered by Rowland[8] and by Odle and Flynn[9] the agreement between experiment and estimates employing WBF's scheme with γ_A/γ_S obtained from the literature[10]

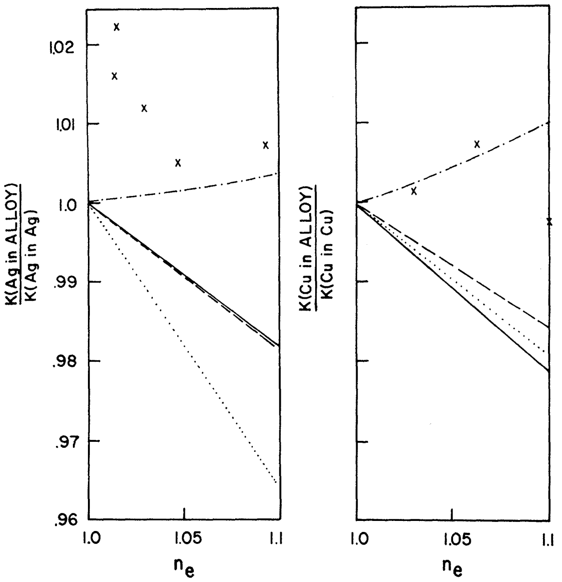

FIG. 1. Plot of $(K+\Delta K/K)$ vs n_c, the electron-to-atom ratio, for Ag in Ag-Cd and for Cu in liquid Cu-Zn. The dotted lines represent experimental data (Refs. 8 and 9). The dashed line is the theory curve quoted by WBF. The crosses denote present estimates employing WBF's parameters. The dot-dashed line represents estimates employing WBF's P_F and specific heats of the free-electron theory. The solid line is a plot of results for a model (Ref. 6) based on screening effects.

or from free-electron theory is very poor in comparison with that obtained in previous work.[6]

It is quite true that the WBF model, in spite of its limitations,[4,11-14] is more elaborate and appears, on the face of it, to contain more physics than a model invoking only impurity screening. However, judging from the unmatched success of the latter,[6] and remembering that we are interested here in the relative change in Knight shifts on alloying rather than in an absolute value, it is quite possible that (as Odle and Flynn[8] also suggest) the dominant feature in more sophisticated and comprehensive approaches to the Knight-shift problem may prove to be simply the screening field. A full-scale treatment assessing properly the relative scope and utility of the two schemes needs to be done, however, for a definite answer. It is regrettable, though, that a numerical error has led WBF to the erroneous conclusion that "The rigid-band model···predicts the correct sign and magnitude for changes in Knight shifts···," and to the implication that a rigid-band scheme can adequately deal with these effects.

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