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THE COLLISIONAL ENERGY TRANSFER PROBLEM AS STUDIED USING IODINE AND BROMINE.
KIT BOWEN, JR., Box 6513, University, Mississippi, 38677

A literature search was conducted to determine the current state of knowledge concerning molecular collisions. For purposes of presentation, the search was narrowed to collisional energy transfer information contributed by work with iodine and bromine. Among the methods of characterizing the transfer of energy between molecules is to study the ability of chemically inert species to influence the rate of unimolecular reactions under specified conditions. A, perhaps, more useful method, which is a special case of the above, concerns the influence of inert gases on the recombination of iodine and bromine molecules. A brief discussion of the theoretical treatment given such studies by various investigators is included.

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SEMI-EMPIRICAL MOLECULAR ORBITAL CALCULATIONS OF Cu(II) Chlorides
~~Wroten McQuirter~~, Albert W. Schlueter, Tougaloo College, Tougaloo, Miss.
and R. A. Jacobson, Dept. of Chem., Iowa State University, Ames, Iowa,
tooio.

Semi-empirical molecular orbital calculations were carried out on CuCl_4^{2-} , CuCl_5^{3-} , and $\text{Cu}_2\text{Cl}_6^{4-}$ complexes. Good agreement with the observed spectra was found. A program was written to calculate the eigenvalues and eigenvector coefficients from which the allowed transitions were determined. The experimental parameters (f factors) were adjusted to fit the observed spectrum of CuCl_4^{2-} , a square planar complex. The following calculated values, in parentheses observed values, were found for $F_6=1.77$, $F_7=2.00$: 52,520 (51,000), 38,360 (41,500), 28,100 (29,500), 25,380 (25,100) (24,500). Other copper complexes were considered while the f factors remained at the above values. It was found that the calculated spectra were in excellent agreement with the observed spectra. It was further found if the $4d$ orbitals were included in the basis set that the $d-d$ transitions were in fairly good agreement.

8 SYNTHESIS OF Fe^{55} -LABELLED FERROCENE FOR USE IN ORBITAL ELECTRON CAPTURE RATIO MEASUREMENTS*, Ronald P. Colle and R. W. Fink, School of Chemistry, Georgia Institute of Technology, Atlanta, Georgia, 30332.

Iron-55 labelled ferrocene (bis-cyclopentadienyliron(II)) was synthesized for measurements of the M/L orbital electron capture ratio in the radioactive decay of Fe^{55} . Several previous methods were evaluated with respect to the subsequent use of the sample as a vaporous source in a multiwire proportional counter [cf. Scobie, Moler, and Fink, Phys. Rev. 116, 657 (1959)]. The method chosen consisted of using anhydrous FeCl_3 as the limiting reagent and reacting it with sodium cyclopentadienide in tetrahydrofuran. After removal of the solvent by evaporation under reduced pressure, the ferrocene was removed from the reaction mixture and collected by sublimation. The labelled ferrous chloride was obtained by adding Fe^{55} activity (as FeCl_3 in HCl) to electrolytic iron powder and reacting the mixture with HCl. After removal of the water, the salt was dehydrated to anhydrous FeCl_3 by heating in vacuo. This method permitted the preparation of ferrocene with specific activities in the range of 2.5 $\mu\text{C}/\text{mg}$. The entire synthesis was conducted in a water and air-free atmosphere and was effected without having to separate and transfer reactants. The sample was contained in a completely inert atmosphere from initial synthesis to final filling of the counter. Prior work on M/L orbital electron capture ratios has been summarized by Renier, et al. [Phys. Rev. 166, 925 (1968)] and by Fink [Phys. Rev. in press (1969)].

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SYNTHESIS OF Fe⁵⁵- LABELLED FERROCENE
FOR USE IN
ORBITAL ELECTRON CAPTURE RATIO MEASUREMENTS*

Ronald P. Colle** and R. W. Fink

School of Chemistry, Nuclear Research Center
Georgia Institute of Technology, Atlanta, Georgia 30332

ABSTRACT

Iron-55 labelled ferrocene (bis-cyclopentadienyliron(II)) was synthesized for measurements of the M/L orbital electron capture ratio in the radioactive decay of Fe⁵⁵. Several previous methods were evaluated with respect to the subsequent use of the sample as a vaporous source in a multiwire proportional counter(cf. Scobie, Moler, and Fink, Phys. Rev. 116, 657 (1959)). The method chosen consisted of using anhydrous labelled FeCl₂ as the limiting reagent and reacting it with sodium cyclopentadienide in tetrahydrofuran. After removal of the solvent by evaporation under reduced pressure, the ferrocene was removed from the reaction mixture and collected by sublimation. The labelled ferrous chloride was obtained by adding Fe⁵⁵ activity (as FeCl₃ in HCl) to electrolytic iron powder and reacting the mixture with HCl. After removal of the water, the salt was dehydrated to anhydrous FeCl₂ by heating in vacuo. This method permitted preparation of ferrocene with specific activities in the range of 2.5 μ C/mg. The entire synthesis was conducted in a water- and air-free atmosphere and was effected without having to separate and transfer reactants. The sample was contained in a completely inert atmosphere from initial synthesis to final filling of the counter. Prior work on M/L orbital electron capture ratios has been summarized by Renier, et. al. (Phys. Rev. 166, 935(1968)) and by Fink (Phys. Rev. in press (1969)).

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**Speaker