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During the last fifteen years there have been an increasing number of studies concerned with the magnetic properties of atoms and molecules. The magnetic properties of atoms and molecules should provide a foundation upon which a theoretical treatment of the magnetic properties of solids can be built, because such a treatment requires an adequate description of the atomic and molecular magnetic properties. The present volume is intended to provide an extensive, but not a complete, review for chemists of our knowledge as of 1960 of this rapidly developing field. Although the lack of an established and developed theoretical framework would appear to doom such an undertaking to a catalogue of isolated facts, it is shown that a relatively simple set of physical ideas do emerge from present theory to unify a great diversity of experimental findings into a coherent unit. Heisenberg's 1928 formulation of a many-body exchange Hamiltonian for the coupling energy of a system of atomic spins has served as a great divide for theoretical studies. On the one hand, the expression has been accepted and effectively used to interpret the varieties of magnetic order that have been encountered experimentally; on the other it has inspired many attempts at justification from the first principles of quantum mechanics. Immediate contact was made between the Heisenberg expression and the classical molecular field formalism for ferromagnetism introduced by Weiss in 1907, a formalism that was generalized in 1948 by Néel to two-sublattice structures to provide an interpretation of antiferromagnetism and ferrimagnetism. Further generalization to six independent sublattices was made in 1952 by Yafet and Kittel, who first introduced the possibility of noncollinear spin configurations. However, it was not until 1960 that Lyons and Kaplan showed how the many-body problem can, in many instances, be rigorously treated to give the true ground state of a system of  $10^{23}$  spins. It is now possible to