importance are collected in Table 26. When several states of the same kind result their number is given in parentheses after the term symbol. The number of Σ states that arise is always odd. There is always one Σ state (with $M_{L_1} = 0$, $M_{L_2} = 0$) in addition to pairs of Σ^+ and Σ^- states similar to that discussed above for $P + P$. The symmetry of this single Σ state cannot be obtained by elementary means. According to Wigner and Witmer it is Σ^+ when $L_1 + L_2 + \Sigma l_{i_1} + \Sigma l_{i_2}$ is even and it is Σ^- when this sum is odd. It will be remembered that Σl_i determines the *parity*, even or odd, of an atomic state. Thus the symmetry of the Σ state in question depends on the L values as well as the parities of the atomic states from which it results. It is for this reason that the parities are indicated by subscripts g and u in Table 26.

TABLE 26. MOLECULAR ELECTRONIC STATES RESULTING FROM GIVEN STATES OF THE SEPARATED (UNLIKE) ATOMS

[According to Wigner and Witmer (712); see also similar tables in Mulliken (514).]

States of the Separated Atoms	Molecular States
$S_g + S_g$ or $S_u + S_u$	Σ^+
$S_g + S_u$	Σ^-
$S_g + P_g$ or $S_u + P_u$	Σ^-, Π
$S_g + P_u$ or $S_u + P_g$	Σ^+, Π
$S_g + D_g$ or $S_u + D_u$	Σ^+, Π, Δ
$S_g + D_u$ or $S_u + D_g$	Σ^-, Π, Δ
$S_g + F_g$ or $S_u + F_u$	Σ^-, Π, Δ, Φ
$S_g + F_u$ or $S_u + F_g$	Σ^+, Π, Δ, Φ
$P_g + P_g$ or $P_u + P_u$	$\Sigma^+(2)$, Σ^-, $\Pi(2)$, Δ
$P_g + P_u$	Σ^+, $\Sigma^-(2)$, $\Pi(2)$, Δ
$P_g + D_g$ or $P_u + D_u$	Σ^+, $\Sigma^-(2)$, $\Pi(3)$, $\Delta(2)$, Φ
$P_g + D_u$ or $P_u + D_g$	$\Sigma^+(2)$, Σ^-, $\Pi(3)$, $\Delta(2)$, Φ
$P_g + F_g$ or $P_u + F_u$	$\Sigma^+(2)$, Σ^-, $\Pi(3)$, $\Delta(3)$, $\Phi(2)$, Γ
$P_g + F_u$ or $P_u + F_g$	Σ^+, $\Sigma^-(2)$, $\Pi(3)$, $\Delta(3)$, $\Phi(2)$, Γ
$D_g + D_g$ or $D_u + D_u$	$\Sigma^+(3)$, $\Sigma^-(2)$, $\Pi(4)$, $\Delta(3)$, $\Phi(2)$, Γ
$D_g + D_u$	$\Sigma^+(2)$, $\Sigma^-(3)$, $\Pi(4)$, $\Delta(3)$, $\Phi(2)$, Γ
$D_g + F_g$ or $D_u + F_u$	$\Sigma^+(2)$, $\Sigma^-(3)$, $\Pi(5)$, $\Delta(4)$, $\Phi(3)$, $\Gamma(2)$, H
$D_g + F_u$ or $D_u + F_g$	$\Sigma^+(3)$, $\Sigma^-(2)$, $\Pi(5)$, $\Delta(4)$, $\Phi(3)$, $\Gamma(2)$, H

We have yet to determine the *multiplicity* of the resulting molecular states. Let us assume that the coupling of the L_i to the field between the nuclei is strong compared to the coupling between L_i and S_i. Then, since the spin is not influenced by an electric field, the two spin vectors S_1 and S_2 of the separated atoms add together forming a resultant S, the resultant spin vector of the molecule. For the corresponding quantum number S we have (see p. 25)

$$S = (S_1 + S_2),\ (S_1 + S_2 - 1),\ (S_1 + S_2 - 2),\ \cdots,\ |S_1 - S_2|. \quad \text{(VI, 2)}$$

For a given orientation of the L_i, each of the values of S in (VI, 2) is possible; that is, *each of the states given in Table 26 can occur with each of the multiplicities*