displacements of the Y nuclei are in the direction XY, is the condition of constant (zero) moment of momentum fulfilled. The magnitude s_Y of the displacements of the Y nuclei is obtained from the condition that the component of the total linear momentum perpendicular to the plane $\sigma_v(yz)$ is zero; that is, since the velocities are proportional to the amplitudes of the displacements, $2m_Y s_Y \sin\alpha = m_X s_X$, where α is half the angle at the top of the triangle formed by the molecule, s_X is the displacement of the X nucleus and m_X and m_Y are the masses of X and Y. Thus the form

TABLE 35. NUMBER OF VIBRATIONS OF EACH SPECIES FOR THE POINT GROUPS HAVING NON-DEGENERATE VIBRATIONS ONLY.

Point group, total number of atoms	Species of vibration	Explained in Table	Number of vibrations[30]
$\mathbf{C_2}$ $(N=2m+m_0)$	A	12	$3m+m_0-2$
	B		$3m+2m_0-4$
$\mathbf{C_s\equiv C_{1h}}$ $(N=2m+m_0)$	A'	12	$3m+2m_0-3$
	A''		$3m+m_0-3$
$\mathbf{C_i\equiv S_2}$ $(N=2m+m_0)$	A_g	12	$3m-3$
	A_u		$3m+3m_0-3$
$\mathbf{C_{2v}}$ $(N=4m+2m_{xz}+2m_{yz}+m_0)$	A_1	13	$3m+2m_{xz}+2m_{yz}+m_0-1$
	A_2		$3m+m_{xz}+m_{yz}-1$
	B_1		$3m+2m_{xz}+m_{yz}+m_0-2$
	B_2		$3m+m_{xz}+2m_{yz}+m_0-2$
$\mathbf{C_{2h}}$ $(N=4m+2m_h+2m_2+m_0)$	A_g	13	$3m+2m_h+m_2-1$
	A_u		$3m+m_h+m_2+m_0-1$
	B_g		$3m+m_h+2m_2-2$
	B_u		$3m+2m_h+2m_2+2m_0-2$
$\mathbf{D_2\equiv V}$ $(N=4m+2m_{2x}+2m_{2y}+2m_{2z}+m_0)$	A	13	$3m+m_{2x}+m_{2y}+m_{2z}$
	B_1		$3m+2m_{2x}+2m_{2y}+m_{2z}+m_0-2$
	B_2		$3m+2m_{2x}+m_{2y}+2m_{2z}+m_0-2$
	B_3		$3m+m_{2x}+2m_{2y}+2m_{2z}+m_0-2$
$\mathbf{D_{2h}\equiv V_h}$ $(N=8m+4m_{xy}+4m_{xz}+4m_{yz}+2m_{2x}+2m_{2y}+2m_{2z}+m_0)$	A_g	14	$3m+2m_{xy}+2m_{xz}+2m_{yz}+m_{2x}+m_{2y}+m_{2z}$
	A_u		$3m+m_{xy}+m_{xz}+m_{yz}$
	B_{1g}		$3m+2m_{xy}+m_{xz}+m_{yz}+m_{2x}+m_{2y}-1$
	B_{1u}		$3m+m_{xy}+2m_{xz}+2m_{yz}+m_{2x}+m_{2y}+m_{2z}+m_0-1$
	B_{2g}		$3m+m_{xy}+2m_{xz}+m_{yz}+m_{2x}+m_{2z}-1$
	B_{2u}		$3m+2m_{xy}+m_{xz}+2m_{yz}+m_{2x}+m_{2y}+m_{2z}+m_0-1$
	B_{3g}		$3m+m_{xy}+m_{xz}+2m_{yz}+m_{2y}+m_{2z}-1$
	B_{3u}		$3m+2m_{xy}+2m_{xz}+m_{yz}+m_{2x}+m_{2y}+m_{2z}+m_0-1$

[30] m is always the number of sets of equivalent nuclei not on any element of symmetry; m_0 is the number of nuclei lying on all symmetry elements present; m_{xy}, m_{xz}, m_{yz} are the numbers of sets of nuclei lying on the xy, xz, yz plane respectively but not on any axes going through these planes; m_2 is the number of sets of nuclei on a two-fold axis but not at the point of intersection with another element of symmetry; m_{2x}, m_{2y}, m_{2z} are the numbers of sets of nuclei lying on the x, y, or z axis if they are two-fold axes, but not on all of them; m_h is the number of sets of nuclei on a plane σ_h but not on the axis perpendicular to this plane.