

tion or breakdown determines the degree of resistance¹⁻¹⁶. Thus it appears that the increase in phenolics in the infected tissue possibly offers resistance in response to pathogen.

Further studies are needed to understand the metabolic alterations owing to host-fungus interaction.

11 September 1986; Revised 29 December 1986

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CORIOLIS COUPLING CONSTANTS AND CENTRIFUGAL DISTORTION CONSTANTS OF SELENYL HALIDES

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SELENYL halides (SeOF_2 , SeOCl_2 , SeOBr_2) are of XYZ_2 type molecule (pyramidal) belonging to C_3 point group, with the frequency distribution $\Gamma = 4A' + 2A''$. The Raman spectra of these halides have been investigated¹. Using a general quadratic valence force field, the potential constants and the other molecular constants such as compliance constants² and vibrational mean amplitudes have been reported earlier^{3,4}. The present investigation is aimed at a fresh evaluation of the coriolis coupling constants and the centrifugal distortion constants to study the trends of these values.

The coriolis coupling constants ζ^α ($\alpha = x, y, z$) in pyramidal XYZ_2 type of molecules arise from the following couplings.

- (i) $A' \times A''$ with respect to x and z axes.
- (ii) $A' \times A'$ and $A'' \times A''$ with respect to y axis.

The coriolis matrix elements C_{ij}^α ($\alpha = x, y, z$) for pyramidal XYZ_2 molecules are obtained according to the vector method of Meal and Polo⁵. From the C_{ij}^α elements, the coriolis coupling constants can be evaluated using the relation,

$$\zeta_{ij}^\alpha = (L^{-1}) C_{ij}^\alpha (L^{-1})',$$

where L is the normal co-ordinate transformation matrix. The theory of centrifugal distortion constants has been reformulated by Cyvin *et al*⁶ by introducing the elements $T_{\alpha\beta,\gamma}$ instead of partial derivatives of the inertiatensor components $J_{\alpha\beta,\gamma}$ ^{7,8}. The non-vanishing C^α and the T_γ matrix elements have been reported recently⁹. The quantities $t_{\alpha\beta\gamma\delta}$ have been obtained using Cyvin's relation. From a knowledge of the moments of inertia of the molecule, $\tau_{\alpha\beta\gamma\delta}$ elements and hence D_J , D_K , D_{JK} etc have been evaluated.

The coriolis coupling constants of the molecules are presented in table 1. The following observations were made from the values in the $A' \times A'$ coupling. ζ_{13}^x and ζ_{14}^x are negative for all the halides. ζ_{14}^x is significant indicating a strong coupling between the species concerned. It shows an increasing trend with decreasing electronegativity. On the other hand, ζ_{16}^x ($A'' \times A''$) exhibits a decreasing trend. In the $A' \times A''$ coupling, ζ_{15}^x , ζ_{15}^y , ζ_{16}^x , ζ_{15}^z and ζ_{16}^z are negative for all

Table 1 Coriolis coupling coefficients

Molecule	Coupling $A' \times A''$			Coupling $A' \times A'$			Coupling $A'' \times A''$
	$-\zeta_{15}^x$ ζ_{25}^x	ζ_{16}^x $-\zeta_{26}^x$	$-\zeta_{15}^z$ $-\zeta_{25}^z$	ζ_{16}^z $-\zeta_{26}^z$	ζ_{12}^y $-\zeta_{13}^y$	$-\zeta_{23}^y$ ζ_{24}^y	ζ_{56}^y
	$-\zeta_{35}^x$ ζ_{45}^x	$-\zeta_{36}^x$ $-\zeta_{46}^x$	ζ_{35}^z ζ_{45}^z	$-\zeta_{36}^z$ ζ_{46}^z	ζ_{14}^y	$-\zeta_{34}^y$	
SeOF ₂	0.1123 0.7896 0.0896 0.5334	0.4831 0.3832 0.1297 0.6412	0.1433 0.5830 0.0543 0.3422	0.6731 0.5315 0.9786 0.1213	0.1671 0.1619 0.7881	0.2543 0.4995 0.4826	0.3720
SeOCl ₂	0.1614 0.5514 0.4728 0.5462	0.6179 -0.5329 0.1966 0.7965	0.1694 0.4615 0.3702 0.2502	0.7012 0.9757 0.8079 0.2214	0.0903 0.2655 0.9054	0.0094 0.1796 0.5179	0.2151
SeOBr ₂	0.2037 0.7467 0.2517 0.5138	0.6415 0.1985 -0.0472 0.4930	0.2141 0.5236 0.1905 0.2334	0.7199 0.6994 0.6302 0.2093	0.2385 0.2351 0.9240	0.5428 0.3289 0.3182	0.0720

Table 2 Centrifugal distortion constants (k Hz)

Molecule	D_J	$-D_{JK}$	$-R_6$
	D_k	$-R_5$	$-\delta_J$
SeOF ₂	5.0026 11.2476	10.3375 3.0227	0.7538 2.8243
SeOCl ₂	2.0054 33.2035	-0.2635 2.8909	0.4138 0.4343
SeOBr ₂	10.3526 51.8746	31.0463 10.0080	2.5484 6.3686

the cases studied here. ζ_{25}^x and ζ_{25}^z show strong coupling between species concerned. It is interesting to note that ζ_{45}^x , ζ_{46}^x , ζ_{45}^z and ζ_{46}^z assume almost equal values in selenyl halides. The centrifugal distortion constants are given in table 2. The values appear to be reasonable. R_5 , R_6 and δ_J assume negative values for all the case while D_{JK} is either negative or very small as observed from the table. Since there are no experimental values available, a comparison is not possible both for coriolis and centrifugal distortion constants.

7 January 1987

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EDAX MINERAL ASSAY OF CROSS-BRED BULL'S SEMEN

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MACRO-micro mineral elements are associated with metabolic pathways of spermatozoa and influence semen quality and freezability. The present study was conducted to know the mineral contents in