

Term	Value (Author)				Value (Racah's)			
⁴ I	= 3F ₀ -	65F ₂ -	141F ₄ -	221F ₆	3F ₀ -	65F ₂ -	141F ₄ -	221F ₆
⁴ G	3F ₀ -	10F ₂ -	75F ₄ -	1222F ₆	3F ₀ -	10F ₂ -	75F ₄ -	1222F ₆
⁴ F	3F ₀ -	30F ₂ -	99F ₄ -	858F ₆	3F ₀ -	30F ₂ -	99F ₄ -	858F ₆
⁴ D	3F ₀ +	$\frac{25}{225}F_2 -$	$(42 - \frac{9}{1089})F_4 -$	$(2060 - \frac{1}{7361})F_6$	3F ₀ +	25F ₂ -	33F ₄ -	1859F ₆
⁴ S	3F ₀ -	30F ₂ -	99F ₄ -	658F ₆	3F ₀ -	30F ₂ -	99F ₄ -	858F ₆
² L	3F ₀ -	$(25 - \frac{25}{225})F_2 -$	$(72 - \frac{9}{1089})F_4 -$	$(19 - \frac{1}{7361})F_6$	3F ₀	-	63F ₄ -	18F ₆
² K	3F ₀ -	40F ₂ +	F ₄ -	38F ₆	3F ₀ -	40F ₂ +	F ₄ +	38F ₆
² I	3F ₀ -	5F ₂ -	6F ₄ -	305F ₆	3F ₀ -	5F ₂ -	6F ₄ -	305F ₆
(² H)	3F ₀ -	23F ₂ -	46.5F ₄ -	136F ₆	3F ₀ -	23F ₂ -	46.5F ₄ -	136F ₆
(² G)	3F ₀ +	7F ₂ +	24.5F ₄ -	620F ₆	3F ₀ +	7F ₂ +	24.5F ₄ -	620F ₆
(² F)	3F ₀ +	$(30 + \frac{25}{225})F_2 +$	$(46.5 + \frac{9}{1089})F_4 +$	$(51 - \frac{1}{7361})F_6$	3F ₀ +	55F ₂ -	55.5F ₄ -	52F ₆
(² D)	3F ₀ -	5.5F ₂ -	27F ₄ +	29.5F ₆	3F ₀ -	7F ₂ -	31.5F ₄ -	130F ₆
² P	3F ₀ -	25F ₂ -	44F ₄ +	143F ₆	3F ₀ -	25F ₂ -	44F ₄ +	143F ₆

(Fractions like $\frac{9}{1089}$, etc., can be neglected without practically any effect on the values)

⁴D and ⁴S.—The values given by Racah indicate that ⁴F and ⁴S have equal energies which is not possible, for, then they are indistinguishable. Theoretically ⁴S with the lesser *l* value should lie higher than ⁴F : a feature which is clearly maintained in our values. The difference is 200 F₆.

The case of ⁴D cannot be demonstrated so easily. But the values obtained by us are believed to be correct. Among the other doublets, while the values for ²G and ²P agree, those for ²F and ²D do not agree. Our method of calculation being by successive steps, if ²G and ²P are correct then the correctness of the values of ²F and ²D may be presumed to be correct (the latter being derived from ²G and ²P from ²D values). The author suggests that Racah's values might be redetermined to detect errors, and discrepancies if any between the values derived from the two independent methods of calculation.

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*Details of the method are given in Slater's paper (1929).

1. Condon, *Phy. Rev.*, 1930, 36, 1121. 2. Condon and Shortley, *Ibid.*, 1931, 37, 1025. 3. Racah, *ibid.*, 1943, 62, 438. 4. Slater, *Ibid.*, 1929, 34, 1293.

DIPOLE MOMENTS OF RESONANCE STRUCTURES AND THE ULTRAVIOLET ABSORPTION MAXIMA OF ANTHRACENE

IN approximately linear molecules, such as the polyenes, the polyphenyls and the cyanines, the large polarizability responsible for colour in the visible region is along one axis, and the major or *x*-axis will be more or less along the line of maximum extension; but in malachite green and other compounds in which the conjugated system extends in two dimensions, Lewis and Calvin have shown that we are no longer dealing with even approximately linear oscillators.¹ Two fundamental bands corresponding to the two axes of oscillation can sometimes be identified (*x* and *y* bands). When a planar molecule does not possess a centre of symmetry, *x* and *y* bands are to be anticipated, but the location of the *y* band in the spectrum may be difficult because of a great difference in the intensities of the two bands, if the polarizability or electron mobility in one direction is much larger than in the other. In the case of a few relatively simple and approximately linear molecules (*p*-azoxy-anisole,² diphenyloctatetræne and diphenyldodecahexæne³) for which X-ray data have indicated the relative position of the atoms in the crystals and hence the direction of the axis of the molecule, it has been found by examining the absorption of polarized light that the absorption is at a maximum when the electric vector of the polarized light is roughly along the axis of the molecule.