

acids in carbon tetrachloride solution. Because the effect of electron withdrawing substituents on ν is so pronounced⁸ small changes in ν may not be due wholly to hydrogen bonding. Furthermore, the results shown in Fig. 1 indicate that the type of acid (aromatic, dibasic, α -oxy ●) may also affect ν . Thus, although hexuronic acids in polyuronides all show slightly higher frequencies than would be expected from their measured pK_a values, factors other than the presence of $\text{CO}_2 \dots \text{HO}$ hydrogen bonds could account for the observed frequencies.

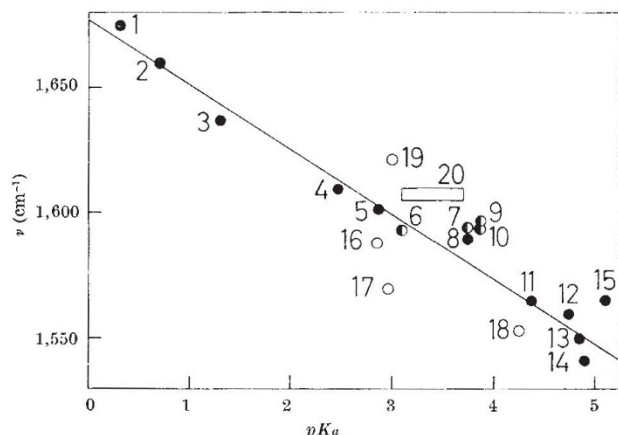


Fig. 1. Relationship between acid dissociation constant (pK_a) and frequency (ν) of the antisymmetric stretching vibration of salts of carboxylic acids in D_2O solution. 1, Trifluoroacetic; 2, trichloroacetic; 3, dichloroacetic; 4, cyanoacetic; 5, chloroacetic; 6, 2-phenoxypropionic; 7, methoxyacetic; 8, formic; 9, glycolic; 10, lactic; 11, 3-hydroxybutyric; 12, acetic; 13, propionic; 14, cyclohexane carboxylic; 15, polyacrylic; 16, malonic; 17, phthalic; 18, benzoic; 19, salicylic; 20, polygalacturonic, polygalacturonic, galacturonic, alginic, hyaluronic, chondroitin sulphates A, B and C. (●), This work; (○), from ref. 5. pK_a values from refs. 1, 4, 6 and 7.

This correlation should prove of interest not only to spectroscopists and workers in the field of electrochemistry, but also to biochemists and others interested in polyanions containing carboxylate groups.

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A Curious Relationship

WHILE collecting together crystallographic data on the alkali metals, I noticed that the lattice constants for lithium, sodium, potassium, rubidium and caesium had all been determined at 5° K as well as at room temperature. These metals are isostructural, having the A2 structure; in other words, they are body centred cubic

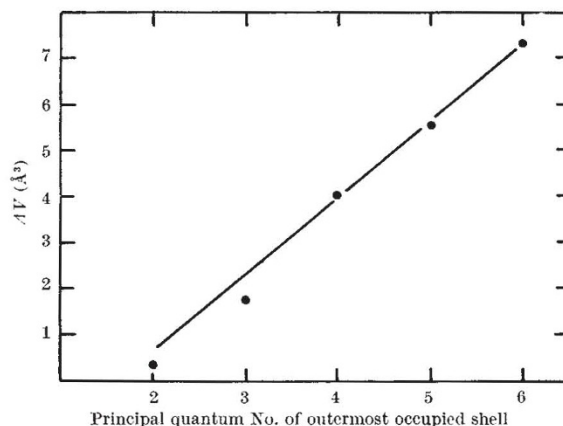


Fig. 1. The change in atomic volume between room temperature and 5° K for five group I metals.

with two atoms per unit cell. The changes in atomic volume on cooling from room temperature to 5° K are plotted against the principal quantum number, n , of the outermost occupied shell in Fig. 1. It is seen that the relationship is linear. The volume changes, in \AA^3 , are closely reproduced by the equation

$$\Delta V = \frac{5}{3}n - \frac{11}{4}$$

Various speculators have failed to bring forth a theoretical reason for this linearity.

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BIOLOGICAL SCIENCES

Function of Mitochondrial DNA in Yeast

MITOCHONDRIA contain small amounts of DNA which differ in several chemical and physical properties from nuclear DNA (reviewed in ref. 1). Mitochondrial DNA (MDNA) of yeast²⁻⁶ is replicated by a mitochondrial DNA polymerase⁷ which is different from the nuclear enzyme. (unpublished results of U. Wintersberger and E. W.). A genetic function of MDNA is indicated because it serves as a template for a mitochondrial RNA polymerase^{8,9}. Mitochondrial RNA (MRNA) has been isolated and characterized using highly purified yeast mitochondria. MRNA of yeast separates into three species when subjected to sucrose gradient centrifugation, one with a sedimentation coefficient of about 4S, the other two sedimenting faster. The 4S RNA accepts amino-acids in a manner similar to cytoplasmic tRNA; the other two RNA components were assumed to be derived from mitochondrial ribosomes⁹. The two ribosomal RNA (rRNA) components of the mitochondria differ in their sedimentation properties from 25S and 17S RNA of the cytoplasmic 80S ribosomes of yeast, and, in contrast, closely resemble the 23S and 16S RNA species of bacterial 70S ribosomes^{10,11}. Hybridization experiments show that yeast MRNA hybridizes readily with MDNA, in sharp contrast to cytoplasmic rRNA which forms hybrids with MDNA very poorly but anneals extensively to nuclear DNA^{11,12}.