

theory of DNA structure¹² is provided by the constancy of molecular weight throughout the structural changes which we have described. In addition, however, we are led to wonder whether the observed phenomena do not point to the participation of water in stabilizing the structure of DNA. With this end in view, we are investigating the behavior of DNA in a variety of organic solvents with different hydrogen-bonding characteristics.

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SEGREGATION COEFFICIENTS OF VARIOUS IMPURITIES IN A SILICON TETRAIODIDE MATRIX

Sir:

The demand for transistors and other semiconductor devices has stimulated considerable research in the preparation of ultra-pure silicon. It was found that zone-refining techniques¹ were inadequate for the removal of certain impurities, e.g., boron, in a silicon matrix,² and it was decided to approach the problem by preparing a suitable compound of silicon, subjecting this to such purification techniques as recrystallization, sublimation, and zone purification and ultimately decomposing it to elemental silicon. Thermodynamic calculations indicated that of the four tetrahalides, silicon tetraiodide decomposed most readily and that it lent itself best to zone-melting techniques because of its relatively high melting point (121.5–122.5°). Furthermore, it could be expected that the segregation coefficients for the various impurities in silicon tetraiodide would differ from those found in silicon.

Silicon tetraiodide was prepared by passing iodine vapor over Coleman and Bell Company ninety-eight per cent. pure silicon at 800° and the product was then crystallized from toluene. This material was used to fill Pyrex ampoules nine millimeters in diameter and thirty centimeters long. It was then densified, the tube sealed, and zone-purification was effected by vertical passage at the rate of five centimeters an hour. The zone width was two and one-half centimeters, and the temperature of the molten zone was about 135°. A small molten zone was passed through the charge only once in order to maintain impurities at spectrographically detectable levels. Spectrographic analyses of the successive two and one-half centimeter zones permitted preliminary calculations to be made based on Pfann's original equation.¹ The results of these calculations gave plots of C/C_0 versus x/l (where C is the concentration of an impurity in a solid frozen from a mother zone, C_0 is the mean concentration of the impurity before zone

refining, x is the distance that the zone has traveled along the tube, and l is the zone length) which indicated that certain impurities can be efficiently removed by this technique. In the case of boron where the concentration level was below the limit of spectrographic detectability, a mathematical extrapolation was employed based on the minimum spectrographically detectable concentration found. Using this value in conjunction with the expression:

$$C_x = K[C_0 + (C_{z-1}/K - C_{z-1})]$$

where C_x is the concentration of an impurity frozen into the x th zone, C_{z-1} is the concentration of the impurity frozen into the previously frozen zone, k is the segregation coefficient of the impurity, and C_0 is as described above, the maximum value for the k of boron was determined. The values of the k 's determined for various metallic impurity species in the SiI₄ matrix are: boron, 0.16 ± 0.07 , aluminum, 0.88 ± 0.04 , sodium, 0.07 ± 0.01 , magnesium, 0.58 ± 0.06 , copper 0.63 ± 0.05 .

It is apparent from the above that the impurities listed can be removed to levels below the one part per million range by a suitable number of passes. Work on this project, and the method and/or methods of preparing pure silicon tetraiodide, as well as the preparation of the elemental silicon, is continuing.

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GLUCOSIDURONIC ACID SYNTHESIS BY β -GLUCURONIDASE IN A TRANSFER REACTION

Sir:

Certain biological phenomena have been correlated with the activity of the enzyme β -glucuronidase. Among these are glucuronidogenesis,¹ action of gonadal hormones,^{2,3,4,5} human cancer,^{6,7,8} genetic control in mouse tissues,^{3,9,10} and effects of pituitary interstitial cell stimulating hormone.¹¹ In attempts to arrive at an interpretation of the function of the enzyme *in vivo*, we have found it difficult to explain the findings on the basis of a purely hydrolytic action of the enzyme or its simple reversal. It was postulated that β -glucuronidase participates as a member of a multi-component system concerned with glucosiduronic

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