Zr—and its a_0 varies somewhat according to the ratio of uranium to zirconium.

A single crystal of this phase was positioned so that one of its major axes was parallel to the main axis of a goniometer. Laue back-reflection photograms were then obtained at each 45° rotation about this axis in order to check for symmetry. Fourfold symmetry was observed at the 0°, 90°, 180° and 270° positions and twofold symmetry was noted at the 45°, 135°, 225° and 315° positions. This same symmetry was observed with several different crystals.

The Laue patterns also showed fourfold symmetry after moving the crystal 90° to the above described rotation axis. In addition, the crystal was positioned so that the (111) plane was perpendicular to the X-ray beam. The resulting Laue photograph showed threefold symmetry.

Rotation and equi-inclination Weissenberg photographs for seven layer lines from these crystals were indexed according to a body-centered cubic unit cell with a_0 approximately 10·69 Å.

Powder photographs of specimens of the same composition could also be indexed according to this cubic cell, except a few of the high-angle lines, which appear to be displaced in a regular way such that this displacement would indicate an increase in a_0 of approximately 1 part in 500.

The a_0 of the δ phase, as shown in Table 1, is slightly less than three times the a_0 of the parent γ phase from which the δ was formed. The γ phase, which is body-centered cubic, is a high-temperature solid-solution phase between γ uranium and β zirconium. Density measurements of the δ phase indicate that there are 54 atoms per unit cell.

Table 1. *Lattice parameters of the γ and δ phases of the same composition* U–Zr *alloy*

Phase	a_0 (Å)
γ	3·575
(3 times γ)	(10·725)
δ	10·688

A transformation has also been made from a single crystal of γ to a single crystal of δ in which the (100) cube face of the small γ cubic cell became the (100) cube face of the δ phase.

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Unit cell and space group of sodium pyrophosphate.

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Sodium pyrophosphate decahydrate, $Na_4P_2O_7.10H_2O$, crystallizes in the monoclinic holohedral class (Groth, 1906–19). Holohedral symmetry has been confirmed by the present writers from morphological study, and the absence of optical activity supports the same conclusion. When crystallized from aqueous solution, the crystal very often grows along the b axis with $\{\bar{1}01\}$, $\{101\}$ and $\{001\}$ as the most prominent faces. From Groth, we get the following crystallographic data:

$$a:b:c = 1{\cdot}2873:1:1{\cdot}8954; \quad \beta = 98° 16'.$$

To conform to the space group $C2/c$, to which the crystal was found to belong on analysis, the a axis and the shorter diagonal of Groth's cell are taken as the a and c axes respectively in the present investigation. Rotation pictures about the b axis yielded $b = 6{\cdot}97$ Å. Weissenberg pictures of the zero, first, second and the third layers, taken with b as the rotation axis, showed that the cell is C face centered with the following systematic absences:

Reflexions	Absences
hkl	$h+k$ odd
$h0l$	(h odd) l odd

The space group is thus $C2/c$.

The monoclinic angle β with the axes chosen as above was found to be 118° 30′, as measured from Weissenberg pictures. This is in very close agreement with Groth's data, which yield $\beta = 118° 25'$. Rotation pictures about the present a and c axes gave $a = 17{\cdot}92$, $c = 14{\cdot}9$ Å. These values have been confirmed by calculations using high-angle reflexions on Weissenberg pictures. It is seen that the actual a axial identity period is twice the corresponding Groth axis, and the calculated values of a and c axes using Groth's data are $a = 17{\cdot}94$, $c = 14{\cdot}89$ Å, which show close agreement with the values obtained from the X-ray data.

Using the above data and the known density $\varrho = 1{\cdot}815$ g.cm.$^{-3}$, the number of molecules per unit cell comes out as four. Complete investigation of the structure is in progress.

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Reference

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