The hydroboration product from 2-hexene prepared as described above, was heated under reflux for three hours (isomerization procedure). The reaction mixture was then treated with 300 mmoles of propionic acid and handled as above. There was obtained 14.7 g. of *n*-hexane, 85% yield.

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RECEIVED JUNE 29, 1959

SOME NEW COMPOUNDS HAVING THE HEXAGONAL BARIUM TITANATE STRUCTURE

Sir:

The structure of hexagonal barium titanate was determined by Burbank and Evans[1] using a single crystal prepared by the method of Matthias.[2] The procedure, which involves heating the reactants in a platinum crucible, has been repeated in this laboratory to obtain the amber colored crystals. These crystals did not become colorless upon heating for several days in air at 1200°. It seemed likely that the presence of platinum was needed to stabilize this hexagonal structure, especially since the isotypic phase $Ba(Ti_{0.75}Pt_{0.25})O_3$ has been reported by Blattner.[3] The possibility that stabilization could be promoted by other foreign ions has been under investigation here for some time.

It has been found, using X-ray powder patterns as the criterion, that the hexagonal structure was adopted in presence of platinum, iridium, rhodium, ruthenium, cobalt, iron, manganese, chromium, vanadium and even trivalent titanium. The phases were prepared according to the formula $BaM_xTi_{1-x}O_{3-z}$. Mixtures of barium oxide, titanium dioxide, and the added metal oxide were ground together in an agate mortar and heated in air except those containing Mn_2O_3, Cr_2O_3 and V_2O_3. These mixtures were heated in evacuated sealed silica capsules. X-Ray powder diffraction photographs showed that the patterns of the phases given agreed closely with that of hexagonal barium titanate. Only a slight difference in spacing and intensities of reflections were observed.

$BaPt_{0.10}Ti_{0.90}O_{3-z}$	$BaIr_{0.25}Ti_{0.75}O_{3-z}$	$BaIr_{0.50}Ti_{0.50}O_{3-z}$
$BaRh_{0.25}Ti_{0.75}O_{3-z}$	$BaRu_{0.25}Ti_{0.75}O_{3-z}$	$BaRu_{0.50}Ti_{0.50}O_{3-z}$
$BaCo_{0.25}Ti_{0.75}O_{3-z}$	$BaFe_{0.25}Ti_{0.75}O_{3-z}$	$BaFe_{0.50}Ti_{0.50}O_{3-z}$
$BaFe_{0.75}Ti_{0.25}O_{3-z}$	$BaV_{0.50}Ti_{0.50}O_{3-z}$	$BaV_{0.75}Ti_{0.25}O_{3-z}$
$BaV_{0.80}Ti_{0.20}O_{3-z}$		

Chemical analyses of these phases have not yet been made. The formulas are derived from starting compositions and from the absence of any evidence for heterogeneity obtained by X-ray and microscopic examination. When the proportion of foreign ion was smaller than the lowest figure shown in the formulas, the pattern of tetragonal barium titanate could be detected in the photographs. Iridium, ruthenium, iron and vanadium in proportions larger than the highest given in the formulas caused the introduction of extraneous lines in the X-ray diffraction photographs. The limiting compositions of the phases have not yet been determined. The data suggest, however, that these metal ions are incorporated in the lattice of the hexagonal barium titanate.

Magnetic susceptibility measurements have been made on the phases of $BaIr_{0.25}Ti_{0.75}O_{3-z}$, $BaCo_{0.25}Ti_{0.75}O_{3-z}$, and $BeFe_{0.25}Ti_{0.75}O_{3-z}$. While these measurements have been made only at one temperature, they appear to indicate one, two and four unpaired electrons per atom of iridium, cobalt and iron, respectively.

Work is now in progress to determine the permissible range of composition of the phases prepared.

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RECEIVED MAY 21, 1959

ISOLATION OF ALDOSTERONE FROM INCUBATES OF ADRENALS OF THE AMERICAN BULLFROG AND STIMULATION OF ITS PRODUCTION BY MAMMALIAN ADRENOCORTICOTROPIN[1,2]

Sir:

We wish to report that aldosterone was the most abundant steroid found in incubates of adrenals from the American bullfrog, *Rana catesbeiana*, under the stimulation of bovine adrenocorticotropin. Corticosterone was the second major steroid found in the incubates, with the ratio of aldosterone to corticosterone, 3.6 to 1. No cortisol could be detected, although previous studies have disclosed only cortisol and corticosterone as the major steroids secreted by the adrenals of both mammals[3] and cold-blooded animals.[4,5] The salt metabolism of the frog has been shown to be under the regulation of both the adrenals and the anterior pituitary,[6] and it is possible that aldosterone may be the adrenal hormone responsible for this regulation.

Adrenal tissue (1218 mg. fresh weight) excised from 37 female bullfrogs (total body weight 13.13 kg.) just prior to their breeding season were cut up into small pieces in isotonic Krebs–Ringer bicarbonate solution containing glucose (200 mg. per 100 cc.), which has been flushed with mixture of 5% CO_2–95% O_2 (final *p*H, 7.4). After incubation for 30 minutes at 25–26° the medium was discarded and incubation was continued for 2 hours with a new volume of medium containing bovine adrenocorticotropin[7] (1.09 I.U. per 100 mg. of tissue). This medium then was extracted with dichloromethane and ethyl acetate. The extract was fractionated by partitioning between ethyl

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(3) H. Blattner, H. Gränicher, W. Kanzig and W. Merz, *Helv. Phys. Acta*, **21**, 341 (1948).

(1) Paper XVIII of the adrenocorticotropin (ACTH) series; for Paper XVII, see C. H. Li, *Bull. Soc. Chim. Biol.*, **40**, 1757 (1958).
(2) This work is supported in part by the U. S. Public Health Service (G-2907) and the Albert and Mary Lasker Foundation.
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