

Studies in the Two Phase System : Sodium Formate - Pyridine. VII. Extraction of Mercury

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(Received September 17, 1964)

While ethyl ether¹⁻³⁾ has been widely used for the extraction of mercury and its separation

from many elements, carbon tetrachloride^{4,5)} and chloroform⁶⁾ are employed by few workers. Recent results from these laboratories initiated work on the distribution of metal ions in the

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two phase system, sodium formate-pyridine.⁷⁾ The present paper deals with the extraction of mercury by pyridine from sodium formate.

Experimental

Reagents.—Reidel de Haen's recrystallized sodium formate, Baker's analytical grade pyridine and Merck's analytical grade mercuric nitrate were used.

Extraction Procedure.—To an aliquot of 5 ml. of 4 M sodium formate, mercuric nitrate is added, followed by 5 ml. of pyridine and the whole mixture is equilibrated for 2 min. After settling, both layers are separated. The mercury extracted into the pyridine layer is determined volumetrically using diphenyl carbazone as an internal indicator.⁸⁾

Effect of Formate Concentration.—Mercuric nitrate solution is added to formate solutions of various molarities and in each case it is extracted with 5 ml. of pyridine and the amount extracted is determined. The results showed that the concentration of formate need not be kept rigorously constant but it should be in the range of 3–6 M.

Effect of pH.—Maximum extraction of mercury into the pyridine is obtained at a pH range of 7–7.5. Above pH 7.5, the whole of the mercury was precipitated and retained in the formate layer and therefore studies at higher pH's were not possible. (Table I)

Effect of Volume of Pyridine.—The effect of volume of pyridine on the extraction of mercury is studied by adding various volumes of pyridine to 5 ml. of 4 M sodium formate containing an aliquot of mercuric nitrate and the amount extracted in each case is determined. The % *E* increased upto

TABLE I. EFFECT OF pH ON THE EXTRACTION OF MERCURY

pH	%E
7.0	99
7.5	99
8.0	50
8.5	20
9.0	3

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TABLE II. EFFECT OF VOLUME OF PYRIDINE

Vol. of pyridine, ml.	%E
2	62
3	73
4	84
5	99
6	99

TABLE III. EXTRACTION OF MERCURY

Volume of pyridine, 5 ml.	
Sodium formate, 5 ml. (4 M)	
Temperature, 25°C	
Amount of mercury added, mg.	Amount of mercury extracted, mg.
0.540	0.535
1.080	1.072
1.620	1.618
2.700	2.697
3.780	3.778

5 ml. of pyridine and remained the same with further increase in volume of pyridine. (Table II)

Almost complete extraction of mercury is obtained with 5 ml. of pyridine from 5 ml. of 4 M sodium formate at a pH range of 7–7.5. (Table III)

Elements like iron, aluminium, chromium, lead, and uranium do not interfere with this extraction procedure.

Summary

The distribution of mercuric mercury in the two phase system sodium formate-pyridine is studied. Almost quantitative extraction of mercury into pyridine is obtained from sodium formate (4 M) at a pH range of 7–7.5 with 5 ml. of pyridine and the extracted mercury is determined volumetrically using diphenylcarbazone as an internal indicator.

Sincere thanks of the authors are due to Professor G.B. Singh for providing the necessary facilities and to the University Grants Commission for the award of a Research Fellowship to one of them (A. L. J. R.).

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