Lawrence Berkeley National Laboratory

Recent Work

Title

CHEMISTRY DIVISION QUARTERLY REPORT, DECEMBER 1952, JANUARY, FEBRUARY 1953; THE SOLUBILITY OF HYDROGEN AND DEUTERIUM IN VARIOUS SOLVENTS

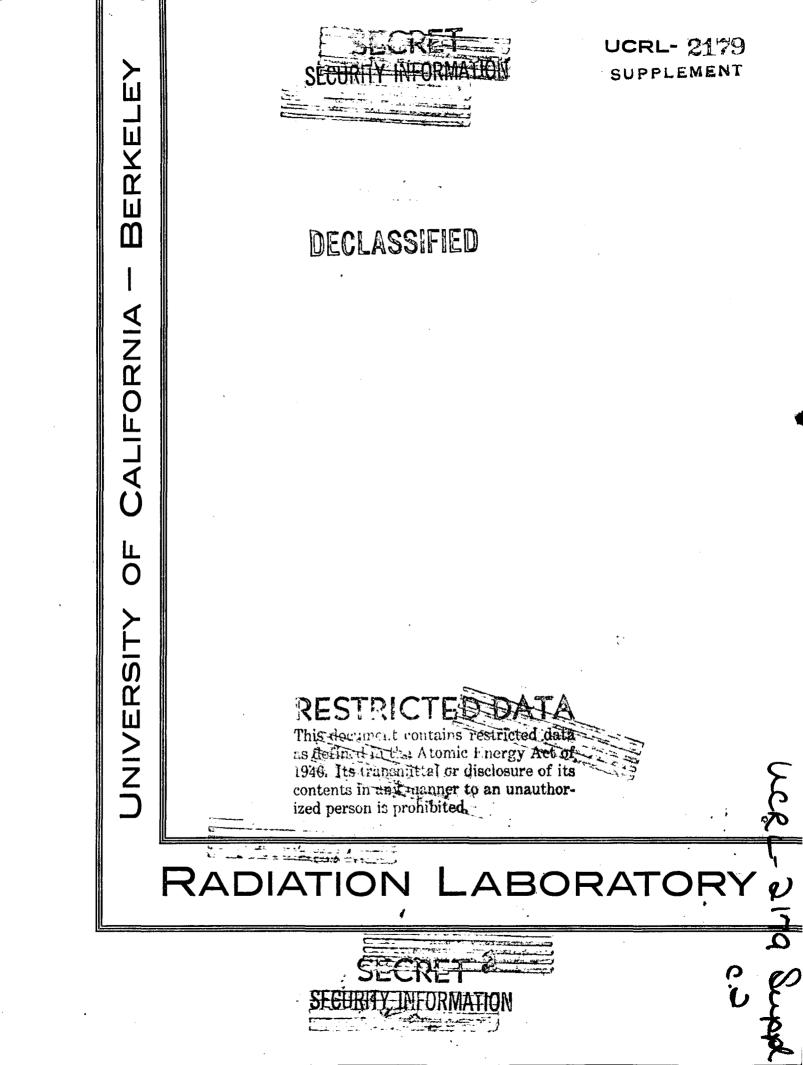
Permalink https://escholarship.org/uc/item/1gr9w9bg

Authors

Cook, M. Hanson, D.N.

Publication Date

1953-04-13



î

DISCLAIMER

This document was prepared as an account of work sponsored by the United States Government. While this document is believed to contain correct information, neither the United States Government nor any agency thereof, nor the Regents of the University of California, nor any of their employees, makes any warranty, express or implied, or assumes any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by its trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof, or the Regents of the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof or the Regents of the University of California.

UNIVERSITY OF CALIFORNIA Radiation Laboratory

Cover Sheet Do not remove INDEX NO. <u>UCR 2-2179 supplement</u> This document contains <u>3</u> pages This is copy <u>99</u> of <u>123</u> series A

DECLASSIFIED

Issued to

	التالية. السينية السينية
the second s	
Classification	المتعظم
Contraction of the local division of the loc	,

Each person who receives this document must sign the cover sheet in the space below.

Route to	Noted by	Date	Route to	Noted by	Date
	RK wahereng	5/7/53		·	
	0				
•					
					Ţ
		·			
-					
		· · ·			

DECLASSIFIED



UCRL-2179 Supplement Chemistry-General Distribution

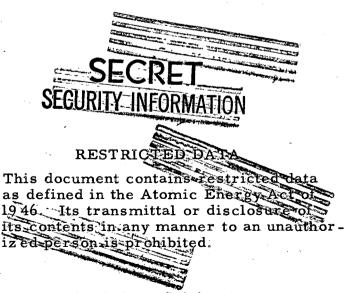
UNIVERSITY OF CALIFORNIA Radiation Laboratory Contract No. W-7405-eng-48

CLASSIFICATION CANCELLED BY AUTHORITY OF THE DECLASSIFICATION

BY AUTHORITY OF THE DECLASSIFICATION BRANCH USAEC BY BERNET 1-19-5C SIGNATURE OF THE DATE PERSON MAKING THE CHANGE

CHEMISTRY DIVISION QUARTERLY REPORT

December, 1952, January, February, 1953 The Solubility of Hydrogen and Deuterium in Various Solvents M. Cook and D. N. Hanson April 13, 1953



Berkeley, California

DECLASSIFIED

-2- UCRL-2179 Emplement Chemistry-General Distribution

Standard Distribution: Series A	Copy Nos.
American Cyanamid Company (Watertown)	1
Argonne National Laboratory	2-9
Armed Forces Special Weapons Project (Sandia)	10
Armed Forces Special Weapons Project, Washington	11
Army Chemical Center	12
Atomic Energy Commission, Washington	13-17
Battelle Memorial Institute	18
Brookhaven National Laboratory	19-21
California Research and Development Company	22-23
Carbide and Carbon Chemicals Company (C-31 Plant)	24-25
Carbide and Carbon Chemicals Company (K-25 Plant)	26-28
Carbide and Carbon Chemicals Company (ORNL)	29-36
Carbide and Carbon Chemicals Company (Y-12 Plant)	37-40
Catalytic Construction Company	41
Chicago Patent Group	42
Chief of Naval Research	43
Dow Chemical Company, Pittsburg	44
Dow Chemical Company (Rocky Flats)	45
duPont Company	46 - 50
General Electric Company (ANPP)	51-53
General Electric Company, Richland	54 - 59
Hanford Operations Office	60
Idaho Operations Office	61-64
Iowa State College	65
Knolls Atomic Power Laboratory	66-69
Los Alamos Scientific Laboratory	70-72
Mallinckrodt Chemical Works	73
Massachusetts Institute of Technology (Kaufmann)	74
Mound Laboratory	75-77
National Advisory Committee for Aeronautics, Cleveland	78
National Bureau of Standards	79
National Lead Company of Ohio	80
Naval Medical Research Institute	81
Naval Research Laboratory	82
New Brunswick Laboratory	83
New York Operations Office	84-85
North American Aviation, Inc.	86-87
Patent Branch, Washington	88
RAND Corporation	89
Savannah River Operations Office, Augusta	90
Savannah River Operations Office, Wilmington	91
Sylvania Electric Products, Inc.	92
Tennessee Valley Authority	93
U. S. Naval Radiological Defense Laboratory	94 95
UCRL Medical Research Laboratory (Warren)	95 96-99
University of California Radiation Laboratory	90 - 99 100 - 10 1
University of Rochester	100 - 101 102 - 103
Vitro Corporation of America Western Beserve University (Friedell)	102-103
Western Reserve University (Friedell) Westinghouse Floatric Corporation	105-106
Westinghouse Electric Corporation Wright Air Development Center	107-108
Wright Air Development Center Technical Information Service, Oak Ridge	109 - 123
recharcar mitor mation betvice, Oak Riuge	10/-125



UCRL-2179 Supplement

The Solubility of Hydrogen and Deuterium in Various Solvents

M. Cook and D. N. Hanson

In the past year, exploratory data have been taken to determine the relative solubilities of hydrogen and deuterium in various solvents in the vicinity of room temperature and atmospheric pressure. This investigation is one phase of a program to determine the feasibility of separating deuterium from hydrogen by means of rectified absorption.

The initial problem was to design an apparatus which would give data accurate to 0.1 percent. Literature values of gas solubilities frequently show discrepancies of the order of 3 percent which is the approximate difference in solubility between hydrogen and deuterium. A unique apparatus has been designed and used successfully wherein the rate of solution can be detected to within 10 ppm. based on the original gas charged. By varying the pressure on the system and plotting the rate of solution vs. pressure the equilibrium pressure is very readily determined.

Solvent	Т, ⁰ С	H ₂ Solubility moles/qm, atm. 10 ⁶	D ₂ Solubility moles/qm, atm. 10 ⁶	D_2/H_2
n-C7H16	15.09 25.09 35.05 50.0	6.47 ₃ 6.87 ₈ 7.28 ₈ 7.92 ₃	6.65 ₀ 7.03 ₅ 7.43 ₃ 8.07 ₆	1.027 1.023 1.020 1.019
• •	65.0	8.639	8.76 <mark>8</mark>	1.015
^{n-C} 7 ^F 16	12.08 25.09 35.05	3.333 3.616 3.861	3.460 3.733 3.968	1.038 1.032 1.028
" Benzene	50.0 15.09	4.303 3.03	4, 393	1.021
** ** **	25.09 35.05 45.0	3.31 3.51 3.89		

The data completed in the past three months are the following.

These data represent duplicate runs on both H_2 and D_2 . The solubility of D_2 in benzene is currently being measured.

Inasmuch as the separation factor increases appreciably as the temperature decreases, a new thermostat capable of providing a temperature of -35° C has been designed and is presently being constructed in the project shops.

Another phase of this program is the measurement of H_2 and D_2 solubilities in liquid N_2 in the range from 1 to 100 atmospheres pressure. Pre-* sently this apparatus is being assembled and a test run is scheduled for about April 1st.





DECLASSIFIED

SECRET