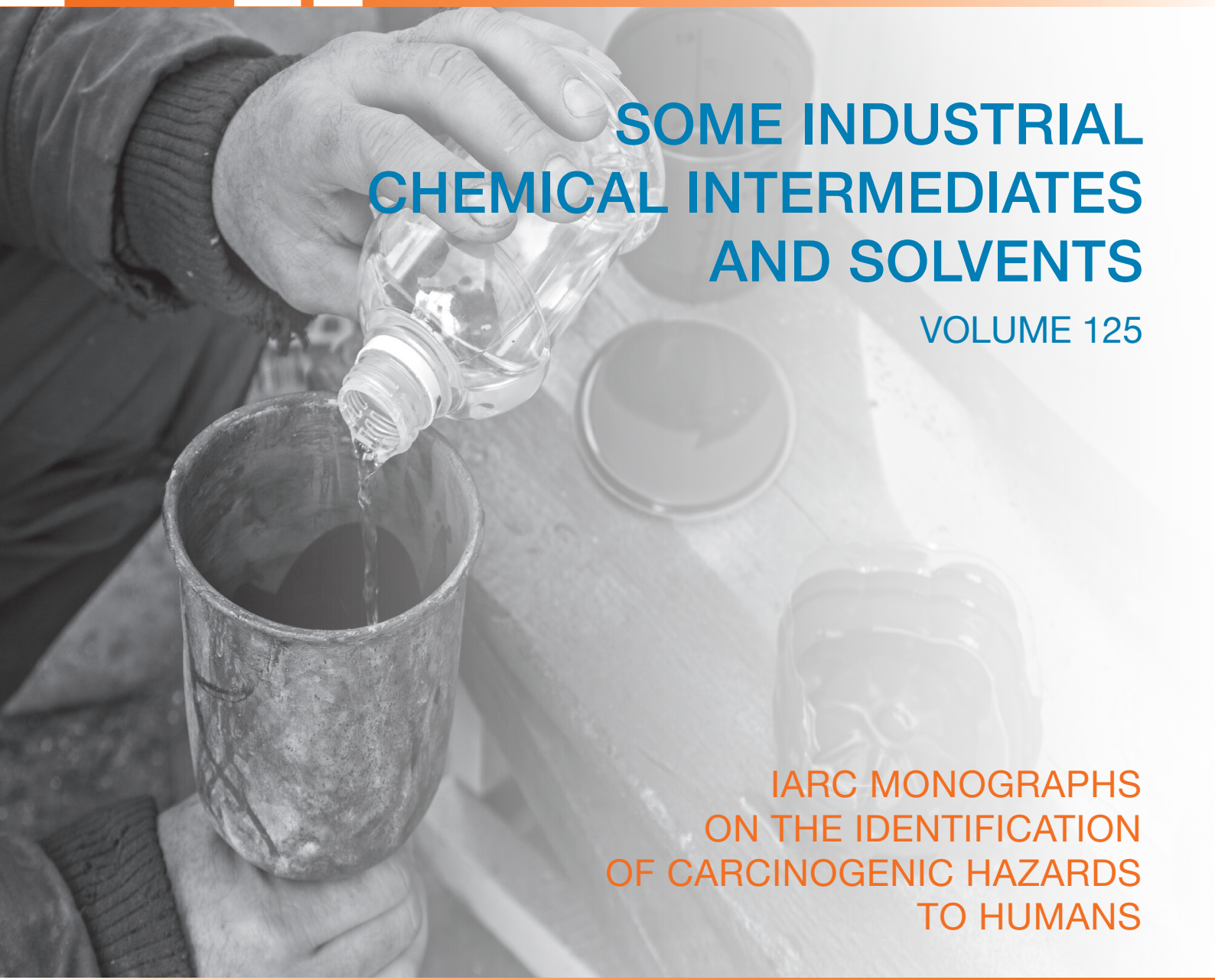
IARC MONOGRAPHS



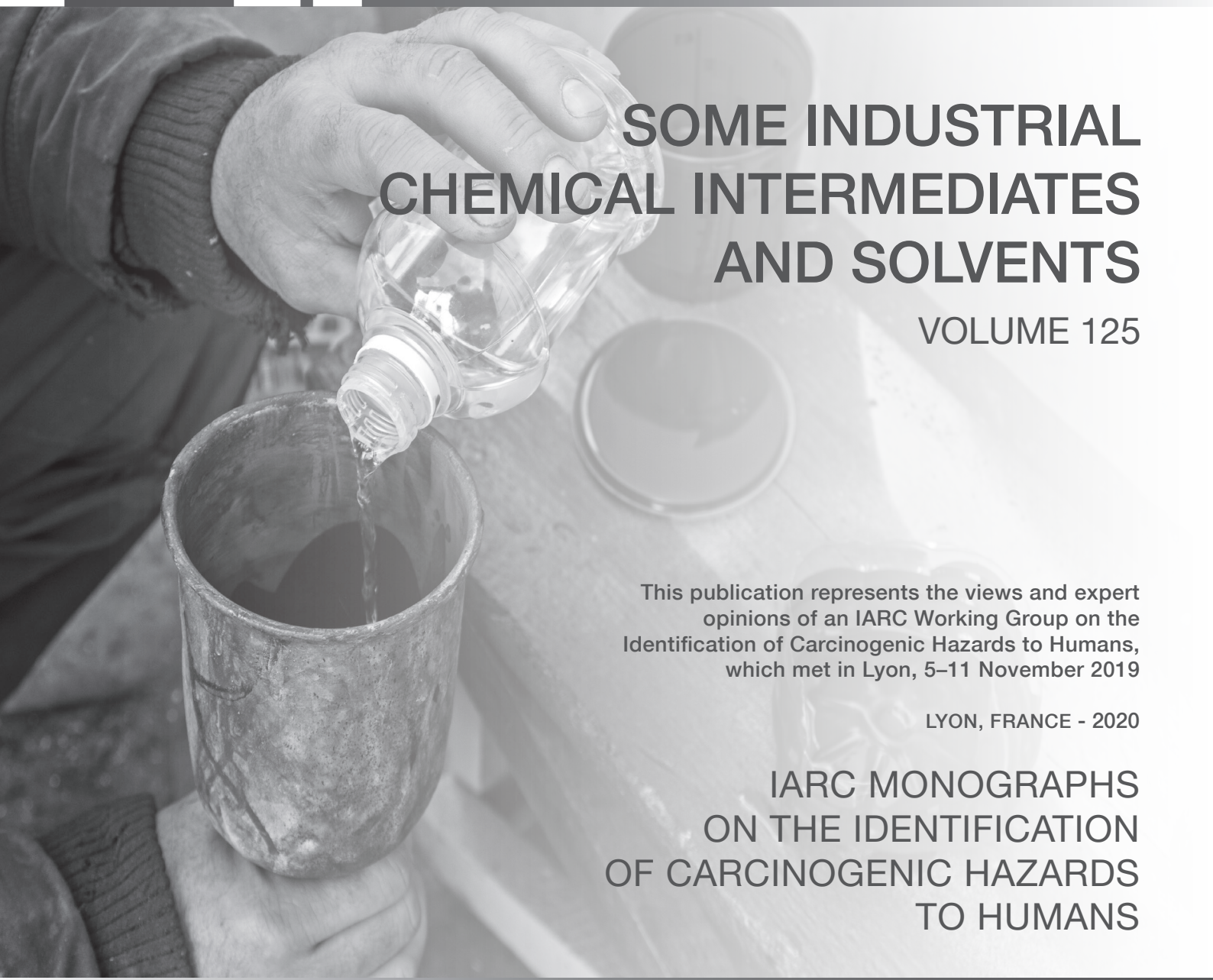
SOME INDUSTRIAL CHEMICAL INTERMEDIATES AND SOLVENTS

VOLUME 125

IARC MONOGRAPHS
ON THE IDENTIFICATION
OF CARCINOGENIC HAZARDS
TO HUMANS

International Agency for Research on Cancer
World Health Organization

IARC MONOGRAPHS



SOME INDUSTRIAL CHEMICAL INTERMEDIATES AND SOLVENTS

VOLUME 125

This publication represents the views and expert opinions of an IARC Working Group on the Identification of Carcinogenic Hazards to Humans, which met in Lyon, 5–11 November 2019

LYON, FRANCE - 2020

IARC MONOGRAPHS ON THE IDENTIFICATION OF CARCINOGENIC HAZARDS TO HUMANS

International Agency for Research on Cancer

World Health Organization

IARC MONOGRAPHS

In 1969, the International Agency for Research on Cancer (IARC) initiated a programme on the evaluation of the carcinogenic hazard of chemicals to humans, involving the production of critically evaluated monographs on individual chemicals. The programme was subsequently expanded to include evaluations of carcinogenic hazards associated with exposures to complex mixtures, lifestyle factors and biological and physical agents, as well as those in specific occupations. The objective of the programme is to elaborate and publish in the form of monographs critical reviews of data on carcinogenicity for agents to which humans are known to be exposed and on specific exposure situations; to evaluate these data in terms of cancer hazard to humans with the help of international working groups of experts in carcinogenesis and related fields; and to identify gaps in evidence. The lists of IARC evaluations are regularly updated and are available on the internet at https://monographs.iarc.fr/.

This programme has been supported since 1982 by Cooperative Agreement U01 CA33193 with the United States National Cancer Institute, Department of Health and Human Services. Additional support has been provided since 1986 by the European Commission Directorate-General for Employment, Social Affairs, and Inclusion, initially by the Unit of Health, Safety and Hygiene at Work, and since 2014 by the European Union Programme for Employment and Social Innovation "EaSI" (2014–2020) (for further information please consult: https://ec.europa.eu/social/easi). Support has also been provided since 1992 by the United States National Institute of Environmental Health Sciences, Department of Health and Human Services. The contents of this volume are solely the responsibility of the Working Group and do not necessarily represent the official views of the United States National Cancer Institute, the United States National Institute of Environmental Health Sciences, the United States Department of Health and Human Services, or the European Commission.

Published by the International Agency for Research on Cancer,
150 cours Albert Thomas, 69372 Lyon Cedex 08, France
©International Agency for Research on Cancer, 2020
Online publication, October 2020

Distributed by WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland
(tel.: +41 22 791 3264; fax: +41 22 791 4857; email: bookorders@who.int).

Publications of the World Health Organization enjoy copyright protection in accordance with the provisions of Protocol 2 of the Universal Copyright Convention. All rights reserved.

Corrigenda to the *IARC Monographs* are published online at https://publications.iarc.fr.
To report an error, please contact: imo@iarc.fr.

Co-funded by the European Union

The International Agency for Research on Cancer welcomes requests for permission to reproduce or translate its publications, in part or in full. Requests for permission to reproduce or translate IARC publications – whether for sale or for non-commercial distribution – should be addressed to the IARC Communications Group at: publications@iarc.fr.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Health Organization concerning the legal status of any country, territory, city, or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

The *IARC Monographs* Working Group alone is responsible for the views expressed in this publication.

IARC Library Cataloguing in Publication Data

Names: IARC Working Group on the Identification of Carcinogenic Hazards to Humans.

Title: Some industrial chemical intermediates and solvents.

Description: Lyon : International Agency for Research on Cancer, 2020. | Series: IARC monographs on the identification of carcinogenic hazards to humans, ISSN 1017-1606 ; v. 125. | "This publication represents the views and expert opinions of an IARC Working Group on the Identification of Carcinogenic Hazards to Humans, which met in Lyon, 5–11 November 2019." | Includes bibliographical references.

Identifiers: ISBN 9789283201649 (pbk.) | ISBN 9789283201922 (ebook)

Subjects: MESH: Carcinogens. | Neoplasms--chemically induced | Solvents. | Resins, synthetic | Occupational exposure. | Risk Factors.

Classification: NLM W1

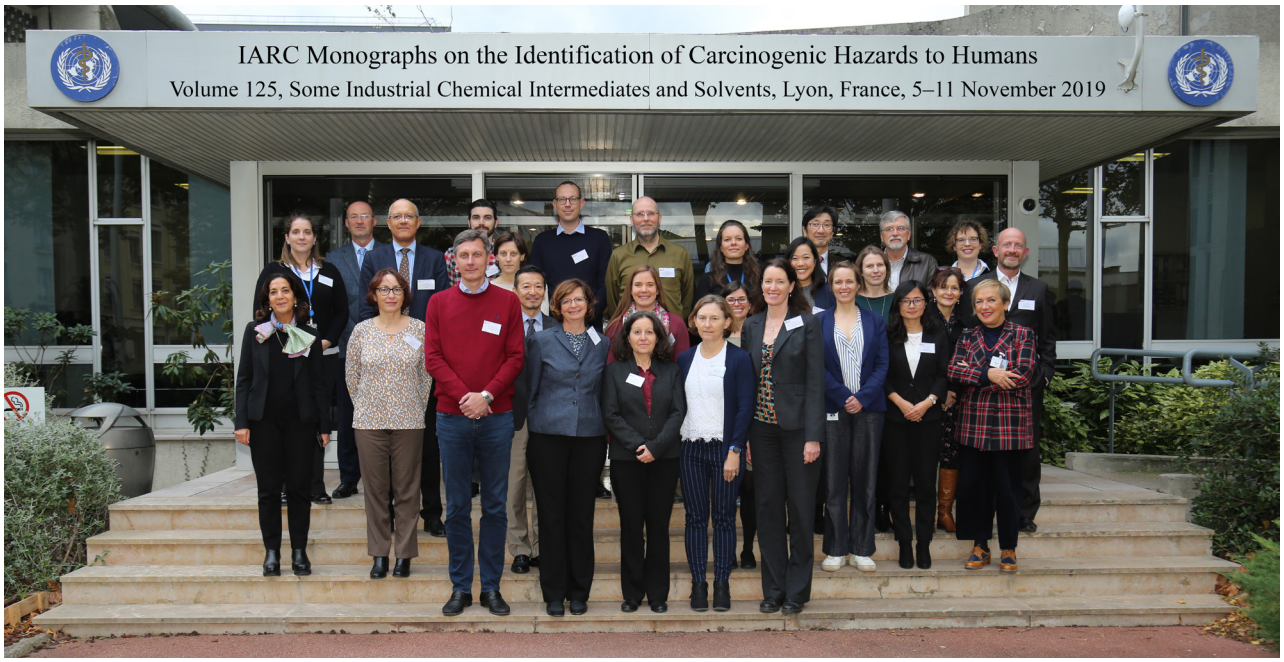


Photo above: The Working Group and other participants at the meeting for *IARC Monographs* Volume 125

The five chemicals evaluated in this volume – glycidyl methacrylate, 1-butyl glycidyl ether, 1-bromo-3-chloropropane, 4-chlorobenzotrifluoride, and allyl chloride – have a wide range of uses in industry.

About the cover: 4-Chlorobenzotrifluoride is widely used as a solvent and diluent for inks, paints, toners, and coatings, including in the car industry. Dermal or inhalation exposure may occur in various occupational and consumer settings.

Source: ©banedeki/istockphoto

How to cite: IARC (2020). Some industrial chemical intermediates and solvents. *IARC Monogr Identif Carcinog Hazards Hum*, 125:1–178.

IARC MONOGRAPHS

This volume of the *IARC Monographs* provides evaluations of the carcinogenicity of five High Production Volume chemicals: glycidyl methacrylate, 1-butyl glycidyl ether, 1-bromo-3-chloropropane, 4-chlorobenzotrifluoride, and allyl chloride.

Glycidyl methacrylate is mainly used in the production of epoxy polymers and vinyl and acrylic resins. The polymers are subsequently used in dental sealants, composites and adhesives, bone composite materials, powder coatings, hydrogel lenses, and food contact material.

1-Butyl glycidyl ether is a reactive intermediate and viscosity-reducing solvent used in the manufacture of epoxy resins, and is also used as a surface modifier in the dyeing of cotton and wool.

1-Bromo-3-chloropropane is an intermediate in the manufacture of a wide range of pharmaceuticals, some pesticides, and other chemicals.

4-Chlorobenzotrifluoride is widely used as a solvent and diluent for inks, paints, toners, and coatings and in dispersive applications in the automotive industry. It is also a major component in industrial and consumer formulations such as cleaners, degreasers, stain removers, and sealants.

Allyl chloride is almost exclusively used in the production of epichlorohydrin, a basic building block for epoxy resins and the synthesis of glycerol, although it is also an intermediate in the synthesis of various pesticides, pharmaceuticals, adhesives, and personal-care products.

Exposure to all these agents may occur in various occupational settings as well as in the general population.

An *IARC Monographs* Working Group reviewed epidemiological evidence, animal bioassays, and mechanistic evidence to reach conclusions as to the carcinogenic hazard to humans of exposure to these agents.

© banedeki/istockphoto