

# BENZENE

VOLUME 120



This publication represents the views and expert opinions of an IARC Working Group on the Evaluation of Carcinogenic Risks to Humans, which met in Lyon, 10–17 October 2017

LYON, FRANCE - 2018

IARC MONOGRAPHS  
ON THE EVALUATION  
OF CARCINOGENIC RISKS  
TO HUMANS

# CONTENTS

---

<b>NOTE TO THE READER</b> .....	1
<b>LIST OF PARTICIPANTS</b> .....	3
<b>PREAMBLE</b> .....	9
<b>A. GENERAL PRINCIPLES AND PROCEDURES</b> .....	9
1. Background.....	9
2. Objective and scope.....	10
3. Selection of agents for review .....	11
4. Data for the <i>Monographs</i> .....	12
5. Meeting participants .....	12
6. Working procedures.....	13
<b>B. SCIENTIFIC REVIEW AND EVALUATION</b> .....	14
1. Exposure data.....	15
2. Studies of cancer in humans.....	16
3. Studies of cancer in experimental animals.....	20
4. Mechanistic and other relevant data.....	23
5. Summary .....	26
6. Evaluation and rationale.....	27
References.....	31
<b>GENERAL REMARKS</b> .....	33
<b>1. EXPOSURE DATA</b> .....	37
1.1 Identification of the agent .....	37
1.2 Production and use.....	38
1.3 Measurement and analysis.....	39
1.4 Occurrence and exposure.....	43
1.5 Regulations and guidelines .....	76
1.6 Exposure assessment methods in epidemiological studies of cancer .....	79
References.....	92

<b>2. CANCER IN HUMANS</b> .....	105
2.1 Adult leukaemia .....	105
2.2 Adult lymphoma.....	124
2.3 Childhood cancer .....	137
2.4 Other cancers .....	149
2.5 Quantitative data.....	163
References.....	167
<b>3. CANCER IN EXPERIMENTAL ANIMALS</b> .....	175
3.1 Mouse .....	175
3.2 Rat .....	197
3.3 Genetically modified animals.....	209
References.....	216
<b>4. MECHANISTIC AND OTHER RELEVANT DATA</b> .....	219
4.1 Toxicokinetic data .....	219
4.2 Mechanisms of carcinogenesis.....	225
4.3 Data relevant to comparisons across agents and end-points .....	261
4.4 Observed exposure–response relationships in mechanistic studies.....	266
References.....	269
<b>5. SUMMARY OF DATA REPORTED</b> .....	289
5.1 Exposure data.....	289
5.2 Human carcinogenicity data .....	290
5.3 Animal carcinogenicity data.....	292
5.4 Mechanistic and other relevant data.....	294
<b>6. EVALUATION AND RATIONALE</b> .....	297
6.1 Cancer in humans.....	297
6.2 Cancer in experimental animals.....	297
6.3 Overall evaluation .....	297
6.4 Rationale .....	297
<b>LIST OF ABBREVIATIONS</b> .....	299