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ESIG solvents human exposure database: 2024 update

December 2024

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Contributors

Anne Sleeuwenhoek
Susanne Todd
Ken Dixon
Shahzad Rashid
Karen S. Galea

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Customer

European Solvents Industry Group (ESIG)

Report Status

Final

Revision

0

Report for:

European Solvents Industry Group (ESIG)

Main Contributors:

Anne Sleeuwenhoek
Susanne Todd
Ken Dixon
Shahzad Rashid
Karen S. Galea

Issued by:

Karen S. Galea

Approved by:

Karen S. Galea

Institute of Occupational Medicine

Research Avenue North
Riccarton
Edinburgh
EH14 4AP
United Kingdom
Tel: +44 (0)131 449 8000
Fax: +44 (0)131 449 8084
Email: publications@iom-world.org

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Document revisions

No	Details	Date

This report including the front and back page contains 15 pages

Contents

1 Aim and objectives

The European Solvents Industry Group (ESIG) previously contracted the Institute of Occupational Medicine (IOM) to perform an update to their solvents exposure database with publicly available human exposure data (published between 2006 and 2019) to relevant products and key uses of oxygenated and hydrocarbon solvents. This MS Access database was also to be reviewed, updated and implemented as a Web based application, supported by a user guide. This programme of work was completed and reported in Galea et al, (2020a&b). ESIG contracted IOM to provide a further update to the solvents exposure database with publicly available human exposure data published between 2020 and 2021, which was reported in Galea et al, (2022). The on-line database is available for access by registered users at URL: https://esig.iom-world.co.uk/

ESIG contracted IOM to provide a further update to the solvents exposure database with available human exposure data published between 1 Jan 2022- 31 Dec 2023. The additional work has the following three objectives:

1. Running and review of searches in Web of Science (WoS) Service for UK Education, Medline[1] and IFA/IAG-Database[2] for relevant articles published during 1 Jan 2022 – 31 Dec 2023, based on the learning from the programme of work reported by Galea et al (2020a).
2. Data entry from articles identified as being relevant for inclusion in the ESIG database using the methodology and learning from the programme of work reported by Galea et al (2020b).
3. Provision of short report outlining results of searches and number of new articles included in the ESIG database following the biannual update.

This short report fulfils objective 3 and summarises the activities undertaken for objectives 1 and 2.

[1] Searches were carried out in Medline rather than PubMed as previously undertaken for ease of exporting references and identifying duplicates. It is anticipated that more searches may be identified using Medline, as the searches are done on title, abstract and keyword fields rather than title and abstract as in PubMed

[2] https://www.dguv.de/ifa/publikationen/datenbank-publikationen/index.jsp

2 Literature review

2.1 Identification of full text articles for data extraction

The criteria for which articles were considered to be applicable (or not) for inclusion in the ESIG database was as follows:

Inclusion criteria

- Contains human inhalation exposure data
- Contains a relevant solvent substance and /or activity
- Published between (and including the years) 2022-2023
- English language papers only (WoS, Medline)
- English and German language references only (IFA/IAG databases and publication lists, https://www.dguv.de/ifa/publikationen/datenbank-publikationen/index-2.jsp)

Exclusion criteria

- Human dosing studies
- Toxicology studies
- Animal studies
- Studies reporting exposures to the following (groups of) substances – Polyaromatic hydrocarbons (PAHs), flame retardants, diesel and gasoline, anaesthetics, pesticides and disinfectants, exposures arising from combustion
- Aviation fuels which were only focussed on refuelling operation
- Petrochemical operations
- Environmental exposures (e.g. urban air pollution)

The following search string was run in WoS and Medline, covering the period 1 Jan 2022 – 31 Dec 2023:

Hydrocarbon / Activity AND exposure AND (inhal* OR monit*)

WoS and Medline searches were untaken in the title, abstract, keywords and keywords plus fields. Searches were carried out for all substances and activities included in the previous reports (Galea et al, 2022, 2020a).

After removal of duplicates and foreign language papers, 3,352 papers were identified. After title screening 162 papers remained. After abstract screening, 49 papers were identified for full text screening. One further paper was included: Ricklund et al, (2023) which was identified during the course of our work. Two of the papers included were published online in 2023, but in print in 2024.

All titles were screened by one reviewer and 20% by a second reviewer. All abstracts were reviewed by both reviewers. A conservative strategy was adopted with a paper being included for full text review if its relevance was not clear from the title and/or the abstract or if there was disagreement between the reviewers. Further, if necessary, the first reviewer reviewed choices based on discussion.

The IFA/IAG-Database was searched for relevant articles published during 1 Jan 2022 – 31 Dec 2023. English and German language articles were searched by publication year and then title screened in the first instance. This was followed by

abstract (where available) and full text screening if considered potentially relevant based on the title. Table 1 shows the outcome of the IFA/IAG-Database screening process, with 2 articles been taken forward for data extraction.

Table 1: Outcome of IFA/IAG database searches

Year	English	German	Articles taken forward for data extraction
2022	Hits: 29 Title screening: 0 Abstract / full text screening: 0	Hits: 188 Title screening: 12 Abstract / full text screening: 0	0
2023	Hits: 32 Title screening: 0 Abstract / full text screening: 0	Hits: 215 Title screening: 22 Abstract / full text screening: 6	2
All	Hits: 61 Title screening: 0 Abstract / full text screening: 0	Hits: 403 Title screening: 34 Abstract / full text screening: 6	2

2.2 Review of full text articles

All 52 articles identified for full text review were obtained. The full text articles were reviewed by one reviewer with further discussion taking place as necessary with the second reviewer to reach consensus on their suitability for inclusion in the database. Those papers rejected either did not contain measurements which could be extracted or did not fit the inclusion criteria.

A total of 22 articles published during 2022-2023 were taken forward for data extraction. Appendix 1 lists the publications selected for data extraction and inclusion in the database.

2.3 Data entry into ESIG database

Data was entered into a spreadsheet and imported into the ESIG database. The data entry and coding guidance as detailed in Galea et al (2020b) was followed.

3 Conclusion

Following this update, the on-line ESIG database (https://esig.iom-world.co.uk/) now contains data extracted from 353 publications and includes 3856 samples and 12432 measurement results for 247 solvents.

The updated ESIG database is live for use by all registered users.

The text concerning the background of the database, https://esig.iom-world.co.uk/About, has been updated to reflect the update as follows (changes as highlighted in red):

"...To facilitate greater visibility and access, the MS Access database application has also been transferred into a web-based system to allow users access (following registration) via their internet browser. Two further reviews of the literature published between 2020-2021 and 2022-2023 have been carried out, with relevant data being extracted and stored in the database.

The current on-line version of the database contains data extracted from 353 publications. ...

- *… However, these original records have not been reviewed and aligned with the new coding structure that has been applied to the 2006-2023 data.*
- *The 1961-2005 records relate to only occupational exposure whereas the 2006-2023 records also may contain information from studies reporting exposure in consumer or experimental / simulation settings.*
- *… Pre-2006 publications were assigned as being Good, Poor or Fair. For data from articles published 2006-2023, the original quality code classification was used, …".*

4 Acknowledgements

The authors would like to thank IOM colleagues for their assistance in obtaining references during the review process.

5 Report references

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Appendix 1: 2022-2023 articles included in database update

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www.iom-world.org

email: iom@iom-world.org

IOM Edinburgh
Research Avenue North
Riccarton, Edinburgh,
EH14 4AP
Tel: 0131 449 8000

IOM Chesterfield
Tapton Park Innovation Centre
Brimington Road, Tapton,
Chesterfield S41 0TZ
Tel: 01246 383 110

IOM Stafford
Brookside Business Park,
Cold Meece, Stone,
Staffordshire, ST15 0RZ
Tel: 01785 333 200

IOM Singapore
237 Alexandra Road #06-17
The Alexcier,
Singapore 159929
Tel: +65 6914 6620