# Cobalt compounds (as co)

| CAS number: | 10210-68-1 (Cobalt carbonyl)  16842-03-8 (Cobalt hydrocarbonyl) |
| --- | --- |
| Synonyms: | Cobalt carbonyl: cobalt tetracarbonyl, dicobalt octacarbonyl  Cobalt hydrocarbonyl: cobalt carbonyl hydride, Tetracarbonylhydrocobalt |
| Chemical formula: | C8O8Co2 (Cobalt carbonyl)  C4HCoO4 (Cobalt hydrocarbonyl) |

Workplace exposure standard (interim)

| TWA: | **0.1 mg/m3** |
| --- | --- |
| STEL: | — |
| Peak limitation: | — |
| Notations: | — |
| IDLH: | — |
| **Sampling and analysis**: The recommended value is quantifiable through available sampling and analysis techniques. | |

## Recommendation and basis for workplace exposure standard

A TWA of 0.1 mg/m3 is recommended to protect for adverse pulmonary effects and lung damage in exposed workers.

Given the limited data available from the primary sources, it is recommended that a review of additional sources be conducted at the next scheduled review.

## Discussion and conclusions

Cobalt carbonyl and cobalt hydrocarbonyl are used in industry as a catalyst for a variety of reactions.

No toxicological data in humans are available and data in animals is limited to acute exposures. Acute exposure of rats to both compounds, in separate scenarios, resulted in adverse pulmonary effects pulmonary oedema and lung damage. Unspecified damage to the spleen and adrenals is reported in rats exposed to cobalt carbonyl. Toxicity of these compounds is possibly due to inorganic cobalt.

The current TWA for both cobalt carbonyl and cobalt hydrocarbonyl are the same concentration based on similar effects identified in acute studies in rats (ACGIH, 2018). In the absence of additional data, it is recommended that the current TWA of 0.1 mg/m3 for cobalt carbonyl and cobalt hydrocarbonyl be retained pending a review of additional sources at the next scheduled review.

## Recommendation for notations

Not classified as a carcinogen according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Not classified as a skin sensitiser or respiratory sensitiser according to the GHS.

There are insufficient data to recommend a skin notation.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 0.1 mg/m3(Cobalt carbonyl)  TWA: 0.1 mg/m3 (Cobalt hydrocarbonyl) | |
|  |
| ACGIH 2001 TLV-TWA: 0.1 mg/m3, as Co(Cobalt carbonyl)  TLV-TWA: 0.1 mg/m3, as Co (Cobalt hydrocarbonyl) |
| **Cobalt carbonyl (10210-68-1)**  TWA-TLA recommended to minimise the potential for adverse pulmonary effects, including pulmonary oedema, reported in rodents.  Summary of data:  No human data presented.  Animal data:   * LC50: 27 mg/m3 (mice, 2 h) * 2/6 rats died following exposure at 37.8 mg/m3 for 2 h * Rats exposed at 12.8 mg/m3 displayed hyperaemia of the pulmonary vessels and an emphysematous distention of the area around the alveoli * 2/6 rats died following exposure at 14.4 mg/m3 Co (83.6 mg cobalt carbonyl); * pathological examination of exposed animals showed pulmonary oedema disturbances in blood flow to the liver and damage to the spleen and adrenals * Oral LD50: 754 mg/kg in rats, 378 mg/kg in mice * Possible carcinogenic effects from Co.   Insufficient data to recommend a skin, sensitiser or carcinogen notation.  **Cobalt hydrocarbonyl (16842-03-8)**  TWA-TLA recommended to minimise the potential for adverse pulmonary effects, including pulmonary oedema, reported in rodents.  Cobalt hydrocarbonyl used as a catalyst in organic reactions.  No human data presented.  Animal data:   * Rapidly decomposes in air from the gaseous state to a solid particulate * Toxicity observed not from the hydrocarbonyl but likely the inorganic Co * LC50: 165 mg/m3 (rats, 30 min) as Co; pulmonary oedema and gross lung damage (congestion, haemorrhage, consolidation of lung areas).   Insufficient data to recommend a skin, sensitiser or carcinogen notation. |
| DFG NA NA |
| No report. |
| SCOEL NA NA |
| No report. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN NA NA |
| No report. |

### Secondary source reports relied upon

| Source |  | Year | Additional information |
| --- | --- | --- | --- |
| NICNAS |  | 2015 | **Cobalt carbonyl (10210-68-1)**   * Data poor, no toxicological data available * The presence of the hazardous metal species cobalt is sufficient to infer it is highly hazardous * Restricted hazardous chemical in the *Australian Work Health and Safety Regulations* as 'Cobalt and its compounds' with restricted use for 'abrasive blasting at a concentration of greater than 0.1% as cobalt'. |

### Carcinogenicity — non-threshold based genotoxic carcinogens

| Is the chemical mutagenic? | No |
| --- | --- |
| **The chemical is not a non-threshold based genotoxic carcinogen.** |  |

## Notations

| Source | Notations |
| --- | --- |
| SWA | NA |
| HCIS | NA |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | NA |
| ACGIH | NA |
| DFG | NA |
| SCOEL | NA |
| HCOTN | NA |
| IARC | NA |
| US NIOSH | NA |

NA = not applicable (a recommendation has not been made by this Agency); — = the Agency has assessed available data for this chemical but has not recommended any notations

### Skin notation assessment

| Calculation |
| --- |
| Insufficient data to assign a skin notation. |

### IDLH

| Is there a suitable IDLH value available? | No |
| --- | --- |

## Additional information

| Molecular weight: | 341.94 (Cobalt carbonyl)  171.98 (Cobalt hydrocarbonyl) |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = Number mg/m3; 1 mg/m3 = Number ppm |
| This chemical is used as a pesticide: |  |
| This chemical is a biological product: |  |
| This chemical is a by-product of a process: |  |
| A biological exposure index has been recommended by these agencies: | ACGIH  DFG  SCOEL |

## Workplace exposure standard history

| Year | Standard |
| --- | --- |
| Click here to enter year |  |

## References

American Conference of Industrial Hygienists (ACGIH®) (2018) TLVs® and BEIs® with 7th Edition Documentation, CD-ROM, Single User Version. Copyright 2018. Reprinted with permission. See the [*TLVs® and BEIs® Guidelines section*](http://www.acgih.org/tlv-bei-guidelines/policies-procedures-presentations) on the ACGIH website.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (2015) Cobalt carbonyl: Human health tier II assessment – IMAP report.