# Diuron

| CAS number: | 330-54-1 |
| --- | --- |
| Synonyms: | 3-(3,4-Dichlorophenyl)-1,1-dimethylurea, Dichlorfenidim, Karmex, Telvar |
| Chemical formula: | C9H10Cl2N2O |
| Structural formula: | — |

Workplace exposure standard (interim)

| TWA: | **10 mg/m3** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **Carc. 2** |
| IDLH: | **—** |
| **Sampling and analysis**: The recommended value is quantifiable through available sampling and analysis techniques. | |

## Recommendation and basis for workplace exposure standard

An interim TWA of 10 mg/m3 is recommended to minimise potential for eye, skin and upper respiratory tract irritation and possible haemopoietic (blood cell) and carcinogenic effects in exposed workers.

Given the data available from the primary sources about the application of animal study endpoints in humans, it is recommended that a review of additional sources be conducted at the next scheduled review.

## Discussion and conclusions

Diuron is a herbicide and soil steriliser that inhibits photosynthesis.

Critical effects reported in worker studies are irritation of the eyes, skin, and upper respiratory tract. Chronic feeding studies report effects including haemopoietic (blood cell) disturbances and renal or urinary carcinogenicity (ACGIH, 2018; ECHA, 2019; US EPA 1988).

The recent evaluation by the ECHA (2019) has closed data gaps evident in the assessment by the ACGIH (2018). The NOAEC for haemopoietic effects in females and males in a sub-chronic inhalation study in rats were 4.7 and 37.4 mg/m3, respectively; about eight times lower than the LOAEC (ECHA, 2019). Principally, chronic animal feeding studies indicate potential for renal and urinary epithelial tumours at the maximum tolerated dose (MTD) with a NOAEL of 1 mg/kg/day and a LOAEL of 10 mg/kg/day in rats. No mutagenic effects were noted *in vitro* or *in vivo* assays (ECHA, 2019).

The TWA of 10 mg/m3 is recommended in the interim and an assessment of additional sources is recommended as a priority.

## Recommendation for notations

Classified as a category 2 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.

A skin notation is not recommended based on the available evidence.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 10 mg/m3 | |
|  |
| ACGIH 2001 TLV-TWA: 10 mg/m3 |
| TLV-TWA intended to minimise potential for irritation to skin, eyes and upper respiratory tract, and, at higher concentrations, possible haematological effects observed in animals.  Summary of data:  TLV-TWA is based on weight of evidence of low relative toxicity observed in animals and lack of reported adverse effects from occupational exposures since 1954.  Human data:   * No significant difficulty reported in use of the substance; irritation to skin eyes and nose may occur (no further information provided)   Animal data:   * LD50: 3,400 mg/kg (male rats, oral) * Negative dermal irritation and sensitisation (guinea pigs, no further information provided) * Chronic 2 yr carcinogenicity and feeding studies in rats and dogs reported:   + NOAEL: 250 ppm in diet (rats), 125 ppm in diet (dogs); trace blood pigment abnormalities noted in some animals, trend of low RBC count observed in dogs; LOAELs not specified   + growth retardation, slight anaemia, increased erythropoiesis and haemosiderosis in spleen at 2,500 ppm in diet (rats, dogs)   + no carcinogenic effects reported, or in similar 18 mo feeding study at ≈1,400 ppm in diet (mice, no further information provided) * No adverse reproductive effects at 125 ppm in diet (rats, 3-generation study, no further information provided) * Genotoxicity and ADME data not presented.   Not classifiable as a human carcinogen based on chronic animal feeding studies. Insufficient data to recommend a STEL or notations for skin absorption or sensitisation. |
| 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 |
| --- | --- | --- | --- |
| HSE |  | 2002 | * 8 h TWA: 10 mg/m3 |
| US EPA |  | 1988 | * Principal study used to derive oral RfD * Chronic feeding study at 0, 25, 125, 250, 1,250 ppm (≈0, 0.63, 3.13, 6.25, 31.3 mg/kg/d; dogs, n=5, 2 yr): * males NOAEL of 0.63 mg/kg/d and LOAEL of 3.13 mg/kg/d * females NOAEL of 3.13 mg/kg/d and LOAEL of 6.3 mg/kg/d for decreased bw, increased erythropoiesis in bone marrow and increased liver weight * Inhalation RfD not yet established * Carcinogenic potential not yet evaluated. |
| ECHA |  | 2019 | * Human data:   + no striking symptoms in a woman who ingested 38 mg/kg   + no exposure-related effects in personnel of Diuron production * Animal data:   + repeat inhalation study using aerosol with exposure range 0, 4.1–268.1 mg/m3 (rats, 6 h/d, 5 d/wk, 14 or 28 d)   + NOAEC: 37.4 mg/m3 (males), 4.1 mg/m3 (females)   + LOAEC 268.1 mg/m3 (males), 37.4 mg/m3 (females) for changes in haematological parameters and dark, enlarged spleens   + NOAEC: 6.6 mg/m3 and LOAEC: 47.6 mg/m3 in similar study with same endpoints (rats, 21 d) * Repeat dermal dose at 50 or 250 mg/kg/d (rabbits, 3 wk) reported no adverse effects or systemic toxicity at highest dose * Non-sensitising when challenged with 50% solution (guinea pigs, solvent not specified) * Oral absorption is rapid, >95% of 5–200 mg/kg dose recovered in excreta; 57% in urine, 38% in bile, peak blood concentrations at 1.7–6.8 h after dose (rats) * Repeat feeding carcinogenicity study with exposure groups 0, 25, 250, and 2,500 ppm of diet; ≈0, 1, 10, and 111 mg/kg/d for males, ≈0, 1.7, 17, and 203 mg/kg/d for females (rats, 2 yr):   + low mortality overall   + malignant neoplasias in bladder at 2,500 ppm and renal epithelial carcinoma in some males at 2,500 ppm   + NOAEL for carcinogenic effects was 1–10 mg/kg/d (males) and 1.7–17 mg/kg/d (females)   + NOAEL: 1 mg/kg/d for urothelial lesions; no NOAEL for haematological changes in females established   + spleen fibrosis and haematological changes at 250 ppm of diet (males), 2,500 ppm of diet (females)   + similar study with mice reported NOAEL of 250 ppm; ≈51 mg/kg/d for males, ≈78 mg/kg/d for females for bladder hyperplasia * Non-mutagenic *in vitro* or *in vivo*. |

### 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 | Carc. 2 |
| HCIS | Carcinogenicity – category 2 |
| NICNAS | NA |
| EU Annex | Carcinogenicity – category 2 |
| ECHA | Carc. 2 |
| ACGIH | Carcinogenicity – A4 |
| 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 |
| --- |
| |  |  |  |  | | --- | --- | --- | --- | | Adverse effects in human case study: |  |  |  | | Dermal LD50 ≤1000 mg/kg: |  |  |  | | Dermal repeat-dose NOAEL ≤200 mg/kg: | no | -3.00 |  | | Dermal LD50/Inhalation LD50 <10: |  |  |  | | *In vivo* dermal absorption rate >10%: |  |  |  | | Estimated dermal exposure at WES >10%: |  |  |  | |  |  | -3 | **a skin notation is not warranted** | |

### IDLH

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

## Additional information

| Molecular weight: | 233.10 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 9.53 mg/m3; 1 mg/m3 = 0.105 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.

European Chemicals Agency (ECHA) (2019) Diuron – REACH assessment.

Tenth Adaptation to Technical Progress Commission Regulation (EU) No 2017/776 amending, for the purposes of its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (the CLP Regulation).

UK Health and Safety Executive (HSE) (2002) Diuron – EH64: Summary criteria for occupational exposure limits.

US Environmental Protection Authority (US EPA) (1988) Integrated Risk Information System (IRIS) Chemical Assessment Summary – Diuron.