**GreenScreen® Polymer Substance Assessment**

**[*Insert Trade Name of Polymer Substance, Manufacturer*]**

**Method Version: GreenScreen® for Safer Chemicals v1.4[[1]](#footnote-1)**

**Assessment Details[[2]](#footnote-2):**

|  |  |
| --- | --- |
| **Assessment Type:** |  |
| **Assessment Prepared By:**  |  |
| **Assessment Prepared For:** |  |
| **Date Assessment Completed:** |  |
| **Assessment Expiration Date:** |  |
| **Assessor Type:** (Licensed GreenScreen Profiler or equivalent, Authorized GreenScreen Practitioner or Unaccredited) |  |

# GreenScreen BenchmarkTM Summary

This assessment report includes a GreenScreen BenchmarkTM score and results for the polymer substance only.

**[***Trade Name of Polymer Substance*] was assigned a Benchmark Score of [*\_\_\_\_\_*] based on ... [*add rationale*].

# Hazard Classification Summary

**Table 1. GreenScreen Polymer Hazard Summary Table[[3]](#footnote-3),[[4]](#footnote-4),[[5]](#footnote-5)**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **GreenScreen Polymer Hazard Summary Table [Insert polymer trade name]** |  |
|  |  | **Group I Human** | **Group II and II\* Human** | **Ecotox** | **Fate** | **Physical** |  |
|  | **% By Weight** | **Carcinogenicity** | **Genotoxicity/Mutagenicity**  | **Reproductive Toxicity**  | **Developmental Toxicity** | **Endocrine Activity** | **Acute Toxicity** | **Systemic Toxicity** | **Neurotoxicity** | **Skin Sensitization\*** | **Respiratory Sensitization\*** | **Skin Irritation** | **Eye Irritation** | **Acute Aquatic Toxicity** | **Chronic Aquatic Toxicity** | **Persistence** | **Bioaccumulation** | **Reactivity** | **Flammability** | **GreenScreen Benchmark** |
|  |  |   |   |   |   |   |   | single | repeat\* | single | repeat\* | \* | \* |   |   |   |   |   |   |   |   |  |
| **Polymer Substance** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Residual monomer[[6]](#footnote-6)** |  |  |  |  |  |  |
| **Catalyst** |  |  |  |  |  |  |

Note: Hazard levels (Very High (vH), High (H), Moderate (M), Low (L), Very Low (vL)) in *italics* reflect estimated values, authoritative B lists, screening lists, weak analogues, and lower confidence. Hazard levels in **BOLD** font are used with good quality data, authoritative A lists, or strong analogues. Group II Human Health endpoints differ from Group II\* Human Health endpoints in that Group II Human Health endpoints have four hazard scores (i.e., vH, H, M and L) instead of three (i.e., H, M and L), and are based on single exposures instead of repeated exposures. Group II\* Human Health endpoints are indicated by an \* after the name of the hazard endpoint or after “repeat” for repeated exposure sub-endpoints.

# Polymer Properties and Constituents

**Table 2. Structural Reporting Requirements for the Polymer Substance**

| **Property** | **Description** | **Information Source** |
| --- | --- | --- |
| Molecular Formula |  |  |
| General polymer class (e.g., polyurethane) |  |  |
| Structure (include whether monomers are blocked and the pattern) |  |  |
| Number average molecular weight (Mn) |  |  |
| Weighted-average molecular weight (Mw) |  |  |
| Percent Amine Nitrogen (%A-N)[[7]](#footnote-7) |  |  |
| Reactive Functional Group (with their respective charge), and Functional Group Equivalent Weight |  |  |
|  |
| Overall Charge |  |  |
| Solubility (mg/L water @ 25 degrees C) |  |  |
| Swellability (Insoluble/non-water absorbing (“non-swellable”), or Water absorbing (“swellable”)) |  |  |
| Particle Size Distribution (microns) |  |  |
| Other key characteristics (e.g., surface chemistry) |  |  |

**Table 3. Inventory of Polymer Substance Constituents**

| **Constituent**  | **Chemical Name** | **CASRN** | **Weight Percent (Wt %) in Polymer Substance** | **Additional Information** (synonyms, etc.) |
| --- | --- | --- | --- | --- |
| **1) Polymer Substance:** |
| a) Polymer species > 0 ppm (0%) |  |  |  |  |
| b) Residual Monomer(s) ≥ 100 ppm (0.01%) |  |  |  |  |
| c) Oligomer(s) with a molecular weight (MW) below 500 Dalton |  |  |  |  |
| d) Oligomer(s) with a molecular weight (MW) below 1000 Dalton |  |  |  |  |
| e) Stabilizer(s) ≥ 100 ppm 0.01%) |  |  |  |  |
| f) Substance Impurities ≥ 100 ppm (0.01%): |
| i) Catalyst |  |  |  |  |
| ii) Other |  |  |  |  |

# Similar Polymer substances

The following similar polymers were used to apply GHS Bridging Principles.

1. Manufacturer & Tradename:
	1. Number average molecular weight:
	2. Molecular Structure(s):
	3. Rationale for similarity:

# Environmental Transformation Products

Identify feasible and relevant environmental transformation products (i.e., dissociation products, transformation products, valence states) and/or moieties of concern.[[8]](#footnote-8)

**Table 4. Environmental Transformation Products Summary**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Life Cycle Stage** | **Transformation Pathway** | **Environmental****Transformation Products** | **CASRN** | **Feasible****(Yes or No)** | **Relevant****(Yes or No)** | **GreenScreen List Translator Score or GreenScreen Benchmark Score** |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Rationale for each determination as to whether an identified environmental transformation product is feasible and relevant:

# Potential Chemicals of High Concern

**Table 5. Polymer Substance Potential Chemicals of High Concern (CoHC)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Chemical Name[[9]](#footnote-9)** | **CASRN** | **(ppm)** | **Function**(monomer or catalyst) |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

# Special case impurities

**Table 6. Special Case Impurities < 100 ppm in the polymer substance**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Chemical Name** | **CASRN** | **(ppm)** | **GreenScreen List Translator score** | **Function** | **Reason for Inclusion** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

# Hazard Classification Summary

**Instructions**

[Delete these instructions when creating a report]

**Polymer Substance**:

For all GreenScreen Hazard Endpoints:

1. Always specify the type of data used for classifying any GreenScreen Hazard Endpoint:
	1. Data for the polymer substance only,
	2. Data on a similar polymer substance applying GHS Bridging Principles, and/or
	3. Data on qualifying constituent(s).
2. Include rationale for any professional judgment used to finalize hazard classifications
3. Clearly indicate relevant exposure route (e.g., oral, inhalation, dermal)
4. Include a summary of each study

**Potential Chemicals of High Concern**:

1. Assess each potential chemical of high concern listed in Table 5 for the applicable Group I Human Health endpoints as described in Section 15.4 of the GreenScreen Guidance using the assessment method for single chemicals (Section I of Guidance).
2. Record results in the Potential Chemical of High Concern Analysis section of this template. Clearly indicate which CASRN is being evaluated for the hazard endpoint under review.
3. Always specify the type of data used to classify each GreenScreen Hazard endpoint assessed.
4. Include all references either in each hazard endpoint section or at the end of the report.

## Group I Human Health Effects (Group I Human)

### Carcinogenicity (C)

[*Polymer Substance*] was assigned a hazard classification level of [H, M, or L] for carcinogenicity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

### Mutagenicity/Genotoxicity (M)

[*Polymer Substance*] was assigned a hazard classification level of [H, M, or L] for mutagenicity/genotoxicity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

### Reproductive Toxicity (R)

[*Polymer Substance*] was assigned a hazard classification level of [H, M, or L] for reproductive toxicity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

### Developmental Toxicity incl. Developmental Neurotoxicity (D)

[*Polymer Substance*] was assigned a hazard classification level of [H, M, or L] for developmental toxicity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

### Endocrine Activity (E)

[*Polymer Substance*] was assigned a hazard classification level of [H, M, or L] for endocrine activity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

## Group II and II\* Human Health Effects (Group II and II\* Human)

*Note: Group II and Group II\* endpoints are distinguished in the v1.4 Benchmark system (the asterisk indicates repeated exposure). For Systemic Toxicity and Neurotoxicity, Group II and II\* are considered sub-endpoints. See GreenScreen Guidance v1.4, Annex 2 for more details.*

### Acute Mammalian Toxicity (AT)

[*Polymer Substance*] was assigned a hazard classification level of [vH, H, M, or L] for acute mammalian toxicity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

### Systemic Toxicity/Organ Effects incl. Immunotoxicity (ST-single)

[*Polymer Substance*] was assigned a hazard classification level of [vH, H, M, or L] for single dose systemic toxicity/organ effects based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

### Systemic Toxicity/Organ Effects incl. Immunotoxicity (ST-repeat) (Group II\*)

[*Polymer Substance*] was assigned a hazard classification level of [vH, H, M, or L] for repeated dose systemic toxicity/organ effects based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

### Neurotoxicity (N-single)

[*Polymer Substance*] was assigned a hazard classification level of [vH, H, M, or L] for single dose neurotoxicity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

### Neurotoxicity (N-repeated) (Group II\*)

[*Polymer Substance*] was assigned a hazard classification level of [H, M, or L] for repeated dose neurotoxicity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

### Skin Sensitization (SnS) (Group II\*)

[*Polymer Substance*] was assigned a hazard classification level of [H, M, or L] for skin sensitization based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

### Respiratory Sensitization (SnR) (Group II\*)

[*Polymer Substance*] was assigned a hazard classification level of [H, M, or L] for respiratory sensitization based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

### Skin Irritation/Corrosivity (IrS)

[*Polymer Substance*] was assigned a hazard classification level of [vH, H, M, or L] for skin irritation/corrosivity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

### Eye Irritation/Corrosivity (IrE)

[*Polymer Substance*] was assigned a hazard classification level of [vH, H, M, or L] for eye irritation/corrosivity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

## Ecotoxicity (Ecotox)

### Acute Aquatic Toxicity (AA)

[*Polymer Substance*] was assigned a hazard classification level of [vH, H, M, or L] for acute aquatic toxicity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

### Chronic Aquatic Toxicity (CA)

[*Polymer Substance*] was assigned a hazard classification level of [vH, H, M, or L] for chronic aquatic toxicity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data

#### Similar Polymer Substance:

* Measured Data

#### Qualifying Constituents:

* Measured Data
* Estimated Data

#### Professional Judgment:

## Environmental Fate (Fate)

### Persistence (P)

[*Polymer Substance*] was assigned a hazard classification level of [vH, H, M, L, or vL] for persistence based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data
* Estimated Data

#### Professional Judgment:

### Bioaccumulation (B)

[*Polymer Substance*] was assigned a hazard classification level of [vH, H, M, L, or vL] for bioaccumulation based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data
* Estimated Data

#### Professional Judgment:

## Physical Hazards (Physical)

### Reactivity (Rx)

[*Polymer Substance*] was assigned a hazard classification level of [vH, H, M, or L] for reactivity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data
* Estimated Data

#### Professional Judgment:

### Flammability (F)

[*Polymer Substance*] was assigned a hazard classification level of [vH, H, M, or L] for flammability based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

#### Polymer Substance:

* Measured Data
* Estimated Data

#### Professional Judgment:

# Potential Chemical of High Concern Analysis

The data summary in this section includes information on the following potential Chemical(s) of High Concern:[[10]](#footnote-10)

**Chemical Name (CASRN):**

**Also Called (List Synonyms):**

**Chemical Structure:**

### Carcinogenicity (C)

[*Monomer/Catalyst*] was assigned a hazard classification level of [H, M, or L] for carcinogenicity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

Data

* Lists
	+ *Authoritative:*
	+ *Screening:*
* Measured Data
* Estimated Data

### Mutagenicity/Genotoxicity (M)

[*Monomer/Catalyst*] was assigned a hazard classification level of [H, M, or L] for mutagenicity/genotoxicity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

Data

* Lists
	+ *Authoritative:*
	+ *Screening:*
* Measured Data
* Estimated Data

### Reproductive Toxicity (R)

[*Monomer/Catalyst*] was assigned a hazard classification level of [H, M, or L] for reproductive toxicity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

Data

* Lists
	+ *Authoritative:*
	+ *Screening:*
* Measured Data
* Estimated Data

### Developmental Toxicity incl. Developmental Neurotoxicity (D)

[*Monomer/Catalyst*] was assigned a hazard classification level of [H, M, or L] for developmental toxicity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

Data

* Lists
	+ *Authoritative:*
	+ *Screening:*
* Measured Data
* Estimated Data

### Endocrine Activity (E)

[*Monomer/Catalyst*] was assigned a hazard classification level of [H, M, or L] for endocrine activity based on [*summarize results relative to Hazard Criteria, the type of substance data used, and professional judgment used. Include comprehensive information in the following sections*].

Data

* Lists
	+ *Authoritative:*
	+ *Screening:*
* Measured Data
* Estimated Data

# References

(may be provided under each hazard endpoint or at the end of document)

# APPENDIX A: Hazard Benchmark Acronyms

**(alphabetical order)**

**(AA) Acute Aquatic Toxicity**

**(AT) Acute Mammalian Toxicity**

**(B) Bioaccumulation**

**(C) Carcinogenicity**

**(CA) Chronic Aquatic Toxicity**

**(D) Developmental Toxicity**

**(E) Endocrine Activity**

**(F) Flammability**

**(IrE) Eye Irritation/Corrosivity**

**(IrS) Skin Irritation/Corrosivity**

**(M) Mutagenicity and Genotoxicity**

**(N) Neurotoxicity**

**(P) Persistence**

**(R) Reproductive Toxicity**

**(Rx) Reactivity**

**(SnS) Sensitization- Skin**

**(SnR) Sensitization- Respiratory**

**(ST) Systemic/Organ Toxicity**

# APPENDIX B: Optional Hazard Summary Table

****

1. Use GreenScreen® Chemical Hazard Assessment Guidance (Guidance) v1.4 in Section II [↑](#footnote-ref-1)
2. **Assessment Type**: GreenScreen reports are either “UNACCREDITED” (by unaccredited person), “AUTHORIZED” (by Authorized GreenScreen Practitioner), or “CERTIFIED” (by Licensed GreenScreen Profiler or equivalent);**Assessment Prepared By**: Licensed GreenScreen Profilers must provide name of organization; Authorized GreenScreen Practitioners must provide their name;

**Assessment Prepared For**: Optional for Licensed GreenScreen Profilers, mandatory for Authorized Practitioners; **Date Assessment Completed**: Assessments by Licensed GreenScreen Profilers require quality control tracked via internal documentation;

**Assessment Expiration Date**: Assessments expire three years from the date of completion. [↑](#footnote-ref-2)
3. See Appendix A for a glossary of hazard endpoint acronyms. [↑](#footnote-ref-3)
4. See Appendix B for alternative GreenScreen Hazard Summary Table (Classification presented by exposure route). [↑](#footnote-ref-4)
5. For Systemic Toxicity and Neurotoxicity, repeated exposure data are preferred. Lack of single exposure data is not a Data Gap when repeated exposure data are available. In that case, lack of single exposure data may be represented as a shaded cell instead of DG. [↑](#footnote-ref-5)
6. The hazard summary for residual monomers and/or catalysts ≥ 100 ppm (0.01%) in the polymer substance is only included in Table 1 for Group I Human Health Hazard Endpoints where hazard classifications are used to determine the final Benchmark score of the polymer substance. [↑](#footnote-ref-6)
7. The percent of amine nitrogen (or other cationic atom) can be used in the cationic nitrogen polymer Structural Activity Relationships (SARs) for estimation of aquatic toxicity. [↑](#footnote-ref-7)
8. A moiety is a discrete chemical entity that is a constituent part or component of a substance. A moiety of concern is often the parent substance itself for organic compounds. For inorganic compounds, the moiety of concern is typically a dissociated component of the substance or a transformation product. [↑](#footnote-ref-8)
9. List includes each residual monomer present at 100 ppm (0.01%) or greater and each catalyst present at 100 ppm (0.01%) or greater in the polymer substance. [↑](#footnote-ref-9)
10. If more than one CASRN is being evaluated, copy and paste additional sections as necessary. [↑](#footnote-ref-10)