



## APPENDIX 2

## GreenScreen® and Assessment of Eight Chemicals Used to Manufacture Polymers

The GreenScreen® for Safer Chemicals was used to assess and determine the hazard level of chemicals in the Plastics Scorecard. The GreenScreen® is a chemical hazard assessment tool developed by Clean Production Action. The GreenScreen® defines four benchmarks on the path to safer chemicals, with each benchmark defining a progressively safer chemical:

**Benchmark 1**

“Avoid—Chemical of High Concern”

**Benchmark 2**

“Use but Search for Safer Substitutes”

**Benchmark 3**

“Use but Still Opportunity for Improvement”

**Benchmark 4**

“Prefer—Safer Chemical”

Each benchmark includes a set of hazard criteria that a chemical, along with its known and pre-

dicted breakdown products and metabolites, must pass. There are 18 hazard endpoints addressed in the GreenScreen® Hazard Criteria (CPA, 2014b).

To better understand the complete hazard profiles of polymer manufacturing for three plastics that prima facie seemed less hazardous than other polymers, Clean Production Action contracted with ToxServices LLC to perform GreenScreen® assessments on eight chemicals related to the polymer manufacturing of polyethylene terephthalate (PET), polylactic acid (PLA), and polypropylene. For PET the chemicals are: acetic acid, ethylene glycol, terephthalic acid, and bis-(2-hydroxyethyl) terephthalate. For PLA the chemicals are: d-glucose, lactic acid, and lactide. For polypropylene the chemical is propylene. The table below lists the verified GreenScreen® benchmarks for each of these chemicals.

The complete verified GreenScreen® assessments are available at [www.bizngo.org](http://www.bizngo.org).

The executive summaries for the eight verified GreenScreen® assessments, listed in alphabetical order below, can be found on pages 46–53:

- Acetic Acid (CAS #64-19-7)
- bis(2-Hydroxyethyl) Terephthalate (CAS #959-26-2)
- Ethylene Glycol (CAS #107-21-1)
- Glucose (CAS #50-99-7)
- Lactic Acid (CAS #50-21-5)
- Lactide (CAS #4511-42-6 and 615-95-2)
- Propylene (CAS #115-07-1)
- Terephthalic Acid (CAS #100-21-0)

## APPENDIX 1 Summary of Eight GreenScreen® Assessments

Plastic	Chemical	Chemical Abstract Services (CAS) Number	GreenScreen® Benchmark
Polyethylene Terephthalate (PET)	Acetic Acid	64-19-7	Benchmark 2
	Ethylene Glycol	107-21-7	Benchmark 1
	Terephthalic Acid	100-21-0	Benchmark 2
	bis-(2-hydroxyethyl) terephthalate	959-26-2	Benchmark Unspecified
Polylactic Acid (PLA)	D-Glucose	50-99-7	Benchmark 3
	Lactic Acid	50-21-5	Benchmark 2
	Lactide	4511-42-6; 615-95-2	Benchmark 2
Polypropylene (PP)	Propylene	115-07-1	Benchmark U/2*

■ GreenScreen® Benchmark 3
 ■ GreenScreen® Benchmark 2
 ■ GreenScreen® Benchmark 1
 ■ GreenScreen® Benchmark Unspecified

Note: \*While a data gap with propylene literally results in a Benchmark Unspecified, if that data gap was filled, no matter its level of concern, propylene would still be a Benchmark 2—therefore propylene is appropriately considered a Benchmark 2.

## GreenScreen® Executive Summary for Acetic Acid (CAS #64-19-7)

Acetic acid is a chemical that functions as an acidifier in the food and pharmaceutical industries, and has been used in commercial organic synthesis of pesticides, as well as in a variety of other applications.

Acetic acid was assigned a GreenScreen® Benchmark Score of 2 (“Use but Search for Safer Substitutes”) based on a Very High (vH) score for Group II Human Toxicity. This corresponds to GreenScreen® benchmark classification 2f (Very High T) in CPA 2011. Data gaps (dg) exist for Reproductive Toxicity (R) and Endocrine Activity (E). As outlined in CPA (2013) Section 12.2 (Step 8 – Conduct a Data Gap Analysis to assign a final Benchmark score), acetic acid meets requirements for a GreenScreen® Benchmark Score of 2 despite the hazard data gaps. In a worst-case scenario, if acetic acid were assigned a High score for the data gaps Reproductive Toxicity (R) or Endocrine Toxicity (E), it would be categorized as a Benchmark 1 Chemical.

### GreenScreen® Benchmark Score for Relevant Route of Exposure

All exposure routes (oral, dermal and inhalation) were evaluated together, as a standard approach for GreenScreen® evaluations, so the GreenScreen® Benchmark Score of 2 (“Use but Search for Safer Substitutes”) is applicable for all routes of exposure.

### GreenScreen® Hazard Ratings for Acetic Acid

Group I Human					Group II and II* Human								Ecotex		Fate		Physical		
C	M	R	D	E	AT	ST		N		SnS*	SnR*	IrS	IrE	AA	CA	P	B	Rx	F
						SINGLE	REPEATED*	SINGLE	REPEATED*										
L	L	DG	L	DG	M	M	L	L	L	M	M	vH	vH	M	L	vL	vL	M	M

Note: Hazard levels (Very High (vH), High (H), Moderate (M), Low (L), Very Low (vL)) in *italics* reflect estimated (modeled) 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 they 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. Please see end of this Appendix for a glossary of the hazard acronyms.

#### Glossary of GreenScreen® Hazard Benchmark Acronyms:

AA Acute Aquatic Toxicity	Cr Corrosion/ Irritation (Skin/ Eye)	IrS Skin Irritation/Corrosivity	Rx Reactivity
AT Acute Mammalian Toxicity	D Developmental Toxicity	M Mutagenicity and Genotoxicity	SnS Sensitization (Skin)
B Bioaccumulation	E Endocrine Activity	N Neurotoxicity	SnR Sensitization (Respiratory)
C Carcinogenicity	F Flammability	P Persistence	ST Systemic/Organ Toxicity
CA Chronic Aquatic Toxicity	IrE Eye Irritation/Corrosivity	R Reproductive Toxicity	



## GreenScreen® Executive Summary for bis(2-Hydroxyethyl) Terephthalate (CAS #959-26-2)

bis(2-Hydroxyethyl) terephthalate is a chemical that functions as a reactant in the production of polyethylene terephthalate plastics.

bis(2-Hydroxyethyl) terephthalate was assigned a GreenScreen® Benchmark Score of U (“Unspecified”) as there are insufficient data to determine a majority of the hazard rankings for this chemical. Data gaps (DG) exist for Carcinogenicity (C), Reproductive Toxicity (R), Developmental Toxicity (D), Endocrine Activity (E), Acute Toxicity (AT), Systemic Toxicity (single and repeat dose) (ST), Neurotoxicity (single and repeat dose) (N), Skin Sensitization (SnS), Respiratory Sensitization (SnR), Skin Irritation (IrS), Eye Irritation (IrE), Reactivity (Rx), and Flammability (F). The data gaps for bis(2-hydroxyethyl) terephthalate do not meet the minimum data requirements for a Benchmark Score of 2 and the available data do not suggest a high enough hazard for a Benchmark Score of 1 as detailed in CPA (2013) Section 12.2 (Step 8 – Conduct a Data Gap Analysis). In a worst-case scenario, if Bis(2-hydroxyethyl) terephthalate were assigned a High score for Carcinogenicity (C), Reproductive Toxicity (R), Developmental Toxicity (D), or Endocrine Activity (E), it would be categorized as a Benchmark 1 Chemical.

### GreenScreen® Hazard Ratings for bis(2-Hydroxyethyl) Terephthalate

Group I Human						Group II and II* Human								Ecotex		Fate		Physical	
C	M	R	D	E	AT	ST		N		SnS*	SnR*	IrS	IrE	AA	CA	P	B	Rx	F
						SINGLE	REPEATED*	SINGLE	REPEATED*										
L	L	DG	L	DG	M	M	L	L	L	M	M	vH	vH	<i>L</i>	<i>L</i>	<i>M</i>	<i>vL</i>	DG	DG

Note: Hazard levels (Very High (vH), High (H), Moderate (M), Low (L), Very Low (vL)) in *italics* reflect estimated (modeled) 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 they 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. Please see end of this Appendix for a glossary of the hazard acronyms.

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B Bioaccumulation	E Endocrine Activity	N Neurotoxicity	SnR Sensitization (Respiratory)
C Carcinogenicity	F Flammability	P Persistence	ST Systemic/Organ Toxicity
CA Chronic Aquatic Toxicity	IrE Eye Irritation/Corrosivity	R Reproductive Toxicity	

## GreenScreen® Executive Summary for Ethylene Glycol (CAS #107-21-1)

Ethylene glycol is a chemical that functions as a monomer in the production of polyethylene terephthalate (PET) plastic. It is also used as an antifreeze and deicing/anti-icing solution, as an ingredient in resins, inks, paints, waxes, heat transfer fluids, hydraulic fluids, and surfactants, and is a component of electrical boards and electrical condensers.

Ethylene glycol was assigned a GreenScreen® Benchmark Score of 1 (“Avoid – Chemical of High Concern”) as it has a High hazard score for developmental toxicity (D). This corresponds to GreenScreen® benchmark classification 1e (High T (Group I Human)) in CPA 2011.

Data gaps (DG) exist for respiratory sensitization (SnR). As outlined in CPA (2013) Section 12.2 (Step 8—Conduct a Data Gap Analysis to assign a final Benchmark score), ethylene glycol meets requirements for a GreenScreen® Benchmark Score of 1 based only on the high hazard score for developmental toxicity. In a worst-case scenario, if ethylene glycol were assigned a High score for respiratory sensitization, it would still be categorized as a Benchmark 1 Chemical.

### GreenScreen® Benchmark Score for Relevant Route of Exposure:

All exposure routes (oral, dermal and inhalation) were evaluated together, as a standard approach for GreenScreen® evaluations, so the GreenScreen® Benchmark Score of 1 (“Avoid—Chemical of High Concern”) is applicable for all routes

### GreenScreen® Hazard Ratings for Ethylene Glycol

Group I Human					Group II and II* Human								Ecotex		Fate		Physical			
C	M	R	D	E	AT	ST		N		SnS*	SnR*	IrS	IrE	AA	CA	P	B	Rx	F	
						SINGLE	REPEATED*	SINGLE	REPEATED*											
L	L	M	<b>H</b>	L	M	vH	<b>H</b>	<b>H</b>	L	L	DG	M	M	L	L	vL	L	L	L	L

Note: Hazard levels (Very High (vH), High (H), Moderate (M), Low (L), Very Low (vL)) in *italics* reflect estimated (modeled) 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 they 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. Please see end of this Appendix for a glossary of the hazard acronyms.

#### Glossary of GreenScreen® Hazard Benchmark Acronyms:

AA Acute Aquatic Toxicity	Cr Corrosion/ Irritation (Skin/ Eye)	IrS Skin Irritation/Corrosivity	Rx Reactivity
AT Acute Mammalian Toxicity	D Developmental Toxicity	M Mutagenicity and Genotoxicity	SnS Sensitization (Skin)
B Bioaccumulation	E Endocrine Activity	N Neurotoxicity	SnR Sensitization (Respiratory)
C Carcinogenicity	F Flammability	P Persistence	ST Systemic/Organ Toxicity
CA Chronic Aquatic Toxicity	IrE Eye Irritation/Corrosivity	R Reproductive Toxicity	



## GreenScreen® Executive Summary for Glucose (CAS #50-99-7)

Glucose is a chemical that functions as a food component and additive, as a nutrient replenisher in pharmaceuticals and a fluid replenisher.

Glucose (anhydrous solid) was assigned a GreenScreen® Benchmark Score of 3 (“Use But Still Opportunity for Improvement”) as it has moderate Rx (Reactivity). This corresponds to GreenScreen® benchmark classification 3d in CPA 2011. A data gap exists for E (Endocrine Activity). Glucose meets the criteria for a benchmark 3 chemical despite the data gap. In a worst case scenario, if glucose were assigned a score of High for E, it would be classified as a GreenScreen® benchmark 1 chemical.

### GreenScreen® Benchmark Score for Relevant Route of Exposure:

All exposure routes (oral, dermal and inhalation) were evaluated together, as a standard approach for GreenScreen® evaluations, so the GreenScreen® Benchmark Score of 3 (“Use But Still Opportunity for Improvement”) is applicable for all routes of exposure.

### GreenScreen® Hazard Ratings for Glucose

Group I Human					Group II and II* Human								Ecotex		Fate		Physical		
C	M	R	D	E	AT	ST		N		SnS*	SnR*	IrS	IrE	AA	CA	P	B	Rx	F
						SINGLE	REPEATED*	SINGLE	REPEATED*										
<i>L</i>	<i>L</i>	<i>L</i>	<i>L</i>	DG	<i>L</i>	<i>L</i>	<i>L</i>	<i>L</i>	<i>L</i>	<i>L</i>	<i>L</i>	<i>L</i>	<i>L</i>	<i>L</i>	<i>L</i>	<i>vL</i>	<i>vL</i>	<b>M</b>	<b>L</b>

Note: Hazard levels (Very High (vH), High (H), Moderate (M), Low (L), Very Low (vL)) in *italics* reflect estimated (modeled) 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 they 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. Please see end of this Appendix for a glossary of the hazard acronyms.

#### Glossary of GreenScreen® Hazard Benchmark Acronyms:

AA Acute Aquatic Toxicity	Cr Corrosion/ Irritation (Skin/ Eye)	IrS Skin Irritation/Corrosivity	Rx Reactivity
AT Acute Mammalian Toxicity	D Developmental Toxicity	M Mutagenicity and Genotoxicity	SnS Sensitization (Skin)
B Bioaccumulation	E Endocrine Activity	N Neurotoxicity	SnR Sensitization (Respiratory)
C Carcinogenicity	F Flammability	P Persistence	ST Systemic/Organ Toxicity
CA Chronic Aquatic Toxicity	IrE Eye Irritation/Corrosivity	R Reproductive Toxicity	

## GreenScreen® Executive Summary for Lactic Acid (CAS #50-21-5)

Lactic acid is a chemical that functions as an acidulant in food, beverage and bakery products; it is used in the textile and leather industries as a mordant in printing woolen goods, a solvent for water-insoluble dyes, and to reduce chromates in mordanting wool, and dehairing, plumping, and decalcifying hides, and in the chemical industry for various purposes.

### GreenScreen® Benchmark Score for Relevant Route of Exposure:

Lactic acid (in liquid form) was assigned a GreenScreen® Benchmark Score of 2 (“Use but Search for Safer Substitutes”) as it has a Very High hazard score for Skin and Eye Irritation/Corrosivity which are Group II\* Human endpoints, due to the corrosiveness of highly concentrated lactic acid solutions. This corresponds to GreenScreen® benchmark classification 2f in CPA 2011. A data gap (DG) exists for Respiratory Sensitization (SnR\*). Although a data gap exists, lactic acid meets requirements for a GreenScreen® Benchmark Score of 2 as outlined in CPA (2013) Section 12.2 (Step 8 – Conduct a Data Gap Analysis to assign a final Benchmark score), even with its hazard data gap. In a worst-case scenario, if lactic acid were assigned a H score for respiratory sensitization, the overall Benchmark Score for lactic acid will not be affected because it has been assigned hazard scores of vH for both eye and skin irritation.

### GreenScreen® Hazard Ratings for Lactic Acid

Group I Human					Group II and II* Human								Ecotox		Fate		Physical		
C	M	R	D	E	AT	ST		N		SnS*	SnR*	IrS	IrE	AA	CA	P	B	Rx	F
						SINGLE	REPEATED*	SINGLE	REPEATED*										
L	L	L	L	L	M	L	L	M	L	L	DG	vH	vH	L	L	L	vL	L	L

Note: Hazard levels (Very High (vH), High (H), Moderate (M), Low (L), Very Low (vL)) in *italics* reflect estimated (modeled) 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 they 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. Please see end of this Appendix for a glossary of the hazard acronyms.

#### Glossary of GreenScreen® Hazard Benchmark Acronyms:

AA Acute Aquatic Toxicity	Cr Corrosion/ Irritation (Skin/ Eye)	IrS Skin Irritation/Corrosivity	Rx Reactivity
AT Acute Mammalian Toxicity	D Developmental Toxicity	M Mutagenicity and Genotoxicity	SnS Sensitization (Skin)
B Bioaccumulation	E Endocrine Activity	N Neurotoxicity	SnR Sensitization (Respiratory)
C Carcinogenicity	F Flammability	P Persistence	ST Systemic/Organ Toxicity
CA Chronic Aquatic Toxicity	IrE Eye Irritation/Corrosivity	R Reproductive Toxicity	



## GreenScreen® Executive Summary for Lactide (CAS #4511-42-6 and 615-95-2)

Lactide is a chemical that functions as a pH regulator in food, a swelling agent in bakery products, a bacteriostat in meat emulsions, a reagent for chemical reactions that do not produce water molecules, a destabilizer for production of porous ceramics, and an electrolyte in lithium batteries.

Lactide was assigned a GreenScreen® Benchmark Score of 2 (“Use but Search for Safer Substitutes”) as it was assigned a score of High for Skin Irritation (IrS) and a score of Very High for Eye Irritation (IrE) for Group II Human. This corresponds to GreenScreen® benchmark classification 2f in CPA 2011. A data gap (DG) exist on Respiratory Sensitization (SnR\*). As outlined in CPA (2013) Section 12.2 (Step 8 – Conduct a Data Gap Analysis to assign a final Benchmark score), lactide meets requirements for a GreenScreen® Benchmark Score of 2 despite the hazard data gap. In a worst-case scenario, if lactide were assigned a High score for the data gap SnR\*, it would still be categorized as a Benchmark 2 Chemical.

### GreenScreen® Benchmark Score for Relevant Route of Exposure:

All exposure routes (oral, dermal and inhalation) were evaluated together, as a standard approach for GreenScreen® evaluations, so the GreenScreen® Benchmark Score of 2 (“Use but search for safer substitutes”) is applicable for all routes of exposure.

### GreenScreen® Hazard Ratings for Lactide

Group I Human					Group II and II* Human								Ecotex		Fate		Physical		
C	M	R	D	E	AT	ST		N		SnS*	SnR*	IrS	IrE	AA	CA	P	B	Rx	F
						SINGLE	REPEATED*	SINGLE	REPEATED*										
L	L	L	L	L	L	L	L	M	L	L	DG	H	vH	M	M	M	vL	L	L

Note: Hazard levels (Very High (vH), High (H), Moderate (M), Low (L), Very Low (vL)) in *italics* reflect estimated (modeled) 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 they 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. Please see end of this Appendix for a glossary of the hazard acronyms.

#### Glossary of GreenScreen® Hazard Benchmark Acronyms:

AA Acute Aquatic Toxicity	Cr Corrosion/ Irritation (Skin/ Eye)	IrS Skin Irritation/Corrosivity	Rx Reactivity
AT Acute Mammalian Toxicity	D Developmental Toxicity	M Mutagenicity and Genotoxicity	SnS Sensitization (Skin)
B Bioaccumulation	E Endocrine Activity	N Neurotoxicity	SnR Sensitization (Respiratory)
C Carcinogenicity	F Flammability	P Persistence	ST Systemic/Organ Toxicity
CA Chronic Aquatic Toxicity	IrE Eye Irritation/Corrosivity	R Reproductive Toxicity	

## GreenScreen® Executive Summary for Propylene (CAS #115-07-1)

Propylene is a major chemical intermediate in the chemical industry and in the production of a large range of chemicals.

Propylene (gas) was assigned a GreenScreen® Benchmark Score of U (“Unspecified”). This chemical has High Flammability and High Reactivity, which corresponds to GreenScreen® benchmark classification 2g (High Flammability or High Reactivity) in CPA 2011a. Data gaps (dg) exist for Skin Irritation (IrS), Skin Sensitization (SnS\*) and Respiratory Sensitization (SnR\*). However, as outlined in CPA (2013) Section III (1) (Benchmarking Chemicals with Data Gaps), propylene fails the requirements for a GreenScreen® Benchmark Score of 2 due to data gaps. As a result, a Benchmark Score of U is assigned. In a worst-case scenario, if propylene were assigned a High score for these data gaps (Skin irritation, Skin and/or Respiratory Sensitization), it would be categorized as a Benchmark 2 Chemical and be classified as both 2f (Very High T or High T) and 2g (High Flammability or High Reactivity). Therefore, the highest and lowest possible Benchmark scores for propylene are both Benchmark 2.

### GreenScreen® Benchmark Score for Relevant Route of Exposure:

All exposure routes (oral, dermal and inhalation) were evaluated together, as a standard approach for GreenScreen® evaluations, so the GreenScreen® Benchmark Score of U (“Unspecified”) is applicable for all routes of exposure.

### GreenScreen® Hazard Ratings for Lactide

Group I Human					Group II and II* Human										Ecotex		Fate		Physical	
C	M	R	D	E	AT	ST		N		SnS*	SnR*	IrS	IrE	AA	CA	P	B	Rx	F	
						SINGLE	REPEATED*	SINGLE	REPEATED*											
<i>L</i>	<i>L</i>	<i>L</i>	<i>L</i>	<i>L</i>	<i>L</i>	<i>L</i>	<i>L</i>	<b>M</b>	<i>L</i>	DG	DG	DG	<i>M</i>	<i>M</i>	<i>M</i>	<i>L</i>	<i>vL</i>	<i>H</i>	<i>H</i>	

Note: Hazard levels (Very High (vH), High (H), Moderate (M), Low (L), Very Low (vL)) in *italics* reflect estimated (modeled) 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 they 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. Please see end of this Appendix for a glossary of the hazard acronyms.

#### Glossary of GreenScreen® Hazard Benchmark Acronyms:

AA Acute Aquatic Toxicity	Cr Corrosion/ Irritation (Skin/ Eye)	IrS Skin Irritation/Corrosivity	Rx Reactivity
AT Acute Mammalian Toxicity	D Developmental Toxicity	M Mutagenicity and Genotoxicity	SnS Sensitization (Skin)
B Bioaccumulation	E Endocrine Activity	N Neurotoxicity	SnR Sensitization (Respiratory)
C Carcinogenicity	F Flammability	P Persistence	ST Systemic/Organ Toxicity
CA Chronic Aquatic Toxicity	IrE Eye Irritation/Corrosivity	R Reproductive Toxicity	





## GreenScreen® Executive Summary for Terephthalic Acid (CAS #100-21-0)

Terephthalic acid is a chemical that functions as a monomer for polyester which has a variety of applications including adhesives, tire cord, beverage bottles and magnetic recording tapes. In addition, terephthalic acid is used as an OH trap in the fluorescent detection of hydroxylated terephthalate for monitoring OH generation in plant tissue under heavy metal stresses.

TPA was assigned a GreenScreen® Benchmark Score of 2 (“Use but Search for Safer Substitutes”) as it has Moderate (M) Toxicity (T) for Carcinogenicity, Endocrine Activity, Reproductive Toxicity and Developmental Toxicity (Group I Human). This corresponds to GreenScreen® benchmark classification 2e in CPA 2011. A data gap (DG) exists for Respiratory Sensitization (SnR\*). Although a data gap exists, TPA meets requirements for a GreenScreen® Benchmark Score of 2 as outlined in CPA (2013) Section 12.2 (Step 8 – Conduct a Data Gap Analysis to assign a final Benchmark score), even with its hazard data gap. In the worst case scenario, TPA would still be categorized as a Benchmark 2 chemical even if it were assigned a High score for the data gap for Respiratory Sensitization.

### GreenScreen® Benchmark Score for Relevant Route of Exposure:

All exposure routes (oral, dermal and inhalation) were evaluated together, as a standard approach for GreenScreen® evaluations, so the GreenScreen® Benchmark Score of 2 (“Use but search for safer substitutes”) is applicable for all routes of exposure.

### GreenScreen® Hazard Ratings for Terephthalic Acid

Group I Human						Group II and II* Human								Ecotex		Fate		Physical	
C	M	R	D	E	AT	ST		N		SnS*	SnR*	IrS	IrE	AA	CA	P	B	Rx	F
						SINGLE	REPEATED*	SINGLE	REPEATED*										
<i>M</i>	<i>L</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>L</i>	<i>M</i>	<i>L</i>	<i>M</i>	<i>L</i>	<i>L</i>	DG	<i>L</i>	<i>M</i>	<i>L</i>	<i>L</i>	<i>vL</i>	<i>vL</i>	<i>M</i>	<i>L</i>

Note: Hazard levels (Very High (vH), High (H), Moderate (M), Low (L), Very Low (vL)) in *italics* reflect estimated (modeled) 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 they 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. Please see end of this Appendix for a glossary of the hazard acronyms.

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