Supplementary Information (SI) for Environmental Science: Advances.

Percent Plastic Polymer Screening Methodology

We define plastic polymers as organic or partially-organic polymeric materials (exclusive of additives), excluding unmodified natural polymers.[1] This definition includes all thermoplastics, thermosets, and elastomers (including rubber and silicone). It includes polymers if they are synthetic (polymerized from either petrochemical or biobased monomers), or semisynthetic (natural polymers such as cellulose and natural rubber that are chemically modified, such as rayon), but does not include naturally occurring polymers (e.g., cellulose, cotton, natural rubber).[2]

We queried all Common Products in Pharos, omitting seven Common Products that capture content of post-consumer recycled materials, not finished products. In the remaining Common Products (N=239) we identified 716 unique chemicals or substances as identified by their Chemical Abstracts Service Registry Number (CASRN) or, for materials without a CASRN, by their unique material identification number from the Pharos database. We created a decision tree (Figure S1) and screened for substances meeting the definition of plastic polymer above using R version 4.5.0.[3] We first identified CASRNs from Common Products that appeared on the Canadian Environmental Protection Act 1999 (CEPA) Domestic Substances List (DSL). We then classified content as a plastic polymer if its substance category was “polymer” or unknown or variable composition, complex reaction products or biological materials (UVCBs) classified as “UVCBs-polymer.” [4,5] We used the CEPA DSL because it is an authoritative list containing over 22,000 chemicals and it characterizes over 4,000 of these substances in one of these two polymer categories.

Substances on the CEPA DSL that were not in either of these two categories were not identified as plastic polymers, unless the substance name indicated that it was a silicone polymer (Table S3a). The CEPA DSL classifies silicone polymers as UVCBs-organic. Since silicones meet the definition of plastic polymer described above, any silicones identified in the CEPA DSL were identified as plastic polymers. We screened all remaining substances identified in Common Products that were not listed or had no classification in the CEPA DSL using the process and search terms shown in Table S3b. We reviewed the results and found two CASRNs that were identified in the CEPA DSL as UVCBs polymers, which were inorganic salts. Since these two salts did not meet the definition of plastic polymer above, we hard-coded these as exceptions in the R script, so they would not be flagged as plastic polymers.

We also screened Common Products for chemicals that react to form polyurethane, epoxy, or acrylic polymers (common reactive polymer chemistry in building products) when applied. We first identified products containing chemicals that combine with other reactants in the product, gases in air, or added water (Table S4). We screened the substances in these products against an additional series of search terms to identify substance names suggesting the presence of plastic polymer precursors (Table S3c).

We determined the total percent weight of plastic polymers in each Common Product by summing the percent weight of all substances flagged as plastic polymers or plastic polymer precursors.

We also screened substance names using a series of regular expressions to identify the percent weight of the specific polymers in each product (Table S5). The resulting data set (Table S1) includes the total percent weight plastic polymers and polymer types for each product. Substances that did not have a plastic polymer type captured by these regular expressions were reviewed and manually assigned a plastic polymer type. A number of substances were present in small quantities or their names suggested chemistries that did not allow them to be readily categorized in one of the plastic polymer categories already included in the analysis. These substances were designated “other” and their chemical name, CASRN, and percent weight are included in Table S1 under the heading ‘Chemical Identities of Plastic Polymer Types Designated as "Other"’.

References:

1 Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the Reduction of the Impact of Certain Plastic Products on the Environment. *Off. J. Eur. Union* 2019, **155** (12.6.2019), 1–19.

2 L. Trasande, R. Krithivasan, K. Park, V. Obsekov and M. Belliveau, *J. Endocr. Soc.*, DOI: 10.1210/jendso/bvad163.

3 R Core Team, R: A Language and Environment for Statistical Computing (version 4.3.1), R Foundation for Statistical Computing, Vienna, Austria, 2023.

4 Environment and Climate Change Canada, Detailed categorization results of the Domestic Substances List - Open Government Portal, https://open.canada.ca/data/en/dataset/1d946396-cf9a-4fa1-8942-4541063bfba4, (accessed March 7, 2025).

5 Health Canada, Chemical substances glossary, https://www.canada.ca/en/health-canada/services/chemical-substances/chemical-substances-glossary.html, (accessed March 7, 2025).

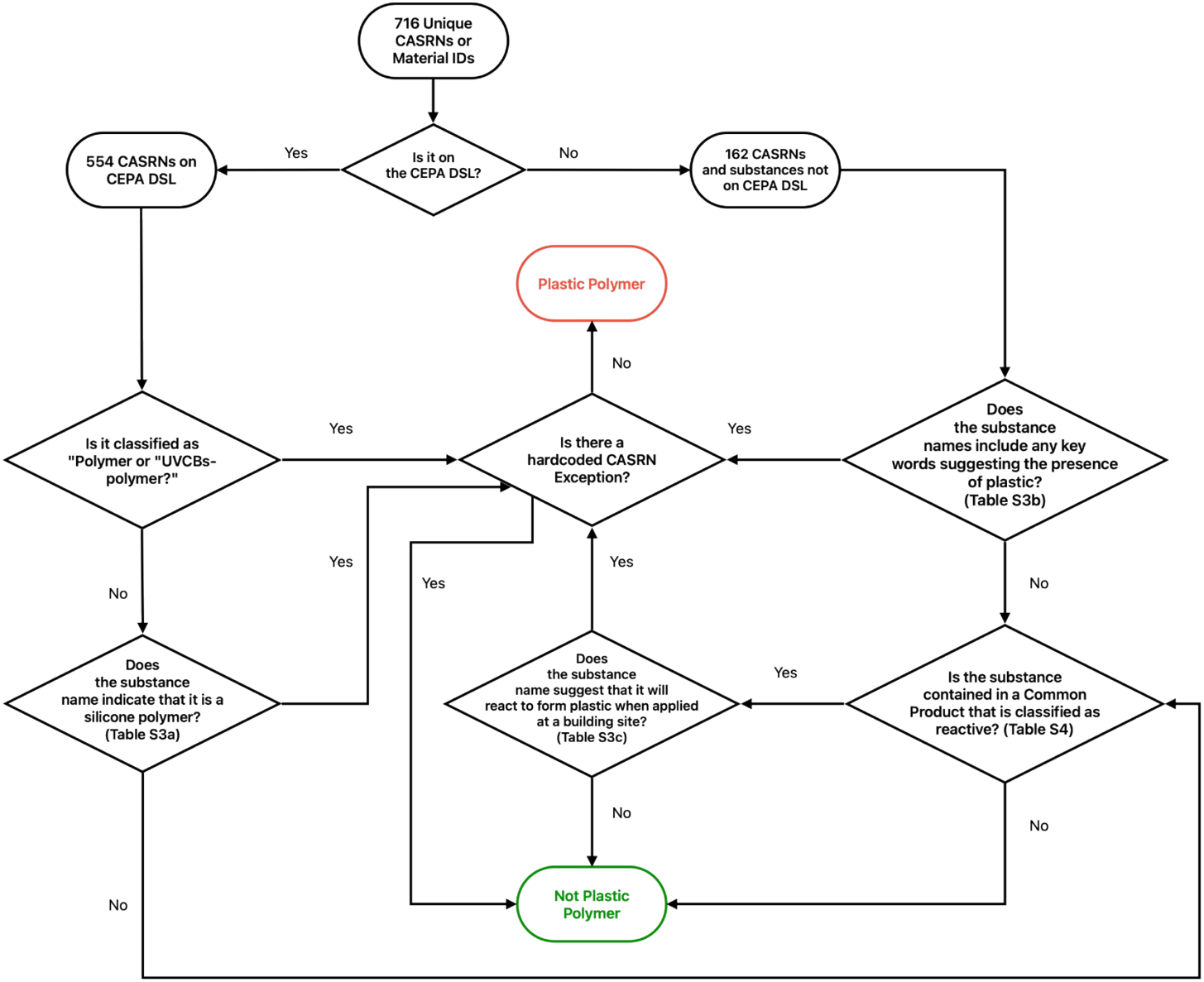

Figure S1. Plastic Polymer Assignment Decision Tree

Table S3a. Regular expressions used to screen substances on the Canadian Environmental Protection Act 1999 (CEPA) Domestic Substances List (DSL) for silicone chemistry.

Search Term	Notes
silicone	silicone
dimethicone	dimethicone

Table S3b. Regular expressions used to screen all products for keywords suggesting polymer chemistry, including those not found on the CEPA DSL.

Search Term	Notes
poly(?!chlorinated\\s?biphenyl|cyclic\ \s?aromatic\\s?hydrocarbon)	captures anything containing 'poly', excluding polychlorinated biphenyls and polycyclic aromatic hydrocarbons
resin	captures anything containing 'resin'
(?<!natural\\s)rubber	rubber, excluding 'natural rubber'
silicone	silicone
nylon	nylon
epoxy	epoxy
(\\sabs\\s)	Acrylonitrile butadiene styrene
elastomer	elastomer
dimethicone	dimethicone

Table S3c. Regular expressions used to screen reactive products for precursors to polymers.

Search Terms	Notes
diisoc	Flag isocyanates that are common precursors to polyurethanes
isocya	Flag isocyanates that are common precursors to polyurethanes
bisphenol	Flag bisphenols, common in epoxy chemistry
glycidyl\\s?ether	Flag glycidyl ethers, which react to form epoxies, polyurethanes, and polyesters
acryl	Captures precursors to acrylic polymers

All searches listed in Tables S3a-c above were conducted in R Version 4.5.0 using the str_detect() function from the stringr library, and were case-insensitive. Search terms are conservative. They are intentionally simple and were designed to err on the side of missing plastic content to avoid identifying non-plastic content as plastic.

Table S4. Reactive Product Designations for All Common Products.

Common Product	Reactive?
Drywall Joint Compound	FALSE
Water-based Penetrating Concrete Sealer	TRUE
Liquid-applied Moisture Barrier	TRUE
Concrete Cork Expansion Joint	FALSE
Acrylic Firestop Joint Spray	FALSE
XPS Insulation (extruded polystyrene)	FALSE
Trivalent Chromate Pretreatment	FALSE
Aluminum Primer	TRUE
Elastic Facade Joint Sealant	TRUE
Heterogeneous Vinyl Resilient Sheet Flooring	FALSE
Quartz Countertops	FALSE
Low VOC Flat Acrylic Ceiling Paint	FALSE
IGU Silicone Sealant	TRUE
Curtain Wall Seals - Rubber (Ethylene Propylene Diene Monomer) Gasket	FALSE
Reinforced EPDM Roofing Membrane	FALSE
Drywall Screws	FALSE
Low VOC Eggshell Acrylic Paint	FALSE
Drywall Joint Tape	FALSE
Drywall Acoustical Sealant	FALSE
Pipe Thread Sealant	FALSE
Solvent Weld Soil and Waste Pipe	FALSE
HDPE Water Pipe	FALSE
Type X Drywall	FALSE
Drywall (FGD)	FALSE
Welded Wire Mesh Concrete Reinforcement	FALSE
Foundation Waterproofing Sheet Primer	FALSE
Solvent-Based Asphalt Dampproofing	TRUE
Plywood	FALSE
Particleboard	FALSE
Wood Framing	FALSE
Fire Retardant Lumber	FALSE
EPS Insulation (expanded polystyrene)	FALSE
Solvent-based Single-ply Roofing Membrane Adhesive	FALSE
Medium Density Fiberboard (MDF)	FALSE
High Performance Coatings (Acrylic)	FALSE
Acrylic Flooring Adhesive	FALSE
Polyurethane Flooring Adhesive	TRUE

Vinyl Composition Tile	FALSE
Hardwood Flooring (prefinished)	FALSE
Bamboo Flooring (engineered)	FALSE
Cross Laminated Timber (CLT)	FALSE
Polypropylene Water Pipe	FALSE
PEX Water Pipe	FALSE
Polyethylene Pipe Insulation	FALSE
Pipe Insulation Adhesives	FALSE
Glulam	FALSE
Gypsum Spray Fireproofing	TRUE
Laminated Glass	FALSE
Fiberglass Duct Board Insulation	FALSE
Solid Surface Countertop	FALSE
Polyester Powder Coating	TRUE
Oriented Strand Board	FALSE
Vinyl Wall Base	FALSE
Horizontal Louver Blinds (PVC) Slats	FALSE
Orange Peel Texture	FALSE
Unfaced Fiberglass Batt Insulation	FALSE
Base Cabinetry	FALSE
Ready Mixed Concrete (Structural, NWC 3000-4000 psi)	TRUE
Sub-Floor Smoothing Compound	TRUE
Cementitious Grouting	TRUE
Double Pane IGU	FALSE
Ready Mixed Concrete (Structural, LWC 3000-4000 psi)	TRUE
Mineral Fiber Batt Insulation	FALSE
Acrylic Intumescent Firestop Sealant	FALSE
Vinyl-Faced Gypsum Acoustical Ceiling Panels	FALSE
Mineral Fiber Acoustical Ceiling Panels	FALSE
Expanded Cork Board Insulation	FALSE
Wet-Blown Cellulose Insulation	FALSE
Fiber-reinforced Water-based HVAC Duct Sealant	FALSE
Blown-in Cellulose Insulation	FALSE
Homogenous Virgin Rubber Flooring	FALSE
Natural Stone Countertop Sealer	TRUE
Waterborne Flooring Finish	FALSE
Unbonded Blown-in Fiberglass Insulation	FALSE
Closed Cell Elastomeric Foam Pipe Insulation	FALSE
Unfaced Cellulose/Cotton Batt Insulation	FALSE

Single Component Spray Polyurethane Foam	TRUE
Fireblock Single Component Spray Polyurethane Foam	TRUE
Fiberglass Pipe Insulation	FALSE
Non-Combustible Sodium Silicate Caulk	TRUE
Acrylic Latex Sealant	FALSE
Siliconized Latex Sealant	TRUE
One-Component Silicone Sealant	TRUE
Single-Component Polyurethane Sealant	TRUE
Spray-applied Fiberglass Insulation	FALSE
Mineral Wool Board Insulation	FALSE
Foil-backed Butyl Tape	FALSE
Silyl-terminated Polyether Sealant	TRUE
FSK-faced Fiberglass Duct Wrap	FALSE
High Density Fiberboard (HDF)	FALSE
Hollow Core Wood Veneer Door	FALSE
Solvent-based Butyl Sealant	FALSE
Polyvinyl Acetate (PVA) Interior Wood Glue	TRUE
ASJ-Faced Fiberglass Board Insulation	FALSE
Wood Fiber Insulation Boards	FALSE
Mineral Silicate Paint	TRUE
Mold and Moisture Resistant Drywall	FALSE
Tire-derived Crumb Rubber	FALSE
EPDM Infill for Synthetic Turf	FALSE
Thermoplastic Elastomer (TPE) Infill for Synthetic Turf	FALSE
Solvent-based HVAC Duct Sealant	FALSE
Water-based Penetrating Grout Sealer (Water Repelling)	TRUE
Water-based Penetrating Grout Sealer (Water and Oil Repelling)	TRUE
Polymer-modified Cementitious Tile Grout	TRUE
Latex-Portland Cement Mortar (Thinset)	TRUE
Water-based Stain-blocking Primer/Sealer	FALSE
Post-Consumer Wood Fiber (OSB, Plywood, and Pallet Waste)	FALSE
Post-consumer Flexible PVC (Multiple Streams)	FALSE
Post-Consumer Paperboard	FALSE
Post-consumer Nylon 6 and 6,6	FALSE
Post-Consumer Newsprint	FALSE
Chlorinated Polyvinyl Chloride (CPVC) Water Pipe	FALSE
Polyvinyl Chloride (PVC) Water Pipe	FALSE
Cold Applied Emulsified Asphalt Dampproofing	TRUE
Inorganic Silicate Concrete Densifier	TRUE

Universal Paint Colorants	FALSE
Water-based Paint Colorants	FALSE
Crystalline Concrete Waterproofing	TRUE
Low-VOC Solvent-based TPO/EPDM Roofing Membrane Adhesive	FALSE
Water-based Single-ply Roofing Membrane Adhesive	FALSE
Asphalt Primer for Built-Up Roofing	TRUE
PE-RT Potable Water Pipe	FALSE
Solventborne alkyd primer	TRUE
Water-based Acrylic Concrete Dye	FALSE
Waterborne alkyd primer	TRUE
High-Solids Silicone Roof Coating	TRUE
Single-Component Polyurethane Fluid-Applied Waterproofing	TRUE
Single-component Silicone Structural Glazing Sealant	TRUE
Single-component Silicone Weather Sealant	TRUE
Mildew-resistant Acetoxy-cure Silicone Sealant	TRUE
Silicone Firestop Joint Spray	TRUE
Silicone Firestop Sealant	TRUE
Firestop Putty	FALSE
Firestop Mortar	TRUE
Acrylic Firestop Sealant	FALSE
Water-reducing High Range Concrete Admixtures (Superplasticizers)	FALSE
Air Entraining Concrete Admixture	FALSE
One-Part Expanding Firestop Spray Foam	TRUE
Open Cell Backer Rod	FALSE
Nail Laminated Timber	FALSE
Supplementary Cementitious Materials	TRUE
Waterborne Penetrating Wood Sealer	TRUE
STPE Fluid-Applied Weather Barrier	TRUE
Cementitious Fireproofing (Medium Density 22-30 pcf)	TRUE
CPVC Solvent Cement	FALSE
PVC and CPVC Pipe Primer	FALSE
Oil-Based Penetrating Wood Sealer	TRUE
Solvent-Based Thin Film Intumescent Coating	FALSE
Water Based Thin Film Intumescent Coating	FALSE
Universal Metal Primer	TRUE
Water-Based Dissipating Resin Concrete Curing Compound	FALSE
Wood Fiber Acoustical Panels	FALSE
Fiberglass Window Frame	FALSE
Rigid PVC Window Profile	FALSE

Sheep's Wool Felt	FALSE
Plastic Acoustical Panels	FALSE
Lime Plaster	TRUE
Gypsum Veneer Plastering	TRUE
Acrylic Plaster	FALSE
Natural Clay Plastering	FALSE
Glass Mat-Faced Interior Gypsum Board	FALSE
Magnesium Oxide Board	FALSE
Composite Window Frame	FALSE
Fiber Cement Siding/Cladding	FALSE
Vinyl Siding	FALSE
Brick Siding	FALSE
Solid Wood Siding	FALSE
Luxury Vinyl Tile (LVT)	FALSE
Linoleum Flooring	FALSE
Rebar (40,60,75,80 Grade Steel)	FALSE
Hydrophilic Concrete Joint Waterstop	FALSE
Vapor Barrier	FALSE
Structural Steel (I-beams)	FALSE
Composite Metal Decking	FALSE
Pre-compressed Polyurethane Joint Seal	FALSE
Anodized Aluminum Curtainwall Extrusion	FALSE
Vinyl-Coated Wire Shelving	FALSE
High Pressure Laminate	FALSE
Gelcoat Fiberglass Bathware	FALSE
Hot-Applied Asphalt Waterproofing/Roofing	TRUE
Acoustical Metal Ceiling Tiles	FALSE
Steel Studs	FALSE
Steel Pipe Hanger	FALSE
Copper Water Pipe	FALSE
Galvanized Steel Ducts	FALSE
Carbon Steel Sprinkler Pipe	FALSE
Steel Conduit	FALSE
Foundation Waterproofing Sheet Membrane	TRUE
Closed Cell Spray Foam Insulation	TRUE
Reinforced Thermoplastic Polyolefin (TPO) Roofing Membrane	FALSE
PVDF-Coated Aluminum Curtainwall Extrusion	FALSE
High Performance Coating (Epoxy)	TRUE
Epoxy Flooring Adhesive	TRUE

Carpet Tile w/Nylon 6 Fiber, Polyolefin Backing, and Limestone Filler	FALSE
Polycarbonate Cladding	FALSE
Structural Steel Cables	FALSE
Cast Iron Pipes	FALSE
Reinforced PVC Roofing Membrane	FALSE
Steel Door	FALSE
Fluid-Applied Flooring	TRUE
Steel Bolt Assembly (General Use)	FALSE
Steel Bolt Assembly (Structural)	FALSE
Cultured Marble Surfaces	FALSE
Kraft-faced Fiberglass Batt Insulation	FALSE
Concrete Masonry Unit	FALSE
Glass Fiber Reinforced Polymer Decking	FALSE
Glass Fiber Reinforced Polymer Water Storage Tank	FALSE
Granular Fill	FALSE
Polyisocyanurate Wall Insulation Board	FALSE
Broadloom Carpet (Nylon Facing, SBR Latex Backing)	FALSE
Exterior Door w/IGU	FALSE
PVC-free Resilient Flooring (Homogeneous)	FALSE
Multilayer Resilient Flooring (WPC)	FALSE
Cork Flooring (Floating Floor)	FALSE
Cork Flooring (Glue-down)	FALSE
Cementitious Backerboard	FALSE
Peel and Stick Flooring Adhesive	FALSE
Ceramic Tile	FALSE
PVC-free Resilient Flooring (Heterogeneous)	FALSE
Cold fluid-applied PMMA waterproofing	TRUE
Bentonite Sheet Waterproofing	FALSE
Modified Bituminous SBS Membrane Roofing	FALSE
Spray Polyurethane Foam (SPF) Roofing	TRUE
Torch Applied APP Bitumen Roofing	TRUE
Two-Component Polyurethane Sealant	TRUE
Firestop Pillow	FALSE
Dowel Laminated Timber	FALSE
Epoxy Thin-Film Intumescent Coating	TRUE
Fully-Bonded Pre-Applied Waterproofing Membrane	TRUE
Portland Cement Terrazzo Flooring	TRUE
Biobased Fluid-Applied Resilient Flooring	TRUE
Fiberglass Acoustical Ceiling Panel	FALSE

PET Acoustical Panels	FALSE
Aluminum Window Frame	FALSE
Stretched-Fabric Acoustical Systems (PVC-Free)	FALSE
Composite Wood Acoustical Panels	FALSE
Fabric-wrapped Acoustical Wall Panels	FALSE
Portland Cement Plastering	TRUE
Gypsum Plaster	TRUE
Acoustical Plastering System	TRUE
Gypsum Veneer Base	FALSE
PVDF-Coated Aluminum Cladding	FALSE
Roof Edge Flashing	FALSE
Synthetic Turf (Tufted Polyolefin Backing, Crumb Rubber + Sand Infill)	FALSE
Synthetic Turf (Tufted Polyolefin Backing, EPDM + Sand Infill)	FALSE
Synthetic Turf (Tufted Polyolefin Backing, TPE + Sand Infill)	FALSE

Products are flagged as reactive if they were determined to contain chemicals that chemically react with other reactants in the product, with gases in air, or with added water.

Table S5. Regular expressions used to identify plastic polymer types.

Plastic Polymer Type	Search Terms	Notes
Polyethylene	(?<!chlorinated\\s?)polyethylene (?!\\s?glycol)	Negative lookbehind prevents chlorinated polyethylene from being classified as polyethylene; negative lookahead prevents polyethylene glycol from being classified as polyethylene.
PVC-related polymers	vinyl\\schloride	
SBR	Styrene Butadiene Rubber	
SBR	SBR	
Formaldehyde-based	formaldehyde	
Polystyrene	polystyrene	
Polypropylene	polypropylene(?!\\s?glycol)	
PET/Polyester	polyethylene terephthalate|PET[g]?$	Polyethylene terephthalate glycol is classified as PET/Polyester to limit the number of categories since it only occurred in one product.
Urethane Acrylic	urethane acrylic	
Acrylic	(?<!urethane.)acryl	Negative lookbehind prevents urethane acrylic polymers from being classified as acrylic polymers,
PU	urethane(?!.acryl)	Negative lookahead prevents urethane acrylic polymers from being classified as polyurethane.
EVA	Ethylenevinylacetate	
Polyvinyl Acetate	polyvinyl acetate	
Acrylic	2-Propenoic acid	
PU	(?<!triglycidyl\\s?)(diisoc|isocya)	
Epoxy	bisphenol	
Epoxy	epoxy	
PU	polyurethane	
Polyvinyl Alcohol	polyvinyl alcohol	
Polycarbonate	polycarbonate	
Nylon	(?=.*capram)|(?=.*capro)	
PET/Polyester	polyester	
Silicone	dimethicone	
Silicone	silicone|(poly.*siloxane)	
Polychloroprene	polychloroprene	
Fluorinated Polymers	fluor(?!.*salt)	Flags fluoropolymers and uses a negative lookahead to prevent salts from being classified as fluoropolymers.

All searches were conducted in R Version 4.5.0 using the str_detect() function from the stringr library, and were case-insensitive. Any additional plastic types reported in Table S1 that are not shown in Table S5 were initially flagged as “Other” and manually assigned a plastic type.