Critical Evaluation of GreenScreen® Benchmark 1 Chemicals to Identify Structural Alerts
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Presenter Biography

Alicia McCarthy is a Research Assistant and Chemical Hygiene Officer for the Toxic Use
Reduction Institute Laboratory. She graduated with a B.S. in Environmental Health and is
currently enrolled in the Occupational and Environmental Hygiene graduate program at the
University of Massachusetts Lowell. Her passion for green chemistry and toxicology has pushed
her to immerse herself in projects that help expand her knowledge in these areas.

Alicia has been a keynote speaker for the Greater Lowell Health Alliance on Chemical
Asthmagens in Indoor Air Quality and a co-author for a study on disinfection testing using steam
cleaning. For the past year and a half, Alicia has been researching alternatives currently on the
market and formulating new products to replace Methylene Chloride and N-Methylpyrrolidone
in paint stripping applications. Alicia will intern at the European Trade Union Institute (ETUI)
this summer in Brussels, Belgium to assist in updating the R.E.A.C.H chemical registry.

Presentation Abstract

The GreenScreen® for Safer Chemicals (GreenScreen) is a comparative chemical hazard
assessment paradigm. To date, more than 800 chemicals have been subject to GreenScreen
evaluation. Industries using the GreenScreen include the electronics, textile, cosmetics, and
construction industries. Application of the GreenScreen paradigm results in the assignment of
one of four benchmark scores that identifies the relative hazards of chemicals. Beginning with
Benchmark 1, the benchmarks indicate progressively safer chemicals up to Benchmark 4. These
benchmarks are assigned based on hazard classifications for 18 human health, environmental,
and physical characteristic endpoints, which are assigned using data authoritative and screening
lists and the Globally Harmonized System (GHS) of Classification and Labelling of Chemicals.
GreenScreen® classifies the most hazardous chemicals, including PBT (persistent,
bioaccumulative and toxic), CMR (carcinogenicity, mutagenicity and reproductive toxicity) or
endocrine active chemicals, as Benchmark 1.

This project evaluates Benchmark 1 chemicals to identify structural alerts (SAs). SAs are
chemicals classes, functional groups, or substructures that are linked to a particular hazard
endpoint (e.g., cancer, aquatic toxicity, etc.). Using these alerts, product formulators can more
easily identify as well as avoid chemicals of concern.

Various chemical and physical properties of 95 Benchmark 1 chemicals were critically analyzed
to identify Benchmark 1 structural alerts. A preliminary set of eleven possible SAs for
Benchmark 1 chemicals were identified: cyclosiloxane derivatives; platinum compounds;
nitrogen heterocyclic aromatic compounds (pyridine and quinolone derivatives); methacrylic
esters; azo compounds; C5 and longer carboxylic acid derivatives; aromatic organophosphorus;
naphthalene derivatives; zinc compounds; benzene substituted alkyl, alkyl ether, alkyl halide and
alcohol compounds; and bisphenol and phenol derivatives. This presentation will outline the
GreenScreen methodology and present the SAs identified along with their associated toxicity
endpoints. Examples will be provided.