

201-15865A

HIGH PRODUCTION VOLUME (HPV)

CHEMICAL INITIATIVE

FINAL SUBMISSION

For

ARYLPOLYOLEFINS CATEGORY

**Prepared by
The American Chemistry Council
Petroleum Additives Panel
Health, Environmental and Regulatory Task Group**

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**LIST OF MEMBER COMPANIES IN THE
HEALTH, ENVIRONMENTAL AND REGULATORY TASK GROUP**

The Health, Environmental, and Regulatory Task Group (HERTG) of the American Chemistry Council Petroleum Additives Panel includes the following member companies:

Afton Chemical Corporation (formerly Ethyl Corporation)

Chevron Oronite Company, LLC

Crompton Corporation

ExxonMobil Chemical Company

Ferro Corporation

Infineum

The Lubrizol Corporation

Rhein Chemie Corporation

SNPE

EXECUTIVE SUMMARY

The American Chemistry Council Petroleum Additives Panel Health, Environmental and Regulatory Task Group (HERTG), and its member companies, hereby submit for review this Final Submission for the “*arylpolyolefin*” category of chemicals under the United States Environmental Protection Agency High Production Volume (HPV) Chemical Challenge Program. This final submission should be read in its entirety in order to obtain a complete understanding of the category and fulfilled testing requirements.

Arylpolyolefin Category. Relying on several factors specified in the EPA guidance document on “Development of Chemical Categories in the HPV Challenge Program,” in which use of chemical categories is encouraged, the following two closely related high production volume chemicals are submitted as a category:

- Benzene, C₁₄-C₂₄-branched and linear alkyl derivatives (CAS # 115733-08-9) referred to in this report as the “C₁₄-C₂₄ alkaryl derivative.”
- Benzene, polypropene derivatives (CAS # 68081-77-6) referred to in this report as the “polypropene derivative.”

Fate and Transport Characteristics. The partitioning data suggest that the Group 2 members will partition primarily to soil and are not expected to partition to water or air if released into the environment due to their low water solubility and low vapor pressure. A biodegradation study (OECD 301F, manometric test) showed the C₁₄-C₂₄ alkaryl derivative had 58% biodegradation in 28 days, indicating this substance is not readily biodegradable. Since members of this category have minimal water solubility and are resistant to hydrolysis because they lack hydrolyzable moieties, hydrolysis testing was technically unfeasible. Structural moieties of category members do not absorb sufficient light energy to result in a structural transformation, therefore, they were not subject to direct photolytic reactions. Although arylpolyolefins have a low potential to partition to the air to a significant degree because of their low vapor pressure, computer-modeled data characterized the atmospheric oxidation potential (indirect photodegradation) for category members and suggested that they would degrade rapidly in air.

Aquatic Toxicology. The 96-hour LC₅₀ for rainbow trout and the 48-h EL₅₀ for daphnia exposed to the C₁₄-C₂₄ alkaryl derivative were both determined to be greater than 1000 mg/L. Both studies used the water soluble fraction (WSF) methodology. Data was available for a Group 2 analogue, a C₆-C₁₂ alkyl derivative (CAS # 68608-80-0), indicating the EC₅₀ for algae exposed to this analogue was greater than 1000 mg/L. Collectively, the reviewed data and completed tests indicate the arylpolyolefins are likely to cause a low degree of aquatic toxicity.

Mammalian Toxicology - Acute. Data on acute mammalian toxicity was reviewed. The findings indicate a low degree of acute toxicity. Data was available for both members of the arylpolyolefin category indicating that the category has been well tested for acute mammalian effects. Therefore, no additional acute mammalian toxicity testing was conducted.

Mammalian Toxicology - Subchronic Toxicity. In order to reduce the number of animals involved in testing for Group 2, subchronic toxicity data was reviewed for two lower molecular weight analogues of the Group 2 arylpolyolefins, a C₆-C₁₂ alkyl derivatives (CAS # 68608-80-0) and a C₁₀-C₁₃ alkyl derivative (CAS # 68648-87-3). Because the available data indicated a low degree of subchronic toxicity (the LOAEL was determined to be approximately 125 mg/kg/day) and the two analogues are expected to be more biologically reactive than the Group 2 members (based on physiochemical properties), no additional subchronic toxicity testing was conducted.

Mammalian Toxicology - Reproductive and Developmental Toxicity. In order to reduce the number of animals involved in testing for Group 2, reproductive and developmental toxicity data from two structurally similar compounds, C₆-C₁₂ alkyl derivatives (CAS # 68608-80-0) and a C₁₀-C₁₃ alkyl derivative (CAS # 68648-87-3), were bridged to the two members of HPV Group 2. These two analogues, both having lower molecular weights and believed to represent a greater health risk than the members of Group 2, did not cause any significant indications of reproductive or developmental toxicity.

Mammalian Toxicology - Genotoxicity. An *in vitro* bacterial gene mutation assay was reviewed for the C₁₄-C₂₄ alkaryl derivative. The C₁₄-C₂₄ alkaryl derivative did not demonstrate mutagenic activity in either the presence or absence of metabolic activation. This data will be used for bridging to the polypropene derivative. The lower molecular weight Group 2 structural analogue, a C₁₀-C₁₃ alkyl derivative (CAS # 68648-87-3), did not cause *in vivo* chromosomal aberrations. Therefore, the members of Group 2 will likely not cause *in vivo* chromosomal aberrations and are likely to have a low degree of genotoxicity.

Conclusion. Based on the physiochemical, environmental fate, aquatic toxicology and mammalian toxicology studies completed for this submission and the data reviewed, the HERTG concluded that the arylpolyolefins do not readily pose a risk to the aquatic and mammalian environments and would likely partition into the soils. As this final submission was completed, careful consideration was given to the number of animals required for tests and conditions to which the animals would be exposed. In consideration of the concerns of some non-government organizations about animal welfare, the use of animals was minimized.

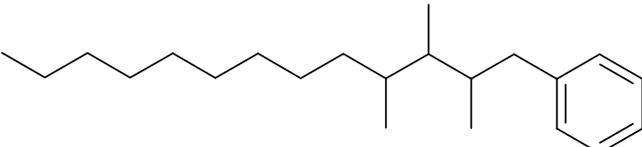
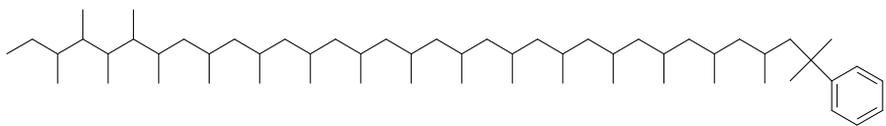
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1.0 INTRODUCTION

In March 1999, the American Chemistry Council (formerly the Chemical Manufacturers Association) Petroleum Additives Panel - Health, Environmental and Regulatory Task Group (HERTG) and its participating member companies committed to address data needs for certain chemicals listed under the United States Environmental Protection Agency (EPA) High Production Volume (HPV) Chemical Challenge Program. This final submission follows up on that commitment. Specifically, this final submission illustrates how the HERTG addressed testing requirements for the two HPV Group 2 substances shown in Table 1. Those two substances were benzene, C₁₄-C₂₄-branched and linear alkyl derivatives (CAS # 115733-08-9) referred to in this report as the “C₁₄-C₂₄ alkaryl derivative”; and benzene, polypropene derivatives (CAS # 68081-77-6) referred to in this report as the “polypropene derivative”.

TABLE 1. CHEMICAL STRUCTURES AND NAMES OF ARYLPOLYOLEFIN CATEGORY MEMBERS

CAS Number	Idealized Chemical Structure and Name
115733-08-9	 <p>C₁₄-C₂₄ alkaryl derivative^a MW = 275 – 415 g</p>
68081-77-6	 <p>Polypropene derivative^b MW = 387 – 1228 g</p>

a Structure represents the benzene C₁₄ alkyl derivative.

b Structure represents an intermediate molecular weight range benzene polypropene (C₅₂) derivative.

In preparing this final submission the following steps were undertaken:

Step 1: A review of the literature and confidential company data was conducted on the physiochemical properties, mammalian toxicity endpoints, and environmental fate and effects for the two arylpolyolefin derivatives of Group 2. Searches included the following sources: MEDLINE, BIOSIS, CANCERLIT, CAPLUS, CHEMLIST, EMBASE, HSDB, RTECS, EMIC, and TOXLINE databases; the TSCATS database for relevant unpublished studies on these chemicals; and standard handbooks and databases (e.g., Sax, CRC Handbook on Chemicals, IUCLID, Merck Index, and other references) for physiochemical properties.

Step 2: The compiled data was evaluated for adequacy in accordance with the EPA guidance documentation. Where additional data was needed, testing was completed to fulfill the Screening Information Data Sets requirements.

2.0 GENERAL SUBSTANCE INFORMATION

Arylpolyolefins consist of a benzene ring with one long-chain alkyl substituent group. The alkyl group is a saturated hydrocarbon chain that can vary in length and extent of branching. The chemical names, CAS numbers and chemical structures for the members of the category are presented in Table 1.

3.0 EXPOSURE INFORMATION

Manufacture

Commercial arylpolyolefins are manufactured by reacting anhydrous olefin (linear or branched) with benzene in the presence of a catalyst and heat. Linear alkylbenzenes use linear alpha olefins with AlCl_3 and HF as the preferred catalyst. Branched alkylbenzenes start with a tetrapropenyl (C_3) stream using HF as the preferred catalyst, but triethyl aluminum (AlEt_3) has also been used as a catalyst.

Use

Arylpolyolefins have a wide range of uses, but they are often employed as non-isolated intermediates for conversion to alkaryl sulfonates. Other uses of arylpolyolefins include base fluids in engine oils, transmission fluids, gear oils, hydraulic fluids and other lubricant fluid applications that require fluidity at low temperatures. Some arylpolyolefins are also used as refrigerant lubricants and thermal transfer fluids.

4.0 PHYSICOCHEMICAL PROPERTIES

Selected physicochemical properties of arylpolyolefin category members are shown below. The physicochemical properties of these two substances were generally similar or overlap, as would be expected based upon the similarity in their chemical structure and chemical processing, and thus support consideration of these substances as a category.

TABLE 2. PHYSIOCHEMICAL PROPERTIES OF ARYLPOLYOLEFIN CATEGORY MEMBERS

CAS Number	Molecular Weight Range ¹	Specific Gravity (@ 15.6°C)	Viscosity (cSt @ 40°C)	Boiling Range ² (°C)	Vapor Pressure Range ² (Pa @ 25°C)	Water Solubility Range ² (mg/L @ 25°C)	Log Kow Range ²
115733-08-9	275-415	0.85	21	342-458	1.3e ⁻² - 1.7e ⁻⁶	≤ 0.411 ³	8.9 - 13.8
68081-77-6	387-1228	0.87	93	≥ 388	≤ 6.2e ⁻⁴	≤ 1.2 ⁻⁷	≥ 12.3

¹ Based on molecular weight range of component molecules.

² Modeled data based on molecular weight range.

³ Water solubility of CAS # 115733-08-9 was measured using the shake flask method (OECD 105).

Note: Melting range is not shown because it is not applicable for the members of Group 2 at ambient conditions.

5.0 ENVIRONMENTAL FATE DATA

5.1 BIODEGRADABILITY

The C₁₄-C₂₄ alkaryl derivative (CAS # 115733-08-9) had 58.8% biodegradation over 28 days (OECD 301F), indicating the C₁₄-C₂₄ alkaryl derivative is not readily biodegradable. A lower extent of biodegradability is expected for the polypropene derivative (CAS # 68081-77-6) because of its higher molecular weight and subsequently lower anticipated water solubility.

5.2 HYDROLYSIS

Arylpolyolefins do not contain functional groups that are subject to hydrolytic reactions. Thus, these substances have little, if any, potential for hydrolysis and are expected to be stable in water. Therefore, testing these substances for hydrolysis is not needed to adequately evaluate this endpoint.

5.3 PHOTODEGRADATION

Based on their structures, arylpolyolefins are not anticipated to undergo direct photodegradation. Therefore, no additional testing for direct photodegradation was planned. For indirect photodegradation, calculated Atmospheric Oxidation Potential

values of selected chemical structures representative of the arylpolyolefin category members were available to characterize this endpoint. Therefore, no additional modeling was conducted. The data suggests that the arylpolyolefin category members would be subject to rapid degradation in air from OH- attack. However, this effect would be limited by the low vapor pressure of these materials.

5.4 FUGACITY MODELING

The relative distribution of substances within this category among environmental compartments was evaluated using the Equilibrium Criterion Model (EQC, Environmental Modeling Centre as developed by D. Mackay) Level I model (Table 5). Data developed using an EQC Level I model can be used for simple comparative purposes across several substances. The data suggested that category members will partition primarily to soil. The EQC Level III model was not used for this evaluation because appropriate emission levels as yet are unknown. Because of the physical nature of the substances in this category, a Level I dataset was adequate to assess the potential partitioning behavior of arylpolyolefin category members in the environment.

TABLE 3. BIODEGRADATION, HYDROLYSIS AND PHOTODEGRADATION DATA FOR ARYLPOLYOLEFIN CATEGORY MEMBERS

CAS Number	BIODEGRADABILITY	HYDROLYSIS¹	PHOTODEGRADATION²
115733-08-9	58% biodegradation in 28 days	No testing needed Arylpolyolefins are not subject to hydrolytic reactions	<u>Direct Photodegradation:</u> No testing needed - Arylpolyolefins are not subject to photolytic reactions <u>Indirect Photodegradation:</u> No testing needed Calculated OH ⁻ Rate Constant (cm ³ /molec-sec) = 23e-12 to 37e-12 Calculated Half-life in Air (hrs) = 5.67 to 3.49
68081-77-6	No testing needed – Bridging	No testing needed Arylpolyolefins are not subject to hydrolytic reactions	<u>Direct Photodegradation:</u> No testing needed - Arylpolyolefins are not subject to photolytic reactions <u>Indirect Photodegradation:</u> No testing needed Calculated OH ⁻ Rate Constant (cm ³ /molec-sec) = ≥31e-12 Calculated Half-life in Air (hrs) = ≤4.10

1. Chemical components of arylpolyolefin products do not contain functional groups that are subject to hydrolytic reactions; these substances are expected to be stable in water and no testing is necessary.
2. Chemical components of arylpolyolefin products do not absorb sufficient light energy to result in a structural transformation, therefore these substances are expected to be stable in solution and no testing is necessary; AOPWIN, a subroutine in EPIWIN, was used to model potential indirect photodegradation rates for selected chemical structures that represent arylpolyolefin category members (see Section 4.1.4.1).

TABLE 4. DISTRIBUTION AND FUGACITY DATA FOR SELECTED CHEMICAL COMPONENTS OF ARYLPOLYOLEFIN CATEGORY MEMBERS

CAS Number	PERCENT DISTRIBUTION AND FUGACITY ¹						
	Air (%)	Water (%)	Soil (%)	Sediment (%)	Suspended Sediment (%)	Biota (%)	Fugacity (uPa)
115733-08-9 Benzene C ₁₄ alkyl derivative ^a	0.102	1.3e-4	97.7	2.170	0.068	0.005	9.18e-3
115733-08-9 Benzene C ₂₄ alkyl derivative ^a	0.026	1.8e-9	97.7	2.172	0.068	0.006	1.54e-3
68081-77-6 Benzene C ₂₂ polypropene ^a	0.027	5.5e-8	97.7	2.172	0.068	0.006	1.71e-3

¹ The EQC Level I model as referenced in Mackay et al., 1996 (Environ. Toxicol. Chem. 15:1627-1637), was used to calculate environmental partitioning data for selected chemical structures that represent arylpolyolefins (see Section 4.1.5.1).

^a The structure used for modeling.

6.0 ECOTOXICOLOGY DATA

6.1 FISH ACUTE TOXICITY

The C₁₄-C₂₄ alkaryl derivative was tested using water soluble fraction (WSF) methodology. The results showed this product did not cause toxicity to fish at loading rates of 1,000 mg/L. The 96-hour LC₅₀ was determined to be greater than 1,000 mg/L. The data indicated the C₁₄-C₂₄ alkaryl derivative did not possess a high degree of toxicity to fish and the results were bridged to the other member of Group 2 (the polypropene derivative).

6.2 DAPHNIA ACUTE TOXICITY

An acute invertebrate toxicity test with *Daphnia magna* was conducted with the C₁₄-C₂₄ alkaryl derivative. A 48-h EL₅₀ was greater than 1,000 mg/L by using the WSF methodology. The data indicated the C₁₄-C₂₄ alkaryl derivative did not possess a high degree of toxicity to daphnia and the results were bridged to the other member of Group 2 (the polypropene derivative).

6.3 ALGAE ACUTE TOXICITY

Algae acute toxicity data was available for a Group 2 analogue, a C₆-C₁₂ alkyl derivative (CAS # 68608-80-0). The results indicated the EC₅₀ (Growth Rate) for algae exposed to this analogue, was greater than 1000 mg/L.¹ The results indicate the ayrpolyolefins are unlikely to have a high degree of toxicity towards algae.

¹ Gledhill, W. E., Saeger, V. W., and Trehy, M. L.. An Aquatic Environmental Safety Assessment of Linear Alkylbenzene, *Environmental Toxicology and Chemistry*, 10, 169-178 (1991)

TABLE 5. AQUATIC TOXICITY DATA FOR ARYLPOLYOLEFIN CATEGORY MEMBERS

CAS NUMBER	FISH ACUTE TOXICITY 96-hr LC₅₀ (mg/L)	INVERTEBRATE ACUTE TOXICITY 48-hr EC₅₀ (mg/L)	ALGA TOXICITY 96-hr EC₅₀ (mg/L)
115733-08-9	96-hour LC ₅₀ > 1000 mg/L	48-hour EL ₅₀ > 1000 mg/L	Bridged from C₆-C₁₂ alkyl derivative (CAS # 68608-80-0)
68081-77-6	No testing needed – Bridging	No testing needed – Bridging	Bridged from C₆-C₁₂ alkyl derivative (CAS # 68608-80-0)
68608-80-0 ^a			EC ₅₀ (Growth Rate) > 1000 mg/L

^a Structurally similar compound to Arylpolyolefins materials

7.0 MAMMALIAN TOXICOLOGY DATA

7.1 ACUTE MAMMALIAN TOXICITY

7.1.1 Acute Oral Toxicity

Both of the substances in the arylpolyolefin category have been adequately tested for acute oral toxicity in rats. For both of the substances in the arylpolyolefin category, no mortality was observed for the test material when administered at the limit dose of 5 g/kg. The acute oral LD₅₀s for these substances were greater than the 5 g/kg limit dose (Table 7) indicating a low order of toxicity.

7.1.2 Acute Dermal Toxicity

Both of the substances in the arylpolyolefin category have been adequately tested for acute dermal toxicity. For both of the substances in the arylpolyolefin category, no mortality was observed for the test material when administered to rabbits at the limit dose of 2 g/kg. The acute dermal LD₅₀s for these substances were greater than the 2 g/kg limit dose (Table 7) indicating a low order of toxicity.

TABLE 6. EVALUATION OF ACUTE MAMMALIAN TOXICITY OF ARYLPOLYOLEFIN CATEGORY MEMBERS

CAS Number	ACUTE ORAL TOXICITY ¹	ACUTE DERMAL TOXICITY ¹
115733-08-9	LD ₅₀ > 5 g/kg (rat)	LD ₅₀ > 2 g/kg (rabbit)
68081-77-6	LD ₅₀ > 5 g/kg (rat)	LD ₅₀ > 2 g/kg (rabbit)

¹Toxicity endpoints are expressed as median lethal dose (LD₅₀) for acute oral and dermal toxicity. The LD₅₀ is defined as the dose that is lethal to 50% of the test organisms. The greater the LD₅₀, the lower the toxicity.

7.2 REPEATED-DOSE TOXICITY

In order to reduce the number of animals involved in testing for Group 2, subchronic repeat-dose toxicity data was bridged from a lower molecular weight analogue of the Group 2 arylpolyolefins, a C₁₀-C₁₃ alkyl derivative (CAS # 68648-87-3) from Monsanto. The available data from the Monsanto study indicated a low degree of subchronic toxicity. There were reductions in food consumption and body weight gains at all doses (0, 2000, 5000, 7500 and 20000 ppm in feed). Gross pathology was performed, and no changes were noted at any dose. The LOAEL was determined to be 2500 ppm which corresponds to approximately 125 mg/kg/day. Because the C₁₀-C₁₃ alkyl derivative possesses a lower molecular weight and log K_{OW} and also a higher water solubility than either Group 2 member, the Group 2 members will likely be less toxic than the Monsanto

analogue. Therefore, the members of Group 2 likely also cause a low degree of repeat-dose toxicity and as a result, no additional subchronic toxicity testing was conducted.

7.3 REPRODUCTIVE/DEVELOPMENTAL TOXICITY

In order to reduce the number of animals involved in testing for Group 2, reproductive and developmental toxicity data from two structurally similar compounds, a C₆-C₁₂ Alkyl Derivative (CAS # 68608-80-0) from Huntsman Chemical and a C₁₀-C₁₃ alkyl derivative (CAS # 68648-87-3) from Monsanto, was bridged to the two members of HPV Group 2. Both a two generation reproduction study and a developmental study via oral gavage in rats which were conducted by Monsanto, which was also cited in the Huntsman test plan.^{2 & 3} In the two generation reproduction study, there was evidence of toxicity at the highest dose (500 mg/kg) as evidenced by depressed adult weight gains; smaller litters; decreased live pups; smaller pups; and lower pup survival. In the 50 mg/kg dose group, there was only a transient reduction in F1 pup weight gain on day 7 which returned to normal on days 14 and 21. Those observations were used to set the reproductive NOAEL for both parental and neonatal animals at 50 mg/kg.

Developmental toxicity was conducted via oral gavage at doses of 0, 125, 500 and 2000 mg/kg using corn oil vehicle. The only effects noted were at doses of 500 and 2000 mg/kg with overt signs of maternal toxicity present: depressed food consumption and weight gain. At the high doses there were some occurrences of delayed ossification, but those effects were not considered to be signs of specific fetal developmental problems. Some skeletal malformations (wavy ribs) were noted at the highest dose. Fetal examination did not reveal any soft tissue malformations at any dose. The study NOAEL was set at 125 mg/kg.

Collectively, the bridged reproductive/developmental toxicity data from Huntsman and Monsanto illustrate a low degree of reproductive/developmental toxicity indicating the members of Group 2 are unlikely to cause significant reproductive/developmental toxicity and as a result, no further testing was conducted.

² Huntsman LLC, Assessment Plan for Benzene, C₆₋₁₂ Alkyl Derivatives (CAS#68068-80-0, Alkylate Top) in Accordance with the USEPA High Production Volume Challenge Program, March 12, 2003

³ Robinson, E. C. and Schroeder, R. E., Reproductive and Developmental Toxicity Studies of a Linear Alkylbenzene Mixture in Rats, Fundamental and Applied Toxicology, 18, 549-556 (1992)

Table 7. Evaluation of Repeated-Dose Mammalian Toxicity of Arylpolyolefin Category Members

CAS Number	REPEATED-DOSE TOXICITY	REPRODUCTIVE/DEVELOPMENTAL TOXICITY
115733-08-9	Bridged from C₁₀-C₁₃ alkyl derivative (CAS # 68648-87-3)	Bridged from C₁₀-C₁₃ alkyl derivative (CAS # 68648-87-3)
68081-77-6	Bridged from C₁₀-C₁₃ alkyl derivative (CAS # 68648-87-3)	Bridged from C₁₀-C₁₃ alkyl derivative (CAS # 68648-87-3)
68648-87-3 ^a	Slight reduction in food intake and weight gain (at all doses, 0, 2000, 5000, 7500, and 20000 ppm) LOAEL was determined to be 2500 ppm (125 mg/kg/day)	<p><u>Reproductive Toxicity Study:</u> Depressed adult weight gains; smaller litters; decreased live pups; smaller pups; and lower pup survival at the highest dose (500 mg/kg/day); Only transient decrease in pup weights at middle dose (50 mg/kg/day)</p> <p><u>Developmental Toxicity Study:</u> Some skeletal malformations only at the highest dose (2000 mg/kg/day); NOAEL was set at 125 mg/kg/day</p>

^a Structurally similar compound to Arylpolyolefins materials

7.4 GENOTOXICITY

7.4.1 Bacterial Gene Mutation Assay

The C₁₄-C₂₄ alkaryl derivative (CAS # 115733-08-9) was tested using *in vitro* bacterial gene mutation assay. The C₁₄-C₂₄ alkaryl derivative did not demonstrate mutagenic activity in the presence or absence of metabolic activation. These test results were bridged to the polypropene derivative (CAS # 68081-77-6).

7.4.2 Chromosomal Aberrations Assay

In order to further reduce the number of animals used for testing, *in vivo* chromosomal aberrations data from a structural analogue of Group 2, a C₁₀-C₁₃ alkyl derivative (CAS # 68648-87-3), was reviewed.⁴ There were no significant increases in chromosome aberrations at any treatment level at any sampling time indicating the C₁₀-C₁₃ alkyl derivative was negative for *in vivo* chromosome aberration. Therefore, because physiochemical properties of the Group 2 members indicates the structural analogue (C₁₀-C₁₃ alkyl derivative) is likely to be more biologically reactive, than the members of Group 2, the arylpolyolefins are unlikely cause *in vivo* chromosomal aberrations and as a result, no further testing was conducted.

TABLE 8. EVALUATION OF GENOTOXICITY OF ARYLPOLYOLEFIN CATEGORY MEMBERS

CAS Number	GENE MUTATION ASSAY	CHROMOSOMAL ABERRATION ASSAY
115733-08-9	<i>In vitro</i> Bacterial Reverse Mutation Assay – With and Without S-9 – Not Mutagenic	Bridged data from C₁₀-C₁₃ alkyl derivative (CAS # 68648-87-3)
68081-77-6	No testing needed – Bridging	Bridged data from C₁₀-C₁₃ alkyl derivative (CAS # 68648-87-3)
68648-87-3 ^a		Did not cause chromosomal aberrations <i>in vivo</i>

^a Structurally similar compound to Arylpolyolefins materials

⁴ Robinson, E. C. and Nair, R. S. , The Genotoxic Potential of Linear Alkylbenzene Mixtures in a Short-Term Test Battery, Fundamental and Applied Toxicology, 18, 540-548 (1992)

Table 9. Summary of Data for Arylpolyolefin Category Members

CAS Number	Environmental Fate					Ecotoxicity			Human Health Effects				
	Physical Chem	Photodeg	Hydrolysis	Fugacity	Biodeg	Acute Fish Toxicity	Acute Invert Toxicity	Algal Toxicity	Acute Toxicity	Point Mutations	Chrom Effects	Sub-chronic	Repro/Develop
115733-08-9	C / A	D / C	D	C	A	A	A	A	A	A	A/B	A	B
68081-77-6	C / B	D / C	D	C	B	B	B	B	A	B	B	B	B

- A Adequate data
- B Bridging
- C Computer modeling completed
- D Technical discussion completed