

## FR-245

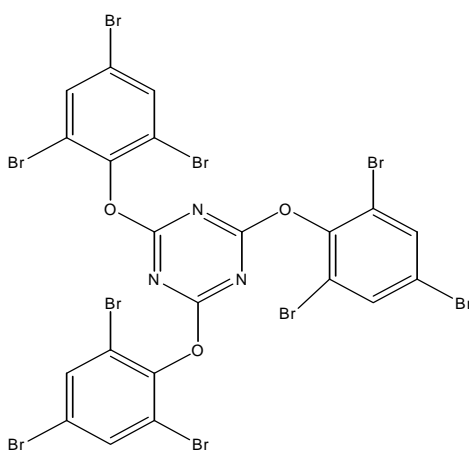
## *Tris(tribromophenoxy) triazine*

***Application Data Sheet for polyethylene  
(PE)***

**FR-245** is offered by ICL-IP as a cost efficient flame retardant for UV stable application in PE and its copolymers.

**FR-245** is based on the joint expertise of the Japanese Group Dai-Ichi Kogyo Seiyaku (DKS) and ICL-IP.

**Figure1: Chemical Structure and Properties of *FR-245*  
Tris(tribromophenyl) triazine**



Bromine content, wt %	67
Nitrogen content, wt %	4
Melting point, °C	230
Specific gravity	2.44
Molecular weight	1067

**FR-245** is designed for both UL-94 V-2 and V-0 ratings.

**FR-245** is also DPO free and offers an optimal balance of properties.

□ **Thermal stability**

Thermogravimetric analysis of **FR-245** reflects its high thermal stability allowing high processing temperatures. Its thermal stability combined with excellent resistance to hydrolysis, makes it the product of choice when recyclability is an issue.

**Table 1: Thermogravimetric analysis (TGA-10<sup>0</sup>C in air)**

Weight loss, %	Temperature, <sup>0</sup> C
2	360
5	385
10	400

□ **Processing conditions**

Suggested processing conditions to compound and mold PE flame retarded with **FR-245** are as follows:

**Compounding**

Compounding in a co-rotating twin screw extruder (L/D: 32)

Temperature profile, <sup>0</sup>C: 170-190-200-200-200-200-200-200

Screw speed, rpm: 300

**Injection molding**

Temperature profile, <sup>0</sup>C: 90-200-200-200-200

□ **FR efficiency**

The unique combination in **FR-245** of 67% aromatic bromine and a cyanuric nucleus confers good flame retardant efficiency. The following table 2 provides indicative formulations to achieve class V-2 and V-0 in PE with **FR-245**.

**Table 2: MD PE flame retarded by *FR-245*.**

Composition, %		
PE (MI 9)	88.1	64.3
FR-245	8.7	26.1
Antimony trioxide	3.2	9.6
Br content, %	5.8	17.5
Flame retardancy UL 94 (3.2mm):		
Max. flaming time, sec	5	3
Total flaming time, sec	15	5
Number of cotton ignition	3	0
Class	V-2	V-0

□ **Excellent light stability**

PE flame retarded by *FR-245* is cost efficient with good UV and light stability properties.

□ **Health – Safety - Environmental aspects**

*FR-245* is designed and developed to be safe and environmentally friendly in usage and environmentally friendly in end of life vehicles, including recycling or waste incineration.

*FR-245* has undergone extensive toxicological and environmental testing<sup>1</sup>, and has been proven to pose no risk to health and the environment. The results of the analyses performed by Institut Fresenius Chemische und Biologische Laboratorien GmbH on *FR-245* as is and under conditions simulating a modern municipal solid waste incinerator for presence of polybrominated dibenzo-para-dioxins/dibenzofurans (PBDD/PBDF), have shown it to be in full compliance with the requirements of the global most strict criteria of the German Dioxin Ordinance and EPA TSCA 40 §766.27 Final Rule requirements<sup>1</sup>.

<sup>1</sup> Further information available upon request

## **FR** Division

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As part of an ongoing Product Stewardship Program and Customer oriented policy, ICL-IP is committed to implement further toxicological and environmental tests if needed.

### □ **Applications**

Recommended applications of **FR-245** in PE are films and pipes. In these applications, **FR-245** exhibits its inherent advantages over other products, with its low cost, good light and thermal stability.

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