REVONOX® 608T

PRODUCT DATASHEET

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Introduction

Revonox® 608T belongs to the family of spiro phosphate antioxidants which are known for their high phosphorous content and notable efficiency compared to other phosphite-based antioxidant families. Revonox® 608T, however, does not suffer from the intrinsic weakness of low hydrolytic stability caused by the spiro structure. At ambient temperature, Revonox® 608T maintains its free flowing properties even after being exposed to a highly humid environment (> 80%) for more than 30 days. Deox® 604 (CAS RN. 26741-53-7), the most widely used spiro phosphite type antioxidant, deliquesces in fewer than 3 days under the same conditions.

Furthermore, the large molecular weight and unique structure of Revonox® 608T makes the molecule very heat stable and it holds the record for thermal stability amongst the commercial phosphite antioxidants. As can be seen from Figure 1, 10% of Revonox® 608T decomposes at a temperature well over 300 °C which is 80 °C higher than that of Deox® 68 (CAS RN 31570-04-4).

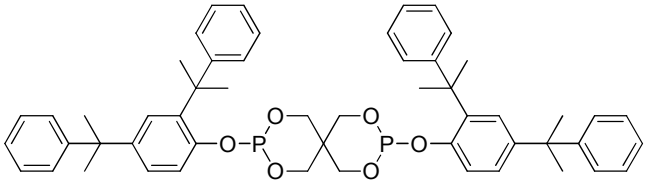
Like the other phosphite antioxidants, Revonox® 608T acts as a secondary antioxidant by quenching the hydroperoxide during the auto-oxidation cycle and retards the degradation associated with color development in particular. When used in engineering plastics such as polyester and nylon, it demonstrates excellent color protection during plastics compounding to an extent unmatched by other phosphite antioxidants even at excess dosage, see Figures 3 and 4.

This outstanding efficiency cannot be explained simply by high thermal stability, low molten color (see Figure 2) and high phosphorous content. A not yet clearly understood mechanism transforming the dark color intermediates associated with the oxidized form of the hindered phenolic-based primary antioxidants back to a low color form could also be a contributor to the efficiency.

Revonox® 608T also adds value to the non-engineering plastics such as PP, PVC, PS, POM, ABS, PMMA, etc, by stabilizing their physical and mechanical properties to a very high degree. However, the high melting point (see Figure 5) of Revonox® 608T limits its use with PE, PU and similar polymers, where the processing temperature is low.

Chemical Information

Structure



Chemical Name
Bis (2,4-dicumylphenyl) pentaerythritol diphosphite

CAS No.
154862-43-8

Molecular weight
852

Physical Data

Odor	:	Odorless
Bulk density	:	0.75 g/mL
pH	:	9.73
TGA (10% loss)	:	340 °C
Phosphorus content	:	7.3%

Specification

Appearance	:	White free flowing powder
2,4-DCP (%)	:	1.0% max.
Acid value	:	2.0 mg KOH/g max.
Triisopropanolamine content	:	1.0% max.
Color, WI	:	82.0 min.
Volatile (%)	:	0.5% max.
Melting point	:	225 - 246 °C

Packaging

15 Kg net / Carton box

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Solubility (g in 100ml solvent @ 20 °C)

Acetone	:	< 0.10
Ethyl acetate	:	< 0.10
Hexane	:	< 0.10
Dichloromethane	:	0.80
Toluene	:	0.13
Cyclohexane	:	< 0.10
Mineral oil	:	< 0.10
Acetonitrile	:	< 0.10
Methanol	:	< 0.10
Isopropanol	:	< 0.10
Water	:	< 0.10

Fig 1. Thermogravimetric analysis (TGA) diagram

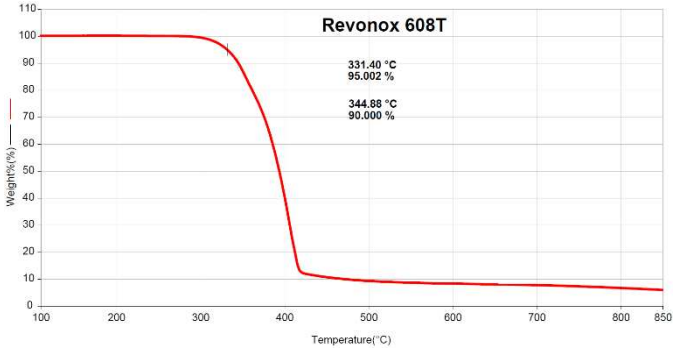


Fig 2. Molten color of Revonox® 608T

(1) Tetrakis(2,4-di-*tert*-butylphenyl)-4,4'-biphenyldiphosphonite

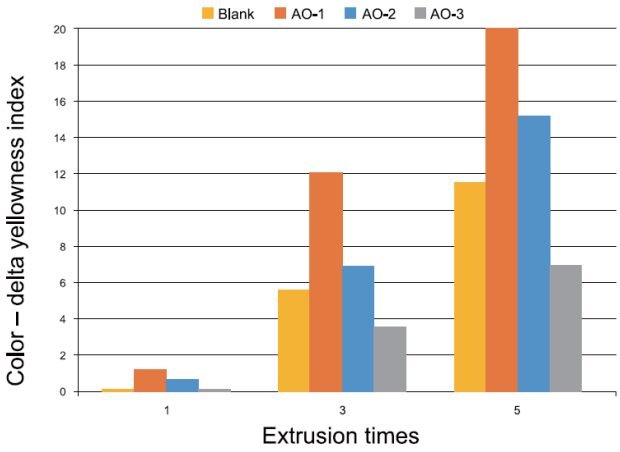
(2) Deox® 604: Bis(2,4-di-*tert*-butylphenyl)pentaerythritol diphosphite

(3) Revonox® 608T

(4) Bis(2,6-di-*tert*-butyl-4-methylphenyl)pentaerythritol-di-phsophite

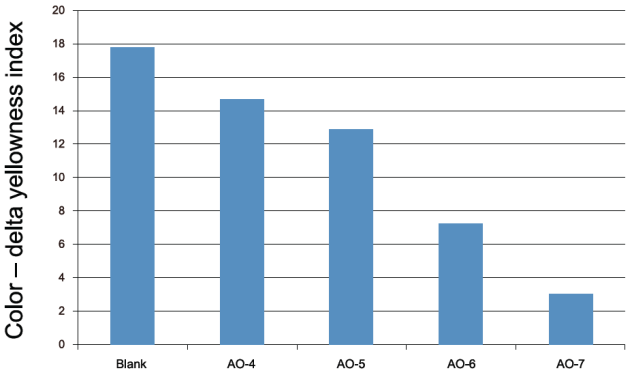
(5) 2,2',2''-Nitrilo[triethyl tris(3,3',5,5'-tetra-*tert*-butyl-1,1'-biphenyl-2,2'-diyl)phosphite]

Fig 3. Color stability of PET - multi extrusions at 280 °C



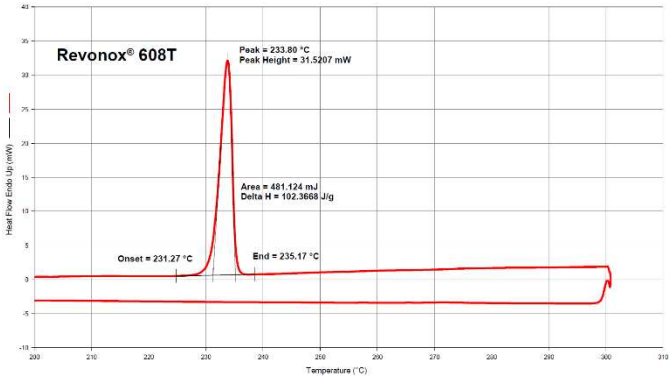
AO-1: 500ppm Deox® 10;
AO-2: 500ppm Deox® 10 + 1,500 ppm Deox® 68;
AO-3: 500ppm Deox® 10 + 1,500 ppm Revonox® 608T;

Fig 4. Color stability of PA66 - compounding once at 280 °C

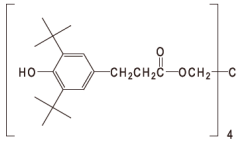


AO-4: 500ppm Deox® MD-1098 + 1,500 ppm Deox® 68 ;
AO-5: 500ppm Deox® MD-1098 + 6,000 ppm Deox® 68;
AO-6: 500ppm Deox® MD-1098 + 1,500 ppm Revonox® 608T;
AO-7: 500ppm Deox® MD-1098 + 3,000 ppm Revonox® 608T;

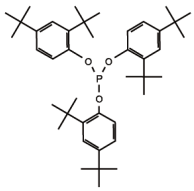
Fig 5. Differential scanning calorimetry (DSC)



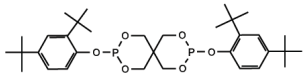
Deox® 10



Deox® 68



Deox® 604



Deox® MD-1098