The Effect of Carbon Black on Thermal Antioxidants for Polyethylene

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Tables II and III were omitted in the publication of this article.

TABLE II

Polyethylene Containing *N,N'*-di-β-Naphthyl-*p*-Phenylenediamine and 2% of Various Carbon Blacks Oxidation and Loss of Antioxidant during Milling

Description of carbon black (manufacturers data)				*N,N'*-di-β-naphthyl-*p*-phenylendiamine, % w				
				Antioxidant determined in blend after milling[a]				
Trade name	pH	Particle size, mμ	Surface area square meters/g.	Antioxidant addition (A)	Unoxidized (U) = (T) − (O)	Oxidized (O)	Oxidized plus unoxidized (T)	Un-accounted (A) − (T)
Clear polyethylene (reference sample)								
—	—	—	—	0.18	0.10	0.08	0.18	nil
Furnace blacks								
Sterling SO	9.0	41	42	0.18	0.08	0.09	0.17	0.01
Sterling 99R	9.5	42	61	0.18	0.05	0.09	0.14	0.04
Channel blacks								
Monarch 74	5.0	17.0	320	0.18	0.02	0.07	0.09	0.09
Printex U	5.0	23.0	111	0.18	0.04	0.10	0.14	0.04
CK 3	5.0	29.5	95	0.18	0.09	0.09	0.18	nil
Elf 8	4.5	29.0	105	0.18	nil	0.07	0.07	0.11
Dixie B	4.1	17.0	189	0.18	0.03	0.04	0.07	0.11
Elf O	4.0	25.0	200	0.18	0.03	0.07	0.10	0.08
Rajah	3.7	16.0	230	0.18	0.03	0.05	0.08	0.10
Carbolac 46	3.0	13.0	800	0.18	0.04	0.03	0.07	0.11
Carbolac 1	3.0	9.0	950	0.18	0.05	0.02	0.07	0.11
Peerless MK II	2.8	22.0	300	0.18	0.04	0.02	0.06	0.12

[a] Each determination made in duplicate. All duplicate determinations agreed within 0.01%.

TABLE III

Effect of Quantity of Various Carbon Blacks on *N,N'*-Di-β-Naphthyl-*p*-Phenylenediamine Decomposition

Description of carbon black (manufacturers data)				*N,N'*-di-β-naphthyl-*p*-phenylenediamine, % w							
				Addition of 0.2% carbon black				Addition of 2% carbon black			
Trade name	pH	Particle size, mμ	Surface area, square meters/g.	Un-oxidized (U) = (T) − (O)	Oxidized (O)	Oxidized plus un-oxidized (T)	Un-accounted for (A) − (T)	Un-oxidized (U) = (T) − (O)	Oxidized (O)	Oxidized plus un-oxidized (T)	Un-accounted (A) − (T)
Carbolac 1 (channel)	3.0	9	950	0.06	0.05	0.11	0.07	0.05	0.02	0.07	0.11
Elf 8 (channel)	4.5	29	105	0.05	0.10	0.15	0.03	nil	0.07	0.07	0.11
Monarch 74 (channel)	5.0	17	320	0.07	0.11	0.18	nil	0.02	0.07	0.09	0.09
Sterling SO (furnace)	9.0	41	42	0.10	0.08	0.18	nil	0.08	0.09	0.17	0.01