

APPLICATION SHEET

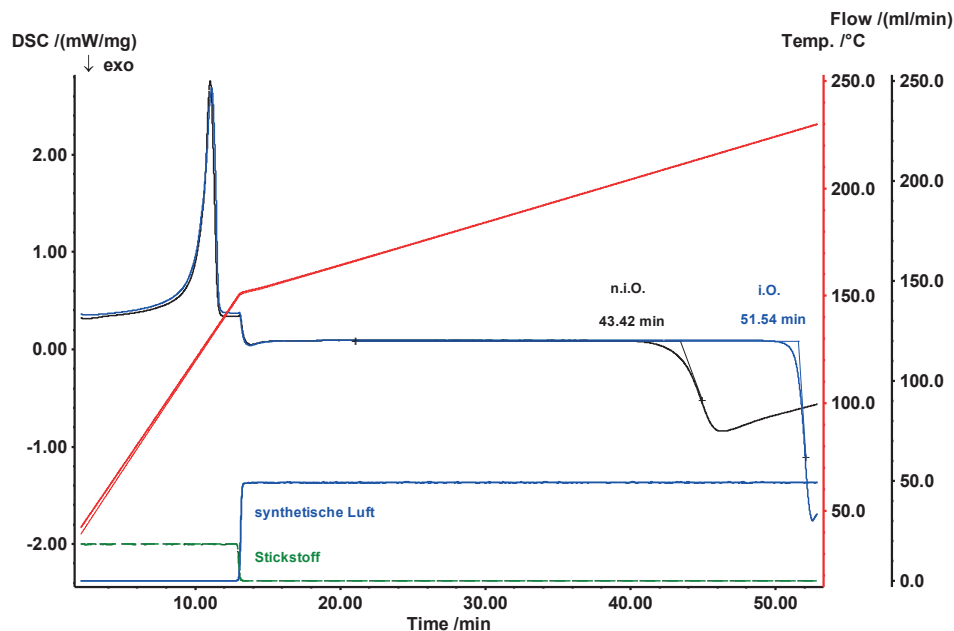
Polymers · Polymer Manufacturing
DSC 204 **F1** Phoenix®

Oxidative Stability of Polyethylene

Introduction

Polyethylene is a thermoplastic commodity heavily used in consumer products (over 60M tons are produced worldwide every year). Polyethylene is created through polymerization of ethene. It can be produced by radical polymerization, anionic polymerization, ion coordination

polymerization or cationic polymerization. This is because ethene does not have any substituent groups which influence the stability of the propagation head of the polymer. Each of these methods results in a different type of polyethylene. All polymers age during usage and storage. By means of DSC, the ageing behavior of polymers can be studied.



Test Conditions

Temperature range:	RT ... 230°C
Heating rate:	10 K/min, 2 K/min
Atmosphere to 150°C:	Nitrogen at 360 ml/min
Sample mass:	3.25 ± 01. mg
Crucible:	Aluminum, open
Atmosphere to 230°C:	Air at 50 ml/min

Test Results

The oxidation behavior of two PE tubes was compared. The samples were heated above the melting temperature at 10 K/min in inert gas (nitrogen). At 150°C, the purge gas (dashed lines) was changed to synthetic air (N₂:O₂ = 80:20). The effectiveness of stabilizing additives extends the time the sample resists against oxygen, whereas aging usually reduces the resistance of polymers against oxidation. The oxidation reaction for sample 1 (blue line) started after 51.5 min and already after 43.4 min for sample 2 (black line). Therefore, the oxidation resistance for sample 1 is obviously much better.