



# Natural Ageing of Rubber

*Changes in Physical Properties  
Over 40 Years*

R.P. Brown and T. Butler

**RAPRA**  
TECHNOLOGY LTD.

*Europe's leading independent  
plastics and rubber specialists*

# Contents

1. Introduction .....	1
2. Materials .....	1
3. Preparation of Test Pieces .....	2
4. Physical Tests .....	2
5. Exposure of Test Pieces.....	3
6. Climate .....	6
7. Results .....	6
7.1 Presentation .....	6
7.2 Uncertainty .....	7
7.3 Interpretation of Results .....	8
8. Discussion.....	8
8.1 General .....	8
8.2 Hardness and Modulus .....	9
8.3 Tensile Strength and Elongation at Break .....	9
8.4 Resilience .....	9
8.5 Low Temperature Stiffness .....	9
8.6 Volume Change .....	10
8.7 Resistivity .....	10
8.8 Compression Set .....	10
9. Conclusions .....	10
Appendix 1 - Compound Details .....	11
Appendix 2 - Results .....	17
Compound A - Natural Rubber - Standard .....	19
Compound B - Natural Rubber - Good Ageing .....	27
Compound C - Natural Rubber - Mineral Filler Loaded .....	35
Compound D - Natural Rubber - Mineral Filler (Heavy Loaded) .....	43
Compound E - Styrene Butadiene Rubber - General Purpose .....	51
Compound F - Styrene Butadiene Rubber - Good Ageing.....	59

Compound G - Styrene Butadiene Rubber (Oil Extended) - General Purpose .....	67
Compound H - Styrene Butadiene Rubber (Oil Extended) - Good Ageing .....	75
Compound J - Butyl Rubber - General Purpose .....	83
Compound K - Butyl Rubber - Good Ageing .....	91
Compound L - Polychloroprene - General Purpose .....	99
Compound M - Polychloroprene - Natural Ageing .....	107
Compound N - Polychloroprene - Heat Ageing .....	115
Compound P - Nitrile Rubber - General Purpose .....	123
Compound R - Nitrile Rubber - Good Ageing .....	131
Compound S - Acrylate Rubber .....	139
Compound T - Chlorosulphonated Polyethylene .....	147
Compound W - Polysulphide Rubber .....	155
Compound X - Silicone Rubber .....	163