

UNCLASSIFIED

AD 268 266

*Reproduced
by the*

**ARMED SERVICES TECHNICAL INFORMATION AGENCY
ARLINGTON HALL STATION
ARLINGTON 12, VIRGINIA**



UNCLASSIFIED

NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U. S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

INDEXED REFERENCES PERTAINING TO
DEGRADATION AND FRACTURE OF PLASTICS



AUGUST
1961

997 897

PLASTEC

PLASTICS TECHNICAL EVALUATION CENTER

PICATINNY ARSENAL
DOVER, NEW JERSEY

DEC 24 1961

11/11/61

Authorized by the Office of Director of Defense Research and Engineering, the Plastics Technical Evaluation Center (PLASTEC) evaluates and disseminates technical information on current development, engineering, and application work in the field of plastics and reinforced plastics. It engages in materials surveys and other special assignments, and provides the Department of Defense with technical data and advice on research and development programs on plastics.

Army, Navy, and Air Force installations, and contractors and other suppliers of needs for defense may request information from this center directly.

Qualified requesters may obtain PLASTEC Reports from the ASTIA Document Service Center, Arlington Hall Station, Arlington 12, Va.

Data originating in this center are available to the general public through the Office of Technical Services, Department of Commerce, Annex 1, Washington 25, D. C.

A handwritten signature in cursive script, reading "Harry E. Pebly, Jr.", written in dark ink.

Harry E. Pebly, Jr., Director

INDEXED REFERENCES PERTAINING TO
DEGRADATION AND FRACTURE OF PLASTICS

BY

ARNOLD E. MOLZON

AUGUST, 1961

PLASTICS TECHNICAL EVALUATION CENTER

CONTENTS

	<u>Page</u>
SUMMARY	2
INTRODUCTORY COMMENTS	3
ORGANIZATION	4
PART I - LIST OF REFERENCES	5
PART II - MATERIALS INDEX	32
PART III - SUBJECT INDEX	34

SUMMARY

Two hundred and ten selected references pertaining to the degradation and the fracture of plastics are listed herein. These are cross indexed in terms of specific types or classes of plastic materials, and in terms of pertinent subjects such as: degradation, failure mechanism, fracture, stress cracking.

This report represents one part of a continuing effort in this field.

INTRODUCTORY COMMENTS

A literature search has been conducted for articles pertaining to the degradation and fracture of plastics. Some key words used in searching the plastics literature were: brittle, crazing, degradation, embrittlement, fracture and stress cracking. References on relatively slow degradation processes such as weathering have been minimized. Some references on the effects of nuclear radiation have been included.

Two hundred and ten selected references have been listed and cross indexed in terms of materials and subject. The materials index identifies those references which pertain to a specific type or class of plastic material; that is, polystyrene, glass reinforced laminates, etc. The subject index identifies those references relating to a specific subject; that is, degradation, failure mechanism, fracture, stress cracking, etc.

This literature search and related work such as the evaluation of references and the compilation of data are continuing. It was felt that the indexed references were of sufficient importance to justify publication at this time.

ORGANIZATION

The material presented herein has been given a functional organization in three parts.

Part I, List of References, reports the outcome of the literature search. The references are numerically identified for within-report usage.

Part II, Materials Index, identifies those references which pertain to a specific type of plastic. This makes possible the easy location of the references on a material of particular interest.

Part III, Subject Index, identifies those references which pertain to a specific subject. This provides a guide among the references from the standpoint of subject interest.

PART I

LIST OF REFERENCES

	<u>Ref. No.</u>
The Apparent Domain Structure of Polystyrene as Revealed by Liquid and Vapor Crazing L. E. Nielsen J. Appl. Polymer Sci. <u>I</u> (1) 24-27 (1959)	1
The Stability of Fluorine - Containing Polymers to Amine M. I. Bro. J. of Appl. Polymer Sci. <u>I</u> (3), 310-312 (1959)	2
Thermal - Oxidative Degradation of Poly (ethyl acrylate) R. Steel, H. Jacobs J. Appl. Polymer Sci. <u>II</u> (4), 86-92 (1959)	3
Effects of Gamma Radiation on some Physical Properties of Teflon (Polytetrafluoroethylene resin) Nishioka et al J. Appl. Polymer Sci. <u>II</u> (4), 114-119 (1959)	4
Chemical Degradation and Mechanical Testing of Polyethylenes E. G. Bobalek et al J. Appl. Polymer Sci. <u>II</u> (5), 210-215 (1959)	5
Crystallization and Second Order Transition Phenomena in Polymers D. H. Feldman Thiokol Chemical Corporation Seminar Series, No. IV, (23 November 1959)	6
Environmental Tests for Plastomers Materials in Design Engineering 124 (April 1961)	7

	<u>Ref. No.</u>
The Photodegradation of Polymethylmethacrylate, The Mechanism of Degradation Cowley and Melville Proc. Roy. Soc. (London) 210A, 461-481 (1952)	8
Chemical Structure and Stability Relationships in Polymers B. G. Achhammer, M. Tyron, G. M. Kline Modern Plastics 131 (Dec. 1959)	9
Accelerated Aging of Elastomers, Plastics, and Resins Gummiwerk Ger. 925, 315	10
Breakdown of Methyl Methacrylate Polymer by High Energy Radiation Charlesby Nature 171, 1153 (1953)	11
High Energy Radiation Effects on Polyacrylates and Polymethylmethacrylate Allan R. Shultz J. Polymer Science <u>XXXV</u> 369-380 (1959)	12
The Effects of Ionizing Radiation on Natural and Synthetic High Polymers Frank A. Bovey Interscience, N.Y. - London (1958)	13
Effect of Plasticizers on Physical Properties R. F. Bayer Tappi <u>34</u> , 357-62 (August 1951)	14
Oxidative Degradation of Polyethylene Harold C. Beachell, S. P. Nemphos J. Polymer Sc. <u>XXI</u> , 113-124 (1956)	15

	<u>Ref. No.</u>
Velocity of Dissolution of Polystyrene K. Veberreiter J. Polymer Sci. <u>23</u> , 75-81 (1957)	16
The Oxidative Degradation of Deutero Polystyrenes H. C. Beachell et al J. Polymer Sci. <u>XXV</u> , 173-187 (1957)	17
Ultrasonic Degradation of Cellulose Nitrate: Effects of Temperature, Solvent and Other Process Variables B. B. Thomas, W. J. Alexander J. Polymer Sci. <u>XXV</u> , 285-304 (1957)	18
Chemistry of High Polymer Degradation Processes Norman Grassie Interscience, New York - London (1956)	19
The Condensed Chemical Dictionary (5th Edition) Rose, Arthur and Elizabeth N. Y., Reinhold (1956)	20
Development of Cracks in Solid Polymers (USSR) M. I. Bessanov, Ye. V. Kuvshinskiy Fizika tverdogo tela <u>3</u> (2), 607-610 (Feb. 1961)	21
The Technology of Solvents and Plasticizers Arthur K. Doolittle N. Y., Wiley (1954)	22
Chemical Resistance of Plastics, Corrosion Department Staatsmijnen in Limburg Heerlen, The Netherlands	23

	<u>Ref. No.</u>
Chemical Resistance of Plastics 1954 U. S. Navy Bureau of Ships, Report, PB 121 133	24
C. D. Bopp, O. Sisman Report 1373 Oak Ridge National Laboratories, Oak Ridge, Tenn. 69 (July 23, 1953)	25
Effect of Radiation on Some Plastics and Plastomers Sisman and Bopp ASTM Spec. Tech. Publ. (208), 119-129 (1957)	26
The Kinetics of Random Degradation of Polymers, A Resume Tobolsky J. Polymer Sci. <u>26</u> , - 247-251 (1957) (degradation via hydrolysis of polymers in solution)	27
Plastics for Corrosion-Resistant Applications R. B. Seymour, R. H. Steiner N.Y., Reinhold (1955)	28
Catalyzed Oxidative Degradation of Natural Rubber Networks Tobolsky and Mercurio J. Am. Chem. Soc. <u>81</u> , 5539, 5540 (1959)	29
Kinetics of the Degradation of Polyesters by Alcohols P. J. Flory Am. Chem. Soc. J. <u>62</u> , 2255-2261 (Sept. 1940)	30
Effect of Chemicals on Flurothene (Kel-F) S. E. Frey and others Ind. and Eng. Chem. <u>42</u> , 2314-2317 (Nov. 1950)	31
Polymer Degradation: Wide-range Dosimeter P. V. Feng Nucleonics <u>16</u> , 114 (October 1958)	32

	<u>Ref. No.</u>
Compatibility of Rocket Propellants with Materials of Construction W. K. Boyd, E. L. White Batelle Memorial Institute, DMIC Memorandum 65	33
Effect of Solvents upon Solid Organic Plastics J. Delmonte Ind. and Eng. Chem. <u>34</u> , 764-770 (June 1942)	34
Synthetic Fibers Materials in Design Eng., Materials Selector Issue (Mid.-Nov. 1960)	35
How New Propellants Affect Plastics and Elastomers R. E. Mowers Materials in Design Eng. <u>50</u> , 89-91 (Sept. 1959)	36
Factors Affecting Durability of Glass-Reinforced Polyester Plastics A. L. Smith, J. R. Lowry Plastics Tech. <u>5</u> , 42-48 (June 1959)	37
How Radiation Affects Plastics and Plastomers Materials in Design Engineering (July 1960)	38
Plastics vs. Corrosion R. S. Seymour Modern Plastics Encyclopedia, <u>29</u> , Breskin Publications (1961)	39
Technical Data on Plastics Manufacturing Chemists Association (Feb. 1957)	40
Polymer Degradation Mechanism National Bureau of Standards Circular 525 (1953) Washington, Government Printing Office	41

	<u>Ref. No.</u>
An Examination of the Deterioration Mechanism of Cloth Reinforced Laminates by Polarized Light and Fluorescent Tracers John Outwater SPI Proc. 15th (1960)	42
Resistance of Plastics to Chemical Reagents G. M. Kline et al ASTM Proceedings <u>41</u> , 1246-1257 or Modern Plastics <u>19</u> , 59-66 (Dec. 1941)	43
Degradation and Aging of High Polymers Paint and Oil Chem. R <u>109</u> , 41 (Dec. 26, 1946)	44
Oxidative Degradation of Polymeric Materials A. V. Tobolsky India Rubber World <u>118</u> , 363-364 (June 1948)	45
Effect on Plastics of Immersion for 7 days in Chemical Reagents at 25°C --table C. W. Patton Mod. Packaging <u>15</u> , 86 (Nov. 1941)	46
Plastics meet the Acid Test R. B. Seymour Modern Plastics <u>27</u> , 91-92 (Aug. 1950)	47
Chemical Resistance of Laminates C. J. Straka Mod. Plastics <u>21</u> , 107-109 (October 1943)	48
Acid and Alkali Resistance of Plastics J. Delmonte Mod. Plastics <u>20</u> , 91-94 (Dec. 1942)	49

	<u>Ref. No.</u>
Compatibility of Rocket Propellants with Materials of Construction W. K. Boyd, E. L. White Batelle Memorial Institute, DMIC Memorandum 65	33
Effect of Solvents upon Solid Organic Plastics J. Delmonte Ind. and Eng. Chem. <u>34</u>, 764-770 (June 1942)	34
Synthetic Fibers Materials in Design Eng., Materials Selector Issue (Mid.-Nov. 1960)	35
How New Propellants Affect Plastics and Elastomers R. E. Mowers Materials in Design Eng. <u>50</u>, 89-91 (Sept. 1959)	36
Factors Affecting Durability of Glass-Reinforced Polyester Plastics A. L. Smith, J. R. Lowry Plastics Tech. <u>5</u>, 42-48 (June 1959)	37
How Radiation Affects Plastics and Plastomers Materials in Design Engineering (July 1960)	38
Plastics vs. Corrosion R. S. Seymour Modern Plastics Encyclopedia, <u>29</u>, Breskin Publications (1961)	39
Technical Data on Plastics Manufacturing Chemists Association (Feb. 1957)	40
Polymer Degradation Mechanism National Bureau of Standards Circular 525 (1953) Washington, Government Printing Office	41

	<u>Ref. No.</u>
An Examination of the Deterioration Mechanism of Cloth Reinforced Laminates by Polarized Light and Fluorescent Tracers John Outwater SPI Proc. 15th (1960)	42
Resistance of Plastics to Chemical Reagents G. M. Kline et al ASTM Proceedings <u>41</u> , 1246-1257 or Modern Plastics <u>19</u> , 59-66 (Dec. 1941)	43
Degradation and Aging of High Polymers Paint and Oil Chem. R <u>109</u> , 41 (Dec. 26, 1946)	44
Oxidative Degradation of Polymeric Materials A. V. Tobolsky India Rubber World <u>118</u> , 363-364 (June 1948)	45
Effect on Plastics of Immersion for 7 days in Chemical Reagents at 25°C --table C. W. Patton Mod. Packaging <u>15</u> , 86 (Nov. 1941)	46
Plastics meet the Acid Test R. B. Seymour Modern Plastics <u>27</u> , 91-92 (Aug. 1950)	47
Chemical Resistance of Laminates C. J. Straka Mod. Plastics <u>21</u> , 107-109 (October 1943)	48
Acid and Alkali Resistance of Plastics J. Delmonte Mod. Plastics <u>20</u> , 91-94 (Dec. 1942)	49

	<u>Ref. No.</u>
Degradation of Plastics J. R. Majer Chem. Age <u>72</u> , 149-154 (1955)	50
Degradation of Vinyl Polymers W. S. Reid Soc. Chem. Ind. J. <u>68</u> , 244-247 (Aug. 1949)	51
Fracture Mechanics of Solid Propellants E. I. du Pont, E-Lab - A-21. (15 April 1960) (series of quarterly reports)	52
Solubility of Heterogeneous Polymers Stockmayer J. Chem. Phys. <u>17</u> , 588 (June 1949)	53
Radiochemical Degradation of High Polymers Durup J. Chem. Phys. <u>51</u> , 64-73 (1954)	54
Mechanism of the Degradation of Polyamides B. G. Achhammer, G. M. Kline J. Res. NBS <u>46</u> , 391-421 (May 1951) J. Ap. Chem. <u>1</u> , 301-320 (July 1951)	55
Embrittlement of Polyethylene C. S. Imig Plastics Tech. <u>5</u> , 35-37 (May 1959)	56
Catalytic Degradation and Oxidation of Cellulose W. G. Parks et al Am. Dyestuff Rep. <u>39</u> , 294-300 (May 1950)	57

	<u>Ref. No.</u>
Research on the Compatibility of Materials with Chlorine Trifluoride, Perchloryl Fluoride and Mixtures of These John C. Grigger, Henry C. Miller Pennsalt Chemicals Corp. Quarterly Technical Summary Report 1, (1 Nov. 59-31 Jan. 1960, 15 Feb. 1960) 12 p. incl. tables (Contract AF 33(616)6796)	58
Gel-type, Vertical Adherence Paint Removers A. Mankowich Coating and Chemical Lab. Report 1, (20 July 1960) 11 p. incl. tables (Proj. 593-32-006; Report CCL 94)	59
Consistencies in Radiation Degradation of Glassy Polymers B. L. Tsetlin, N. G. Zaitseva, V.M. Korbut, V. A. Kargin Khim., Akad. Nauk SSSR, Otdel, Khim. Nauk 285-286 (1957)	60
Cracking of Stressed Polyethylene; Effect of Chemical Environment J. B. De Coste and others Ind. and Eng. Chem. <u>43</u> , 117-121 (Jan. 1951)	61
Degradation of Cellulose Acetate Films William K. Wilson, B. W. Forshee SPE Journal <u>15</u> -(2), 146-156 (1959)	62
Degradation with Heat and Oxygen of Polymers of Olefins and Dienes P. Maltese Materie Plastice <u>24</u> , 1081-1095 (1958)	63
Effect of Neutron and X-ray Irradiation on the Dielectric Constant and Loss Tangent of some Plastic Materials R. A. Weeks, D. Binder Power App. and Systems 88-94 (April 1959)	64

	<u>Ref. No.</u>
Effects of Nuclear Radiation on the Mechanical Strength Properties of Glass Fiber Reinforced Plastics Laminates R. C. Tomashot, D. Harvey SPI Proceedings Sec. 9-A (1957)	65
What Makes Plastics Crack and Craze Product Engineering 14 (16 Dec. 1957)	66
Degradation Effects of High Intensity Thermal Radiation on Plastic Radome Materials Rex W. Farmer Wright Air Development Div. Report WADC TN 59-251 (July 1960)	67
The Vacuum-Thermal Stability of Organic Coating Materials, Part I. The Polyurethanes James J. Mattice Wright Air Development Div., Report WADD TR 60-126, pt. 1 (1 June - Nov. 1959)	68
Failure Mechanism in Glass Fiber Reinforced Plastics M. B. Desai and F. A. McCarry ASTM Bulletin, July 1959 (T.P. 155)	69
How to Predict Structural Behavior in R.P. Laminates Lawrence Fisher Modern Plastics (June 1960)	70
Effects of Stress Concentrations on Laminate Strengths E. L. Strauss Plastics Technology (Aug. 1959)	71
Internal Laminate Mechanics Richard E. Chambers Plastics Research Lab., Mass. Institute of Technology (March 15, 1958)	72

	<u>Ref. No.</u>
On the Mechanism of Brittle Failure of Plastics V. R. Regel Translation from Russian Journal of Technical Physics (March 1951), Vol. 21, No. 3, p. 287-303	73
Development of a Method to Determine Plastic Strains and Stresses Using Brittle Coatings Armour Research Project K 108 Final Report (June 1959)	74
Residual and Thermal Stresses in Potting Resins and the Development of Strain Gage Instrumentation for their Determination R. Heise Naval Ordnance Lab., NAVORD 5769 (29 Aug. 1958)	75
Electric Breakdown and Conduction Through Mylar Film Mass. Institute of Technology, T R 112 (Dec. 1956)	76
Castable Materials for Neutron Shields J. W. McGarvey and W. M. Veroeven Rock Island Arsenal Lab., RIA-61-1344, (April 1961) (information on depolymerization of butyl rubber via thermal degradation)	77
Thermal Embrittlement of Stressed Polyethylene J. H. Heiss and V. L. Lanza Wire and Wire Products, Vol. 33, (October 1958)	78
Measurement of Environmental Stress-Cracking of Polyethylene Rudin and Birks ASTM Bulletin No. 245 (April 1960)	79
A Review of Stress-Cracking in Polyethylene J. B. Howard Soc. of Plastic Engineers Journal, Vol. 15, (May 1959)	80

	<u>Ref. No.</u>
The Phase Equilibrium Between a Crystalline Polymer and Solvents R. B. Richards Transactions of the Faraday Society 42, 10-28 (1946)	81
Report on Research on Stability of Rigid Polyurethane Foam Plastics N. Y. Naval Shipyard (25 April 1961)	82
Correlation Between Structure and Thermal Stability of Epoxy Resins WADD TR 60-700 (Nov. 1960)	83
Relationship of Polymer Structure to Thermal Deterioration of Adhesive Bonds in Metal Joints NASA Tech. Note D-108 (Aug. 1959)	84
Degradation Studies on Condensation Polymers Institute of Rubber Research, Univ. of Akron, Final Report (Jan. 1961)	85
The Degradation of Plasticized PVC Compositions under High Level Radiation Atomic Energy Research Estab., Harwell, AERE E/R 2518 (1958)	86
Lubrication Behavior and Chemical Degradation Characteristics of Experimental High Temperature Fluids and Lubricants WADD TR 60-855	87
Thermal Degradation of Polymers at High Temperature National Bureau of Standards, NBS 7002 (Oct. 31, 1960)	88
Thermal Degradation of Polymers at High Temperatures NBS 6911 (July 1960)	89

	<u>Ref. No.</u>
Ozone Resistance of Butyl Vulcanizates E. Bergstrom Rock Island Arsenal Lab. Report 60-1593 (May 1960)	90
Ozone Resistance of SBR Vulcanizates Rock Island Arsenal, RIA-60-2563 (Aug. 1960)	91
Thermal Degradation of Printed Wiring Adhesives Schlaback and Rider Adhesives Age (July 1959)	92
Strain Gage Evaluation of Casting Resins Sampson and Lesnick 14 Annual SPE Conference (Jan. 1958), also Modern Plastics (Feb. 1958)	93
Pressures on Objects Embedded in Rigid Cross-Linked Polymers Dewey and Outwater Modern Plastics (Feb. 1960) (143)	94
Physical Chemistry of High Polymeric Systems H. Mark and A. V. Tobolsky 2nd Ed., Interscience (1950) Chapter on Degradation of High Polymers	95
High Temperature Resistance and Thermal Degradation of Polymers Symposium on 21-23 Sept. 1960, U.S. Navy/ONRI.-G-23-60, AD 246805	96
Degradation of Polymers by Ultraviolet Radiation NRL Memo Report 914 (April 1959)	97

	<u>Ref. No.</u>
Plastics at High Rates of Stressing, Molecular Structure and Mechanical Behavior H. Warburton Hall DMXRD Report P2/53/1, Directorate of Materials and Explosives Research and Development, Great Britain	98
The Resistance to Shock of Plastics and their Derivatives G. Fabre Royal Aircraft Establishment, Translation 657, (May 1957) (DCCAERO No. 40, Sept. 1956)	99
Reinforced Plastics Research Program MCA-MIT Plastics Research Project, Plastics Res. Lab., MIT (July 1, 1958)	100
Impact and Shock Resistance of Plastics North Carolina State College, Final Report on Contract NObs-72035 (1734F), (Dec. 1957)	101
Polythene Household Ware, Residual Moulding Strains and Service Behavior G. J. Gilbert Plastics (Aug. 1958)	102
Parameter for Rupture Stress Phenomena in Metals and Plastics Eng. Res. & Dev. Lab., Fort Belvoir, ERD SM, 1 Feb. 1959 S. Goldfein	103
Tensile Properties of Some Plastics at Low Temperatures J. Dymant and H. Ziebland Explosives Research and Development Establishment Report 24/R/55, Ref. XR 812/2	104
Chemical Resistance of Plastics E. M. Schoenborn Final Report, North Carolina State College, Contract NObs-55441, June 30, 1953	105

	<u>Ref. No.</u>
Creep and Time Fracture Strength of Plastic Materials under Tensile Stresses U.S. Air Force, Tech. Serv. Cmd., TR 4989, (14 July 1943)	106
Stability of Rigid Polyurethane Foam Plastics I. Resnick New York Naval Shipyard, Lab. Project 6247, Prog. Rpt. #10, (25 April 1961)	107
Compatibility of Explosives with Polymers Marjorie St. Cyr Picatinny Arsenal T.R. 2595 (March 1959)	108
Relationship between (Apparent) Second-order Transition Temperature and Melting Point R. G. Beaman J. Polymer Science, <u>9</u> , 490 (1952)	109
Thermal Degradation of Polymers at Temperatures up to 1200°C Madorsky and Strauss WADC TR 59-64 Part II	110
The Strength of Glassy Polymers J. P. Berry SPE Transactions, No. 3 (July 1961)	111
Role of Entanglements in Degradation of Elastic Networks Scott, Allen, Morton Proceedings of 6th JANAF Conference on Elastomer Research and Development, Oct. 1960, Quartermaster Research and Engineering Command, Natick, Massachusetts	112
Degradation of Polymers by External Corona Discharge R. F. Grossman 9th Annual Technical Progress in Communication Wires and Cables, Nov-Dec. 1960, Army Signal Research & Development Lab., Fort Monmouth, N. J.	113

	<u>Ref. No.</u>
Polymer Structure and its Resistance to a Chemical Agent K. C. Tsou, B.D. Halpern Proceedings of 6th JANAF Conference on Elastomer Research and Development, Oct. 1960, Quartermaster Research and Engineering Command, Natick, Mass.	114
Antioxidant Action in Polymers Winslow, Hawkins, Worthington Proceedings of 6th JANAF Conference on Elastomer Research and Development, Oct. 1960, Quartermaster Research and Engineering Command, Natick, Mass.	115
Radiation Degradation of Polyethylene Terephthalates and Polyvinyl Halides L. M. Epstein 1960 Annual Report, Conference on Electrical Insulation, Oct. 1960, Publication 842, National Academy of Sciences, Washington D.C.	116
Studies on the Thermal Degradation Elevator Effects R. R. Divis 1960 Annual Report, Conference on Electrical Insulation, Oct. 1960, Publication 842, National Academy of Sciences, Washington, D.C.	117
The Role of Oxidation on the Properties of Polyester Reinforced Laminates at Elevated Temperature G. H. Hicks 16th Annual Conference, Reinforced Plastics Division, Society of the Plastics Industry, Feb. 1961	118
The Strength of Glassy Polymers J. P. Berry 17th Annual Technical Conference, Society of Plastic Engineers Jan. 1961	119

	<u>Ref. No.</u>
Polymer Requirements and Insulation Techniques for High Density Polyethylenes R. J. Ettinger 9th Annual Technical Progress in Communication Wires and Cables Nov-Dec. 1960, Army Signal Research and Development Lab., Fort Monmouth, N. J. (Thermal embrittlement)	120
The Environmental Stress Rupture of Polyethylene Used in Blown Bottle Applications L. L. Lander 17th Annual Tech. Conference, Society of Plastic Engineers, Jan. 1961	121
Physical Techniques Used in Studying Interfacial Phenomena R. L. Patrick 16th Annual Conference, Reinforced Plastics Div., Society of the Plastics Industry, Feb. 1961	122
Interaction of Organic Monomers and Water with Fiberglass Surfaces K. Gutfreund, H. Weber 16th Annual Conference, Reinforced Plastics Div., Society of the Plastics Industry, Feb. 1961	123
Some Problems Investigated in the Study of Mechanical Aspects of Reinforcements J. S. Isliner, F. K. Halvax 16th Annual Conference, Reinforced Plastics Div., Society of the Plastics Industry, Feb. 1961	124
Time Dependent Rupture of High Impact Thermoplastics J. V. Schmitz, R. S. Hagan 17th Annual Tech. Conference, Society of Plastic Engineers Jan. 1961	125

	<u>Ref. No.</u>
The Different States of Polymers Based on their Thermo-Mechanical Properties M. Chatain, P. Dubois 17th Annual Technical Conference, Soc. of Plastic Engineers Jan. 1961	126
Use of Laboratory Data to Predict Moldability and End Use Properties of High Density Polyolefin Blow Molding Materials H. Bassett, N. Burns, R. Christensen 17th Annual Technical Conference, Soc. of Plastic Engineers Jan. 1961	127
Stress Distribution in the Resin of Reinforced Plastics D. C. West, J. O. Outwater p6th Annual Conference, Reinforced Plastics Div., Society of the Plastics Industry, Feb, 1961	128
Photoelastic Investigation of Residual Stresses in Glass-Plastic Composites I.M. Daniel, A. J. Durelli 16th Annual Conference, Reinforced Plastics Div., Society of the Plastics Industry, Feb. 1961	129
High Density Polyolefins - Their Applications in Corrosion Engineering O. E. Larsen SPE Regional Technical Conference, "Plastics vs Corrosion", Oct. 1960	130
The Microstructure of Impact Resistant Thermoplastics E. G. Bobalek, R. M. Evans ACS, Div. of Organic Coatings and Plastics Chemistry, 138 Ch. National Meeting, Sept. 1960	131

	<u>Ref. No.</u>
Long-Term Rupture and Impact Stresses in Reinforced Plastics S. Goldfein ASTM Bulletin, Sept. 1957, p. 36-39	132
Determination of Long-Term Rupture and Impact Stresses in Glass Reinforced Plastics from Short-Time Static Tests at Different Temperatures 12th Annual Meeting, Reinforced Plastics Div. Society of Plastics Industry, Feb. 1955	133
Time-Temperature Relationship for Rupture Stresses in Reinforced Plastics S. Goldfein Proc. ASTM, Vol. 54, (1954)	134
General Formula for Creep and Rupture Stresses in Plastic Materials S. Goldfein USERDL Materials Branch Report 2409-17, July 1958	135
Degradation of Plastics SPE-RETEC Washington, D. C., Dec. 1959	136
A New Test Device for Determining the Resistance of Cast Resin Compositions to Thermal Shock and Shrinking Stress SPE-RETEC Fort Wayne, Indiana, May 22, 1959	137
A New Theory of Stabilization of Mixtures Containing Polyvinyl Chloride C. H. Fuchsman 16th ANTEC, SPE, 1959 - also J. SPE Sept. 1959	138

	<u>Ref. No.</u>
A. Review of Stress-Cracking in Polyethylene J. B. Howard 16th ANTEC, SPE, 1959	139
Device for Measuring Stress Relaxation of Plastics R. C. Curran and others Modern Plastics, 142, (November 1960)	140
Embrittlement of Polyethylenes C. S. Imig 14th ANTEC, SPE, 1958	141
Environmental Stress-Cracking of Polyethylene Injection Moldings-Practical Control and Test Methods Anderson & Melvin 14th ANTEC, SPE. 1958	142
Internal Strains in Casting Resins Sampson & Lesnick J. SPE, Aug. 1958	143
Degradation of Cellulose Acetate Films Wilson & Forshee J. SPE, Feb. 1959	144
Energies of Polymer Decomposition, Part II L. A. Wall J. SPE, Sept. 1960	145
Plastics in Corrosion Control G. Reed J. SPE, Oct. 1960	146

	<u>Ref. No.</u>
Polyesters as Corrosion-Resistant Coatings L. Graubart J. SPE, Dec. 1960	147
Environmental Stress Rupture of Polyethylene L. L. Landon J. SPE, Dec. 1960	148
Polyvinyl Chloride Degradation and Stabilization B. Baum J. SPE, Jan. 1961	149
Measurement of Polyethylene Degradation by ZST Test Meltzer and Muldew J. SPE, Jan. 1961	150
A. Comparison of the Brittle Behavior of Metallic and Nonmetallic Materials DMIC Memorandum 107, May 16, 1961, G. T. Hahn & R.I. Jaffee	151
Stress-Corrosion Cracking - A Nontechnical Introduction to the Problem W. E. Berry DMIC Report 144, Jan. 6, 1961	152
Plastics vs. Corrosion RETEC, SPE, Oct. 5, 1960	153
Fracture Phenomena in Polymers Wolock, Kies, and Newman Fracture, p. 250, Wiley, New York (1959)	154
Morphology of Fracture in Polymethyl Methacrylate W. F. Busse, E. Orowan, J. H. Neimark Presented before American Physical Society, Phila., Pa. March 1957	155

	<u>Ref. No.</u>
Effects of Molecular Weight on Crazing and Tensile Properties of Polymethylmethacrylate I. Wolock, M. A. Sherman, B. M. Axilrod NACE Research Memorandum 54 A 04 (1954)	156
The Mechanisms of Polymer Failure A. M. Bueche and J. P. Berry Fracture, p. 265, Wiley, New York (1959)	157
Fractures Produced by Stress Waves H. Kolsky Fracture, p. 281, Wiley, N. Y. (1959)	158
Velocity Effects in Fracture H. Schardin Fracture p. 297, Wiley, N. Y. (1959)	159
The Strength of Silicate Glasses and Some Crystalline Oxides R. J. Charles Fracture, p. 225, Wiley, N. Y. (1959)	160
S. B. Newman and I. Wolock, J. Appl. Phys. 29, 49 (1958) (mol. wt. PMMA vs appearance of fracture surface)	161
Mechanical Behavior of High Polymers T. Alfrey, Jr. Interscience Publishers, N. Y. (1948) (tensile prop. of PMMA vs. temp.)	162
A Comparative Study of the Corrosion Resistance of a Bisphenol-A Polyester Resin, A General Purpose Resin, and an Isophthalic Polyester Resin S. S. Feuer and A. F. Torres 15th Annual Conference, Reinforced Plastics Div., Society of Plastics Industry, 1960	163

	<u>Ref. No.</u>
The Deterioration of Epoxy Laminates under Extreme Aging Conditions M.C.W. Judd, T. Lloyd, P. McMullen & E. W. Russel, <i>ibid</i>	164
Glass Reinforced Plastic Laminates in Contact with Fuels or Sea Water J. E. Alfors and W. R. Graner, <i>ibid</i>	165
Study of Interface Relationships in Glass-Reinforced Plastic Systems by Sorption Methods K. Gutreund, H. S. Weber, Callaway Brown, <i>ibid</i>	166
Use of the Differential Expansion Technique for the Study of Internal Strain in Reinforced Plastic Structures J. G. Mohr, <i>ibid</i>	167
An Examination of the Deteriorating Mechanism of Cloth Reinforced Laminates by Polarized Light and Fluorescent Tracers J. O. Outwater, <i>ibid</i>	168
Stress Response of Glass-Filled Resins above Their Glass Transition Temperatures D. L. Hollinger and C. D. Doyle, <i>ibid</i>	169
On Relating Ultrasonic Scanning Information to Size, Shape and Type of Flaws in Laminated Plastic Structure T. J. Griffen, G. S. Binns, C. D. Doyle, V. C. Petrillo, <i>ibid</i>	170
Reinforced Plastics in the Chemical Industry J. J. Fisher, <i>ibid</i>	171
Effects of Stress Concentrations on the Strength of Reinforced Plastic Laminates Eric L. Strauss 14th Annual Conference, Reinforced Plastics Div., Society of Plastics Industry, 1959	172

	<u>Ref. No.</u>
Study of Toughness of Polyester Resins: Dissipation of Energy at Large Strains and Rates of Strain H. S. Loveless, <i>ibid</i>	173
Epoxy Laminates under Stress in Chemical Solutions J. Delmonte, Ed. Sarna, <i>ibid</i> (6D)	174
On the Flexural Failure of Cloth Reinforced Laminates J. O. Outwater, <i>ibid</i> (6E)	175
Resin Shrinkage Pressure During Cure R. E. Chambers, <i>ibid</i> (12B)	176
Resin-Glass Bond Study R. D. Mooney and F. J. McGarry, <i>ibid</i> (12E)	177
Fibre Glass Reinforced Plastics in the Chemical Industry F. J. Jaray, <i>ibid</i> (14C)	178
Shear Effects in Fiberglass Reinforced Plastic Laminates R. E. Chambers and F. J. McGarry, <i>ibid</i> (16C)	179
Failure Mechanisms in Fiberglass Reinforced Plastics N. M. Desai, F. J. McGarry, <i>ibid</i> (16E)	180
Bond of Resin To Glass A. C. Anderson and Dr. J. H. Healy 13th Annual Conference, Reinforced Plastics Division, Society of Plastics Industry (3B)	181
Some Factors Influencing Durability of Glass Reinforced Polyesters Arthur L. Smith, John R. Lowry, <i>ibid</i> (6B)	182

	<u>Ref. No.</u>
Resin-Glass Bond Characteristics Prof. F. J. McGarry, <i>ibid</i> (11B)	183
The Significance of Transition Temperatures in Polyester- Glass Laminates A. D. Coggeshall 12th Annual Conference, Reinforced Plastics Div., Society of Plastics Industry, 1957 (8A)	184
Resin Degradation Testing W. G. Murray and R. E. Ely 12th Annual Conference, Reinforced Plastics Div., SPI, 1957 (13E)	185
Contribution of Glass Fiber Wetting to the Physical and Chemical Properties of Glass Reinforced Polyester Systems V. Sonkup and F. H. Bratton, <i>ibid</i> (16C)	186
Load-Deflection Characteristics of Glass-Cloth Reinforced Plastics Laminates under Conditions of Rapid Heating J. H. Beno, E. F. Smith, A. M. Dowell 11th Annual Conference, Reinforced Plastics Div., 1956 (8D)	187
The Mechanics of Plastic Reinforcement J. Ogden Outwater, Jr., <i>ibid</i> (9B)	188
Mechanical and Metallurgical Behavior of Sheet Materials 7th Sagamore Ordnance Materials Research Conference, Aug. 16-19, 1960 Sagamore Conference Center, Roquette Lake, N. Y. (Sessions on Fracture, Crack Initiation & Propagation contain fundamental information)	189
On Crazing of Linear High Polymers C. C. Hsiao, J. A. Sauer, <i>J. Appl. Phys.</i> 21, 1071 (1950)	190

	<u>Ref. No.</u>
Studies on Polymethylmethacrylate, Part III, Crazing Effects Report No. Chem. 447, Royal Aircraft Establishment, England (Aug. 1948) also Nature, London, No. 4186, 175, 91 (1950)	191
Crazing of Polystyrene Films J. R. McLoughlin Princeton Univ., Plastics Lab. TR 12B, Dec. 15, 1948	192
Factors Affecting the Crazing of Polystyrene B. Maxwell, L. F. Rahm Princeton Univ., Plastics Lab. T.R. 14B, May 5, 1949	193
Crazing of Cast Polymethylmethacrylate E. W. Russell Nature, 165, 91 (1950)	194
Fracture Phenomena and Molecular Weight in Polymethylmethacrylate S. B. Newman and I. Wolock I. Appl. Phys., 29, 49 (1948)	195
High Speed Fracture of Rubber Peter Mason J. Appl. Phys., 29, 1146 (1948)	196
Tensile Strength of Plastics: Effects of Flaws and Chain Relaxation F. Bueche J. Appl. Phys., 29, 1231 (1958)	197
The Degradation of Addition Polymers by Ultrasonic Waves M.A.K. Mostafa; Part II J. Polymer Sci. XXVII, 473 (1948), Part III Experimental, J. Polymer Sci. XXVIII, 499 (1958), Part IV The Effect of Ultrasonic Intensity, J. Polymer Sci., XXVIII, 519 (1958)	198

	<u>Ref. No.</u>
Rheological Properties of Polystyrene below 80°C B. Maxwell and L. F. Rahm Ind. Eng. Chem., 41, 1988 (1949)	199
Complex Stressing of Polyethylene I. L. Hopkins, W. O. Baker, J. B. Howard J. Appl. Phys., 21, 206, (1950)	200
The Effect of Solvents on High Molecular Weight, Stable Acetal Resins R. G. Alsup, J. O. Punderson, G. F. Leverett, J. Appl. Polymer Sci., 1, 185 (1959)	201
W. B. Klemperer, Applied Mechanics T. von Karman Anniversary Volume, 328 (1941)	202
Process for Inhibiting Cracking of Polymeric Bodies W. O. Baker U. S. Patent 2,373,093 (1945)	203
Crazing of Phenolic Resin when Exposed to Acetone Barkhoff, R. A. and Carswell, T.S. Industrial Eng. Chem., 36, 461 (1944)	204
Matthaes, K. Jahrbuch deutsch, Luft-Fahrtforsng (1941)	205
Vieweg, R. and Schneider, W., Kunststoffe, 33, 268 (9) (1943)	206
Designing with du Pont Plastics, Handbook E. I. du Pont Wilmington, Delaware	207
Silicones R. N. Meals and F. M. Lewis Reinhold Pub. (1959) (Reversion of Silicones)	208

	<u>Ref. No.</u>
Transition and Brittle Temperature, Polymers and Resins Brage Golding, Van Nostrand Pub. Co., 550 (1959) (Table - on 2nd order transition temperature of many polymers)	209
Technical Data Bulletin, Isochem Resins Co., Providence, R.I. Isochemstrip 701-708 (An example of one of the <u>many</u> commercial solvent mixtures developed for degrading epoxy, polyester, and polyurethane type cast materials).	210

PART II
MATERIALS INDEX

<u>Material</u>	<u>Reference Number</u>
Acetals	201, 207
Acrylics	3, 8, 11, 12, 21, 155, 156, 161, 191, 194, 195, 207
Adhesives	84, 92
Cellulosics	57, 205, 206
Cellulose Acetate	62, 144
Cellulose Nitrate	18
Elastomers (Rubber)	7, 26, 29, 36, 38, 77, 90, 91, 109, 112, 196
Epoxy	83, 164
Fibers	35
Fluorocarbons	2, 4, 31
Glass	160
Glass Reinforced Laminate	37, 42, 48, 65, 69, 70, 71, 72, 100, 118, 123, 124, 128, 129, 132, 133, 134, 135, 164, 165, 166, 167, 168, 169, 170, 171, 172, 174, 175, 177, 178, 179, 180, 181, 182, 183, 184, 186, 187, 188
Laminate	(See Glass Reinforced Laminate)
Lubricants	87
Mylar	76, 116
Nylon	(See Polyamide)

<u>Material</u>	<u>Reference Number</u>
Phenolic	204
Plastics *	9, 10, 13, 19, 22, 23, 24, 25, 26, 27, 28, 34, 36, 38, 39, 40, 41, 43, 44, 45, 46, 47, 49, 50, 53, 54, 60, 63, 64, 66, 67, 84, 85, 88, 89, 93, 95, 96, 98, 99, 101, 103, 104, 105, 106, 108, 110, 111, 113, 114, 115, 119, 125, 126, 131, 135, 136, 137, 143, 145, 151, 153, 154, 157, 197, 198
Polyamide	55, 207
Polyester	30, 147, 163, 173
Polyethylene	5, 15, 56, 61, 78, 79, 80, 81, 102, 120, 121, 127, 130, 139, 141, 142, 148, 150, 190, 200
Polymethyl Methacrylate	(See Acrylics)
Polystyrene	1, 16, 17, 192, 193, 199
Polyurethane	52, 68, 82, 107
Polyvinyl Chloride (see also Vinyl)	86, 116, 138, 149
Propellant	33, 36
Silicone	208
Vinyl (see also Polyvinyl Chloride)	51, 205, 206

* These articles are on groups of plastics rather than one specific type.

PART III
SUBJECT INDEX

<u>Subject</u>	<u>Reference Number</u>
Aging	10, 44, 164
Antioxidant	115
Biaxial Stressing	200
Brittle Coating	74
Brittle Fracture	(See Fracture)
Brittle Temperature	(See Second Order Transition Temperature)
Chemical Resistance	16, 23, 24, 28, 31, 34, 43, 46, 47, 48, 49, 53, 58, 61, 105, 114, 130, 146, 147, 165, 171, 174, 178, 186, 201, 207
Chemical Structure	9, 19, 25, 83, 84, 114
Compatibility	33, 58, 108
Corona	113
Corrosion	28, 130, 146, 147, 153, 163
Crazing	1, 66, 156, 190, 191, 192, 193, 194, 199, 200, 202, 203, 204, 207
Degradation	2, 3, 5, 8, 9, 15, 17, 18, 19, 27, 29, 30, 32, 37, 41, 42, 44, 45, 50, 51, 54, 55, 57, 60, 62, 63, 67, 68, 76, 77, 82, 83, 84, 85, 86, 87, 88, 89, 92, 95, 96, 97, 107, 110, 112, 113, 116, 117, 118, 136, 138, 144, 145, 149, 150, 164, 168, 185, 198, 208
Failure Mechanism	52, 69, 73, 81, 87, 100, 157, 175, 179, 180, 197, 200, 202, 203

<u>Subject</u>	<u>Reference Number</u>
Fracture	21, 52, 56, 61, 73, 81, 103, 106, 125, 132, 133, 134, 135, 140, 151, 154, 155, 157, 158, 159, 160, 161, 189, 195, 196, 197, 199, 200, 203
Glass Temperature	(See Second Order Transition Temperature)
Glassy Polymers	111, 119, 209, 210
Interface Phenomena, Glass-Resin	122, 123, 166, 177, 181, 183, 186
Laminate Mechanics	72, 124, 188
Low Temperature	104
Ozone	90, 91
Paint Remover	59, 210
Plasticizer	14, 22
Propellant	33, 36, 52, 58
Radiation, Effects of	4, 11, 12, 13, 25, 26, 32, 38, 60, 64, 65, 86, 97, 116
Radiochemical	54
Second Order Transition Temperature	6, 52, 109, 169, 184, 209
Shock	99, 101, 131, 132, 133, 137, 199
Solvents	22, 34, 59, 81, 201, 210
Stability	(See Degradation)
Stress Cracking	61, 79, 80, 121, 139, 142, 148, 152, 207
Stress Concentration	71, 75, 93, 94, 98, 100, 102, 128, 129, 143, 167, 169, 172, 174, 176

<u>Subject</u>	<u>Reference Number</u>
Structural Behavior	70
Test Method	7, 74, 75, 79, 93, 122, 129, 140, 167, 168, 170, 185, 199
Thermal Embrittlement	56, 78, 120, 141
Ultrasonics	198

AD _____ Accession No. _____

Plastics Technical Evaluation Center

INDEXED REFERENCES PERTAINING TO DEGRADATION AND FRACTURE OF PLASTICS (U)

Arnold E. Molzon

PLASTEC Note 2 August 1981

A literature search has been conducted for articles pertaining to degradation and fracture of plastics. Some key words used in searching the plastics literature were: brittle, crazing, degradation, embrittlement, fracture and stress cracking. References on relatively slow degradation processes such as weathering have been minimized. Some references on the effects of nuclear radiation have been included.

(OVER)

UNCLASSIFIED

1. Plastics - Degradation
2. Embrittlement
3. Fracture
4. Crazing
5. Stress cracking
6. Failure mechanism
7. Degradation-bibliography

I. Molzon, Arnold E.

UNITERMS

Degradation
Fracture
Deterioration
Bibliography
Molzon, Arnold E.

UNCLASSIFIED

AD _____ Accession No. _____

Plastics Technical Evaluation Center

INDEXED REFERENCES PERTAINING TO DEGRADATION AND FRACTURE OF PLASTICS (U)

Arnold E. Molzon

PLASTEC Note 2 August 1981

A literature search has been conducted for articles pertaining to degradation and fracture of plastics. Some key words used in searching the plastics literature were: brittle, crazing, degradation, embrittlement, fracture and stress cracking. References on relatively slow degradation processes such as weathering have been minimized. Some references on the effects of nuclear radiation have been included.

(OVER)

UNCLASSIFIED

1. Plastics - Degradation
2. Embrittlement
3. Fracture
4. Crazing
5. Stress cracking
6. Failure mechanism
7. Degradation-bibliography

I. Molzon, Arnold E.

UNITERMS

Degradation
Fracture
Deterioration
Bibliography
Molzon, Arnold E.

UNCLASSIFIED

AD _____ Accession No. _____

Plastics Technical Evaluation Center

INDEXED REFERENCES PERTAINING TO DEGRADATION AND FRACTURE OF PLASTICS (U)

Arnold E. Molzon

PLASTEC Note 2 August 1981

A literature search has been conducted for articles pertaining to degradation and fracture of plastics. Some key words used in searching the plastics literature were: brittle, crazing, degradation, embrittlement, fracture and stress cracking. References on relatively slow degradation processes such as weathering have been minimized. Some references on the effects of nuclear radiation have been included.

(OVER)

UNCLASSIFIED

1. Plastics - Degradation
2. Embrittlement
3. Fracture
4. Crazing
5. Stress cracking
6. Failure mechanism
7. Degradation-bibliography

I. Molzon, Arnold E.

UNITERMS

Degradation
Fracture
Deterioration
Bibliography
Molzon, Arnold E.

UNCLASSIFIED

AD _____ Accession No. _____

Plastics Technical Evaluation Center

INDEXED REFERENCES PERTAINING TO DEGRADATION AND FRACTURE OF PLASTICS (U)

Arnold E. Molzon

PLASTEC Note 2 August 1981

A literature search has been conducted for articles pertaining to degradation and fracture of plastics. Some key words used in searching the plastics literature were: brittle, crazing, degradation, embrittlement, fracture and stress cracking. References on relatively slow degradation processes such as weathering have been minimized. Some references on the effects of nuclear radiation have been included.

(OVER)

UNCLASSIFIED

1. Plastics - Degradation
2. Embrittlement
3. Fracture
4. Crazing
5. Stress cracking
6. Failure mechanism
7. Degradation-bibliography

I. Molzon, Arnold E.

UNITERMS

Degradation
Fracture
Deterioration
Bibliography
Molzon, Arnold E.

UNCLASSIFIED

Two hundred and ten selected references have been listed and cross indexed in terms of materials and subject. The materials index identifies those references which pertain to a specific type or class of plastic material; that is, polystyrene, glass reinforced laminates, etc. The subject index identifies those references relating to a specific subject; that is, degradation, failure mechanism, fracture, stress cracking, etc.

DISTRIBUTION - Copies obtainable from Office of Technical Services and ASTIA. Qualified organizations write to PLASTECH.

UNCLASSIFIED

UNCLASSIFIED

Two hundred and ten selected references have been listed and cross indexed in terms of materials and subject. The materials index identifies those references which pertain to a specific type or class of plastic material; that is, polystyrene, glass reinforced laminates, etc. The subject index identifies those references relating to a specific subject; that is, degradation, failure mechanism, fracture, stress cracking, etc.

DISTRIBUTION - Copies obtainable from Office of Technical Services and ASTIA. Qualified organizations write to PLASTECH.

UNCLASSIFIED

UNCLASSIFIED

Two hundred and ten selected references have been listed and cross indexed in terms of materials and subject. The materials index identifies those references which pertain to a specific type or class of plastic material; that is, polystyrene, glass reinforced laminates, etc. The subject index identifies those references relating to a specific subject; that is, degradation, failure mechanism, fracture, stress cracking, etc.

DISTRIBUTION - Copies obtainable from Office of Technical Services and ASTIA. Qualified organizations write to PLASTECH.

UNCLASSIFIED

UNCLASSIFIED

Two hundred and ten selected references have been listed and cross indexed in terms of materials and subject. The materials index identifies those references which pertain to a specific type or class of plastic material; that is, polystyrene, glass reinforced laminates, etc. The subject index identifies those references relating to a specific subject; that is, degradation, failure mechanism, fracture, stress cracking, etc.

DISTRIBUTION - Copies obtainable from Office of Technical Services and ASTIA. Qualified organizations write to PLASTECH.

UNCLASSIFIED

UNCLASSIFIED

AD _____ Accession No. _____

Plastics Technical Evaluation Center

INDEXED REFERENCES PERTAINING TO DEGRADATION AND FRACTURE OF PLASTICS (U)

Arnold E. Molzon

PLASTECH Note 2 August 1961

A literature search has been conducted for articles pertaining to degradation and fracture of plastics. Some key words used in searching the plastics literature were: brittle, crazing, degradation, embrittlement, fracture and stress cracking. References on relatively slow degradation processes such as weathering have been minimized. Some references on the effects of nuclear radiation have been included.

(OVER)

UNCLASSIFIED

1. Plastics - Degradation
2. Embrittlement
3. Fracture
4. Crazing
5. Stress cracking
6. Failure mechanism
7. Degradation-bibliography

I. Molzon, Arnold E.

UNITERMS

Degradation
Fracture
Deterioration
Bibliography
Molzon, Arnold E.

UNCLASSIFIED

AD _____ Accession No. _____

Plastics Technical Evaluation Center

INDEXED REFERENCES PERTAINING TO DEGRADATION AND FRACTURE OF PLASTICS (U)

Arnold E. Molzon

PLASTECH Note 2 August 1961

A literature search has been conducted for articles pertaining to degradation and fracture of plastics. Some key words used in searching the plastics literature were: brittle, crazing, degradation, embrittlement, fracture and stress cracking. References on relatively slow degradation processes such as weathering have been minimized. Some references on the effects of nuclear radiation have been included.

(OVER)

UNCLASSIFIED

1. Plastics - Degradation
2. Embrittlement
3. Fracture
4. Crazing
5. Stress cracking
6. Failure mechanism
7. Degradation-bibliography

I. Molzon, Arnold E.

UNITERMS

Degradation
Fracture
Deterioration
Bibliography
Molzon, Arnold E.

UNCLASSIFIED

AD _____ Accession No. _____

Plastics Technical Evaluation Center

INDEXED REFERENCES PERTAINING TO DEGRADATION AND FRACTURE OF PLASTICS (U)

Arnold E. Molzon

PLASTECH Note 2 August 1961

A literature search has been conducted for articles pertaining to degradation and fracture of plastics. Some key words used in searching the plastics literature were: brittle, crazing, degradation, embrittlement, fracture and stress cracking. References on relatively slow degradation processes such as weathering have been minimized. Some references on the effects of nuclear radiation have been included.

(OVER)

UNCLASSIFIED

1. Plastics - Degradation
2. Embrittlement
3. Fracture
4. Crazing
5. Stress cracking
6. Failure mechanism
7. Degradation-bibliography

I. Molzon, Arnold E.

UNITERMS

Degradation
Fracture
Deterioration
Bibliography
Molzon, Arnold E.

UNCLASSIFIED

AD _____ Accession No. _____

Plastics Technical Evaluation Center

INDEXED REFERENCES PERTAINING TO DEGRADATION AND FRACTURE OF PLASTICS (U)

Arnold E. Molzon

PLASTECH Note 2 August 1961

A literature search has been conducted for articles pertaining to degradation and fracture of plastics. Some key words used in searching the plastics literature were: brittle, crazing, degradation, embrittlement, fracture and stress cracking. References on relatively slow degradation processes such as weathering have been minimized. Some references on the effects of nuclear radiation have been included.

(OVER)

UNCLASSIFIED

1. Plastics - Degradation
2. Embrittlement
3. Fracture
4. Crazing
5. Stress cracking
6. Failure mechanism
7. Degradation-bibliography

I. Molzon, Arnold E.

UNITERMS

Degradation
Fracture
Deterioration
Bibliography
Molzon, Arnold E.

UNCLASSIFIED

Two hundred and ten selected references have been listed and cross indexed in terms of materials and subject. The materials index identifies those references which pertain to a specific type or class of plastic material; that is, polystyrene, glass reinforced laminates, etc. The subject index identifies those references relating to a specific subject; that is, degradation, failure mechanism, fracture, stress cracking, etc.

DISTRIBUTION - Copies obtainable from Office of Technical Services and ASTIA. Qualified organizations write to PLASTECH.

UNCLASSIFIED

UNCLASSIFIED

Two hundred and ten selected references have been listed and cross indexed in terms of materials and subject. The materials index identifies those references which pertain to a specific type or class of plastic material; that is, polystyrene, glass reinforced laminates, etc. The subject index identifies those references relating to a specific subject; that is, degradation, failure mechanism, fracture, stress cracking, etc.

DISTRIBUTION - Copies obtainable from Office of Technical Services and ASTIA. Qualified organizations write to PLASTECH.

UNCLASSIFIED

Two hundred and ten selected references have been listed and cross indexed in terms of materials and subject. The materials index identifies those references which pertain to a specific type or class of plastic material; that is, polystyrene, glass reinforced laminates, etc. The subject index identifies those references relating to a specific subject; that is, degradation, failure mechanism, fracture, stress cracking, etc.

DISTRIBUTION - Copies obtainable from Office of Technical Services and ASTIA. Qualified organizations write to PLASTECH.

UNCLASSIFIED

UNCLASSIFIED

Two hundred and ten selected references have been listed and cross indexed in terms of materials and subject. The materials index identifies those references which pertain to a specific type or class of plastic material; that is, polystyrene, glass reinforced laminates, etc. The subject index identifies those references relating to a specific subject; that is, degradation, failure mechanism, fracture, stress cracking, etc.

DISTRIBUTION - Copies obtainable from Office of Technical Services and ASTIA. Qualified organizations write to PLASTECH.

UNCLASSIFIED

UNCLASSIFIED