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**TECHNICAL REPORT  
NATICK/TR-77/009**

# **RADAPPERTIZATION (RADIATION STERILIZATION) OF FOODS**

**Irradiated Food Products Group  
Radiation Preservation of Food Division**

**Approved for public release;  
distribution unlimited.**

**December 1976**

**UNITED STATES ARMY  
NATICK RESEARCH and DEVELOPMENT COMMAND  
NATICK, MASSACHUSETTS 01760**



**FOOD ENGINEERING LABORATORY  
FEL-62**

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------|
| 1. REPORT NUMBER<br>NATICK/TR-77/009                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2. GOVT ACCESSION NO. | 3. RECIPIENT'S CATALOG NUMBER                                                    |
| 4. TITLE (and Subtitle)<br>RADAPPERTIZATION (RADIATION STERILIZATION)<br>OF FOODS.<br>BIBLIOGRAPHY OF TECHNICAL PUBLICATIONS AND PAPERS                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       | 5. TYPE OF REPORT & PERIOD COVERED<br>March 1962 through Dec. 1976               |
| 7. AUTHOR(s)<br>Joseph S. Cohen and Vera C. Mason                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                       | 6. PERFORMING ORG. REPORT NUMBER<br>FEL 62                                       |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS<br>U.S. Army Natick Research and Development Command<br>ATTN: DRXNM-WR<br>Kansas St., Natick, MA 01760                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                       | 8. CONTRACT OR GRANT NUMBER(s)                                                   |
| 11. CONTROLLING OFFICE NAME AND ADDRESS<br>U.S. Army Natick Research and Development Command<br>ATTN: DRXNM-WR<br>Kansas St., Natick, MA 01760                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                       | 10. PROGRAM ELEMENT, PROJECT, TASK<br>AREA & WORK UNIT NUMBERS<br>1L762724AH99DB |
| 14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                       | 12. REPORT DATE<br>December 1976                                                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                       | 13. NUMBER OF PAGES<br>43                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                       | 15. SECURITY CLASS. (of this report)<br>Unclassified                             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                       | 15a. DECLASSIFICATION/DOWNGRADING<br>SCHEDULE                                    |
| 16. DISTRIBUTION STATEMENT (of this Report)<br><br>Approved for public release; distribution unlimited.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |                                                                                  |
| 17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                       |                                                                                  |
| 18. SUPPLEMENTARY NOTES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |                                                                                  |
| 19. KEY WORDS (Continue on reverse side if necessary and identify by block number)<br>RADAPPERTIZATION      SHELF LIFE      TECHNICAL PUBLICATIONS<br>STERILIZATION      HIGH DOSE RADIATION      BIBLIOGRAPHIES<br>FOOD IRRADIATION      FOOD PROCESSING      DOCUMENTS<br>IRRADIATED FOOD      FOOD PRESERVATION<br>IRRADIATION                                                                                                                                                                                                                                                                              |                       |                                                                                  |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number)<br>This report is a bibliography of technical publications and papers on radappertized (radiation sterilized) foods written by scientific personnel of the U.S. Army Natick Research and Development Command and other scientists working in or responsible for the part of the National Radiation Preservation of Food Program dealing with radiation-sterilization processing of prepackaged, shelf-stable foods, mainly red meats, poultry, and selected seafoods. The report includes 230 documents published within the |                       |                                                                                  |

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20. period March 1962 through December 1976, subdivided into books, technical reports, patents, technical papers (NARADCOM) and articles in scientific and technical journals.

Index of authors with their corresponding entry numbers are included for easy search of the publications by the names of the authors.

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## PREFACE

Numerous requests from the food industry and academic and research institutions in the United States and abroad about the status and progress made in the field of radappertized (radiation sterilized) shelf-stable foods prompted updating of the bibliography report first published in June 1973 as Technical Report 74-3-FL. This bibliography is a list of technical publications and papers by scientific personnel of the US Army Natick Research and Development Command (NARADCOM) working in or responsible for the part of the National Radiation Preservation of Food Program dealing with high-dose radiation processing of prepackaged, shelf-stable foods.

In addition, the compilation contains contractors' reports and a few selected books which have been either edited by or contain papers contributed by NARADCOM personnel. In the book section are listed five periodic reviews of the food radiation program by the Joint Committee on Atomic Energy, Congress of the United States, which continuously encourages and supports the food irradiation program under the "Atoms for Peace" program.

We have also included a listing of selected papers pertaining to food processing by irradiation that have been published in the Journal of Food Science and not listed elsewhere in this bibliography.

The period covered by this bibliography is March 1962 through December 1976. The bibliography, subdivided into six groups, is arranged chronologically by the date of publication. We have also included an indexing system to allow for easier and more frequent updating of the bibliography and to make it easier to use for reference.

During that period this installation was renamed from US Army Natick Laboratories to US Army Natick Development Center, and finally to US Army Natick Research and Development Command (NARADCOM).



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## RADAPPERTIZATION OF FOODS

### I. BOOKS

- B-1-T REVIEW OF AEC AND ARMY FOOD IRRADIATION PROGRAMS.  
Hearings before the Subcommittee on Research, Development and Radiation of the Joint Committee on Atomic Energy, Congress of the United States (JCAE), Eighty-Seventh Congress, Second Sessions, March 6 and 7, 1962. Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402  
Price \$3.00
- B-2-T REVIEW OF THE ARMY FOOD IRRADIATION PROGRAM.  
Hearing, JCAE, Eighty-Eighth Congress, First Session, 13 May 1963. Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402  
Price \$1.50
- B-3-T RADIATION PROCESSING OF FOODS.  
Hearings, JCAE, Eighty-Ninth Congress, First Sessions, 9 and 10 June 1965. Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402  
Price \$2.50
- B-4-T REVIEW OF THE FOOD IRRADIATION PROGRAM.  
Hearing, JCAE, Eighty-Ninth Congress, Second Session, 12 September 1966. Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402  
Price \$1.00
- B-5-T STATUS OF THE FOOD IRRADIATION PROGRAM.  
Hearings, JCAE, Ninetieth Congress, Second Sessions, 18 and 20 July 1968. Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402  
Price \$3.00
- B-6-T THE TECHNICAL BASIS FOR LEGISLATION ON IRRADIATED FOOD.  
Report of a Joint FAO/IAEA/WHO Expert Committee, Rome, 21-28 April 1964. FAO, Atomic Energy Series No. 6, Food and Agriculture Organization of the United Nations, Rome 1965.
- B-7-E CURRENT STATUS AND COMMERCIAL PROSPECTS FOR RADIATION PRESERVATION OF FOOD.  
H. W. Ketchum, J. W. Osburn, Jr., and J. Deitch. TID-21431, BDSA U. S. Department of Commerce, Washington, DC 20230. January 1965. (174 pages, 185 references).

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- B-8-T RADIATION PRESERVATION OF FOODS.  
Proceedings, International Conference, Boston, MA, 27-30 September 1964; Publication 1273, National Academy of Sciences-National Research Council, Washington, DC 20418, 1965. (37 papers, 424 pages).  
Price \$9.00
- B-9-T FOOD IRRADIATION.  
Proceedings, International Symposium on Food Irradiation, The International Atomic Energy Agency and the Food and Agriculture Organization of the United Nations, Karlsruhe, Germany, 6-10 June 1966; STI/PUB/127, International Atomic Energy Agency, P.O. Box 590, (67 papers, 956 pages).  
Price \$20.00
- B-10-T CHEMICAL AND FOOD APPLICATIONS OF RADIATION.  
60th National Meeting of the American Institute of Chemical Engineers. Atlantic City, NJ, 18-21 September 1966. Chemical Engineering Progress Symposium Series, No. 83, Vol. 64, 1968 - American Institute of Chemical Engineers, 345 E. 47th Street, New York, NY 10017. (16 papers, 149 pages).
- B-11-T RADIATION PRESERVATION OF FOODS.  
A symposium co-sponsored by the Division of Agricultural and Food Chemistry and the Division of Nuclear Chemistry and Technology at the 150th Meeting of the American Chemical Society, Atlantic City, NJ, 16-17 September 1965. Advances in Chemistry Series 65, American Chemical Society, Washington, DC, 1967 (15 papers, 184 pages).  
Price \$7.00
- B-13-E THE COMMERCIAL PROSPECTS FOR SELECTED IRRADIATED FOODS.  
TID-24058, BDSA, US Department of Commerce, Washington, DC 20230, March 1968. (90 pages, 154 references).  
Price \$ .50
- B-14-T RADIATION PROCESSING OF FOOD PRODUCTS.  
L. V. Metlitskii, V. N. Rogachev, and V. G. Krushchev, Moscow, USSR, 1967. ORNL-IIC-14, July 1968. Translated from original Russian by Oak Ridge National Laboratory, Oak Ridge, TN, for the US Atomic Energy Commission. Edited by M. Gerrard, F. E. McKinney, P. S. Baker, and E. Wierbicki. US Department of Commerce, National Technical Information Services, Springfield, VA 22161 (115 pages, 32 references).  
Price \$3.00
- B-15-M ELIMINATION OF HARMFUL ORGANISMS FROM FOOD AND FEED BY IRRADIATION.  
Proceedings of a Panel, Zeist, 12-16 June 1967, International Atomic Energy Agency, Vienna, 1968.

## RADAPPERTIZATION OF FOODS

- B-16-T PRESERVATION OF FRUIT AND VEGETABLES BY RADIATION.  
Proceedings of a Panel, Vienna, 1-5 August 1966, International Atomic Energy Agency, Vienna, 1968.
- B-17-O TRAINING MANUAL OF FOOD IRRADIATION TECHNOLOGY AND TECHNIQUES.  
International Atomic Energy Agency, Vienna, 1970.
- B-18-P PRESERVATION OF FISH BY IRRADIATION.  
Proceedings of a Panel, Vienna, 15-19 December 1969.  
International Atomic Energy Agency, 1970.
- B-19-P DISINFESTATION OF FRUIT BY IRRADIATION.  
Proceedings of a Panel, Honolulu, 7-11 December 1970,  
International Atomic Energy Agency, Vienna, 1971.
- B-20-E COST-BENEFITS ANALYSIS.  
Potential Radiation Sterilized Military Subsistence Items.  
J. Deitch, J. W. Osburn, Jr., and H. W. Ketchum. US  
Department of Commerce, Bureau of Domestic Commerce, March  
1972. Superintendent of Documents, US Government Printing  
Office, Washington, DC 20402 (150 pages, 66 references).  
Price 1.25
- B-21-C RADIATION RESEARCH REVIEWS.  
Symposium on the Recent Advances in the Chemistry of Food  
Irradiation, 161st National Meeting, The American Chemical  
Society, Division of Agricultural Chemistry, 1 April 1971,  
Los Angeles, CA. Edited by E. S. Josephson and C. Merritt,  
Jr., Vol 3 (4): 281-460 (completing Vol. 3), July 1972.  
Elsevier Publishing Company, P.O. Box 211, Amsterdam, The  
Netherlands (11 papers).
- B-22-T RADIATION PRESERVATION OF FOOD.  
Proceedings, IAEA/FAO Symposium, Bombay, India, 13-17  
November 1972, STI/PUB/317. Proceeding Series, Vienna, 1973.  
International Atomic Agency, Vienna, Austria. (51 papers,  
774 pages).  
Price \$30.00
- B-23-E FACTORS INFLUENCING THE ECONOMICAL APPLICATION OF FOOD  
IRRADIATION.  
Proceedings of a Panel, FAO/IAEA Division of Atomic Energy  
in Food and Agriculture, Vienna, Austria, 14-18 June 1971.  
International Atomic Energy Agency, Kaerntner Ring 11, P.O.  
Box 590, A-1011, Vienna, Austria. STI/PUB/331, February 1973.

## RADAPPERTIZATION OF FOODS

B-24-T ASPECTS OF THE INTRODUCTION OF FOOD IRRADIATION IN DEVELOPING COUNTRIES.

Proceedings of a Panel by the Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture, Bombay, India 18-22 November 1972. International Atomic Energy Agency, Kaerntner Ring 11, P.O. Box 590, A-1011, Vienna, Austria. STI/PUB/362, December 1973.

B-25-T IMPROVEMENT OF FOOD QUALITY BY IRRADIATION.

Proceedings of a Panel, Vienna, 18-22 June 1973, International Atomic Energy Agency, Vienna, 1974.

### II. TECHNICAL REPORTS

R-1-P EXTRACTIVES AND FUNCTIONAL PERFORMANCE OF FLEXIBLE PACKAGING MATERIALS FOR USE IN RADIATION STERILIZATION OF PREPACKAGED FOODS.

G. O. Payne, Jr. and C. H. Speigl. (Continental Can Company, Contract No. DA19-129-AMC-162(n); Project Officer, NLABS - J. J. Killoran). FD-3, December 1964 (AD 455 946).

R-2-C INDUCED RADIOACTIVITY IN FOOD AND ELECTRON STERILIZATION.

R. A. Meyer. (US Army Natick Laboratories). FD-6, April 1965 (AD 613 950).

R-3-T INVESTIGATION OF THE USE OF VERY HIGH DOSE RATES FOR THE RADIATION PRESERVATION OF PROTEIN FOOD.

P. E. Hansen, G. Ellermann, and A. J. Pedersen. (The Danish Meat Research Institute, Contract No. DA91-591-EUC-3342; Project Officer, NLABS - E. S. Josephson). OI-452-4472, 13 August 1965.

R-4-S CALCULATED INTERNATIONAL RADIATION DOSE FROM INGESTION OF MEAT STERILIZED BY ELECTRON IRRADIATION.

T. G. Martin, III. (US Army Natick Laboratories). 66-26-FD, April 1966 (AD632 360).

R-5-P STUDY OF EXTRACTABLE SUBSTANCES AND MICROBIAL PENETRATION OF POLYMERIC PACKAGING MATERIALS TO DEVELOP FLEXIBLE PLASTIC CONTAINERS FOR RADIATION STERILIZED FOODS.

G. O. Payne, Jr., C. J. Speigl, and F. E. Long. (Continental Can Company, Contract No. DA19-219-AMC-162 (n); Project Officer, NLABS - J. J. Killoran). 69-57-FL, January 1969 (AD 685 831).

R-6-T EFFECT OF LOW TEMPERATURE IRRADIATION ON CHEMICAL AND SENSORY CHARACTERISTICS OF BEEF STEAKS.

F. L. Kauffman and J. W. Harlan. (Swift and Company, Contract No. DA19-129-AMC-164(N); Project Officer, NLABS - E. Wierbicki). 69-74-FL, March 1969 (AD 687 340).

## RADAPPERTIZATION OF FOODS

- R-7-T DEVELOPMENT OF RADIATION-STERILIZED FISH PRODUCTS.  
M. E. Waters and M. H. Thompson. (US Department of Interior, Bureau of Commercial Fisheries; Project Officer, NLABS - F. Heiligman). 69-65-FL, April 1969 (AD 688 123).
- R-8-M MODE OF RADIATION RESISTANCE OF CLOSTRIDIUM BOTULINUM SPORES.  
B. D. Church, G. R. Germaine, and D. B. Rowley. 71-4-FL, August 1970 (AD 717 563).
- R-9-N EFFECT OF IRRADIATION DOSE AND TEMPERATURE ON THE THIAMINE CONTENT OF HAM.  
M. H. Thomas and E. Wierbicki. (US Army Natick Laboratories). 71-44-FL, January 1971 (AD 726 380).
- R-10-T STORAGE STABILITY STUDIES ON RADIATION STERILIZED FISH ITEMS.  
R. O. Sinnhuber. (Oregon State University, Contract No. DA19-129-AMC-853(N); Project Officer, NLABS - F. Heiligman). 71-39-FL, March 1971 (AD 731 495).
- R-11-T DEVELOPMENT OF COOKING PROCEDURES AND RECIPES FOR USING IRRADIATION STERILIZED MEATS.  
A. F. Carlin (Iowa State University, Contract No. DA19-129-AMC-227 (N); Project Officer, NLABS - F. Heiligman). 72-31-FL, January 1972 (AD 736 845).
- R-12-T IRRADIATION STUDIES ON MEAT.  
J. W. Harland and F. L. Kauffman. (Swift and Company, Contract No. 172; NLABS Project Officer - F. Heiligman). 72-32-FL, January 1972 (AD 736 360).
- R-13-P EFFECT OF IONIZING RADIATION ON PHYSICAL AND CHEMICAL PROPERTIES OF FIBERBOARD AND PAPERBOARD.  
J. J. Killoran, S. Agarwal, and P. T. Burke. 74-6-GP, October 1972 (AD 755 510).
- R-14-T DEVELOPMENT OF RADIATION STERILIZED FISH ITEMS.  
L. J. Ronsivalli. (US Department of Interior, Bureau of Commercial Fisheries, Project Order No. 66-68; Project Officer, NLABS - F. Heiligman). 72-42-FL, February 1972 (AD 739 497).
- R-15-C IRRADIATION INDUCED HEADSPACE GASES IN PACKAGED RADIATION STERILIZED FOOD.  
G. B. Pratt and L. E. Kneeland. (American Can Company, Contract No. DA19-129-AMC-119(N); Project Officer, NLABS - F. Heiligman). 72-55-FL, February 1972 (AD 741 792).
- R-16-S ACCELERATOR RADIATION PROTECTION.  
T. G. Martin, III. (US Army Natick Laboratories). 73-7-FL, 1972 (AD 755 510).

## RADAPPERTIZATION OF FOODS

- R-17-T RADAPPERTIZATION (RADIATION STERILIZATION) OF FOODS.  
E. Wierbicki. Bibliography of Technical Publications and papers. 74-3-FL, June 1973, Addendum September 1974 (AD 766 268).
- R-18-D MEASUREMENT OF DEPTH-DOSE DISTRIBUTION IN CARBON, ALUMINUM, POLYETHYLENE, AND POLYSTYRENE FOR 10 MEV INCIDENT ELECTRONS.  
J. C. Humphreys, S. E. Chappell, W. L. McLaughlin, and R. D. Jarrett. NBSIR 73-413, November 1973.
- R-19-T PRESERVATION OF ENZYME INACTIVATED LAMB SLICES - EFFECTS OF FREEZE DESICCATION AND LOW DOSE IRRADIATION.  
B. Y. K. Rao, G. W. Shults, and E. Wierbicki (US Army Natick Laboratories). TR-74-34-FL, February 1974 (AD 777 550).
- R-20-T EFFECTS OF CONDENSED PHOSPHATES ON THE pH, WATER-HOLDING CAPACITY AND MEAT SWELLING PROPERTIES OF PORK MUSCLE.  
G. W. Shults and E. Wierbicki (US Army Natick Laboratories). TR-74-22-FL, January 1974 (AD 776 336).
- R-21-T MEASUREMENT OF COHESIVENESS OF FABRICATED, IRRADIATED MEAT ROLLS. J. S. Cohen and L. J. Rice. TR-74-45-FL, April 1974 (AD 786 523).
- R-22-T DEVELOPMENT OF IRRADIATED BEEF.  
I. Acceptance of Beef Loin Irradiated at Cryogenic Temperatures. G. W. Shults and E. Wierbicki (US Army Natick Laboratories). TR-74-57-FL, July 1974 (AD 786 540).
- R-23-T DEVELOPMENT OF IRRADIATED BEEF.  
II. Effects of Irradiation Temperature and Dose on the Quality of Roast Beef. G. W. Shults and E. Wierbicki (US Army Natick Laboratories). TR-74-56-FL, July 1974 (AD 786 539).
- R-24-T CHANGES IN THE NPN CONTENT AND SENSORY CHARACTERISTICS OF BEEF STEAKS AS AFFECTED BY THE HEAT TREATMENT.  
G. W. Shults and E. Wierbicki. TR-75-8-FEL, July 1974 (AD 787 279).
- R-25-T CHANGES IN THE SENSORY CHARACTERISTICS, TEXTURE, AND ORGANIC VOLATILES OF IRRADIATED AND NON-IRRADIATED PORK CHOPS.  
G. W. Shults, J. J. Howker, and E. Wierbicki. TR-75-114-FEL, April 1975.
- R-26-T THE EFFECT OF IRRADIATION DOSE AND TEMPERATURE ON CURED HAM.  
G. W. Shults, J. S. Cohen, and E. Wierbicki. TR-76-19-FEL, April 1975.

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- R-27-T EFFECTS OF NaCl AND TPP ON THE TEXTURE, ORGANIC VOLATILES AND SENSORY CHARACTERISTICS OF IRRADIATED AND NONIRRADIATED PORK ROLLS.  
G. W. Shults, J. J. Howker, and E. Wierbicki. TR-75-116-FEL, May 1976.
- R-28-T EFFECTS OF NaCl, PHOSPHATES AND OTHER CURING INGREDIENTS ON THE WATER-HOLDING CAPACITY OF LEAN PORK MEAT AND THE QUALITY OF HAM.  
E. Wierbicki, J. J. Howker, and G. W. Shults. TR-76-24-FEL, August 1975.
- R-29-C RADIATION-INACTIVATION OF MEAT PROTEASES AS DETERMINED BY A <sup>14</sup>C LABELLED HEMOGLOBIN METHOD.  
G. W. Shults, J. S. Cohen, and E. Wierbicki. TR-76-33-FEL, November 1975.
- R-30-M RADIATION RESISTANCE OF ASPOROGENOUS BACTERIA IN FROZEN BEEF.  
R. B. Maxcy, D. B. Rowley, and A. Anellis. TR-76-43-FSL, March 1976 (AD A024 363).
- R-31-S RESULTS OF ASSAY OF RADIATION STERILIZED BEEF FOR INDUCED ACTIVITY.  
T. G. Martin, III and R. L. Becker. TR-76-64-FEL, September 1976.
- R-32-T EFFECT OF COMBINED IRRADIATION AND THERMAL PROCESSING ON CANNED BEEF.  
J. J. Howker, G. W. Shults, and E. Wierbicki. TR-7T-5-FEL, (in press)1976.
- R-33-T RADURIZATION OF FRESH POULTRY.  
J. J. Howker, R. S. Kahan, and E. Wierbicki. NATICK/TR-77/006, 1977.
- R-34-T THE EFFECTS OF RADURIZATION ON THE pH, FREE WATER, MEAT SWELLING AND VOLATILE ORGANIC COMPOUND CONCENTRATIONS OF STORED CHICKEN MEAT.  
J. J. Howker, P. Angelini, and E. Wierbicki. Technical Report in press.

### III. PATENTS

- P-1-T IRRADIATION STABILIZATION OF PARTIALLY DEHYDRATED MEAT.  
G. W. Shults, US Patent No. 3,493,397 (3 February 1970).
- P-2-T PROCESS FOR INACTIVATING ENZYMES IN MEAT TO BE STABILIZED BY IRRADIATION.  
G. W. Shults and E. Wierbicki, US Army Natick Laboratories; US Patent No. 3,554,773 (12 January 1971).

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- P-3-T PROCESS FOR RADIATION STERILIZING A PACKAGED PRECOOKED MEAT AND GRAVY PRODUCT.  
G. W. Shults, US Army Natick Laboratories; US Patent No. 3,573,067 (30 March 1971).
- P-4-T PROCESS FOR PREPARING STERILIZED COMMINUTED BEEF PRODUCTS.  
G. W. Shults, US Army Natick Laboratories; US Patent No. 3,592,658 (13 July 1971).
- P-5-T PROCESS FOR STABILIZING STRUCTURE OF GROUND MEAT.  
G. W. Shults and E. Wierbicki, US Army Natick Laboratories; US Patent No. 3,642,500 (10 February 1972).
- P-6-P METHOD FOR PACKAGING FLEXIBLE PACKAGES IN CYLINDRICAL CONTAINERS.  
F. Heiligman, US Army Natick Laboratories; US Patent No. 3,645,759 (29 February 1972).
- P-7-T METHOD FOR PRODUCING CORNED BEEF.  
G. W. Shults and E. Wierbicki, Patent No. 3,845,227 (29 October 1974).

#### IV. TECHNICAL PAPERS, NARADCOM

- T-1-T RADIATION STERILIZATION OF FOOD IN THE U.S.A.  
E. S. Josephson (Eighth Conference on Radioisotopes - Tokyo, Japan (13-16 November 1967)).
- T-2-M RESISTANCE OF CLOSTRIDIUM BOTULINUM SPORES TO IONIZING RADIATION AS RELATED TO RADAPPERTIZATION OF FOODS.  
D. B. Rowley, H. M. El-Bisi, A. Anellis, and O. P. Snyder. Proceedings, First US-Japan Conference on Toxic Microorganisms, Honolulu, Hawaii, 7-10 October 1968; pp. 459-467.
- T-3-T ADVANTAGES, PROBLEMS AND EXPERIENCES OF IRRADIATED FOODS.  
E. S. Josephson (Aerospace Food Technology, NASA SP-202; The University of Florida, Tampa, FL, 15-17 April 1969).
- T-4-T NUCLEAR APPLICATIONS IN THE FOOD INDUSTRY.  
E. S. Josephson (44th Annual Conference of the American Industrial Development Council, Inc., Miami Beach, FL, 11-14 May 1969).
- T-5-T STATUS OF THE US ARMY PROGRAM IN FOOD IRRADIATION.  
E. S. Josephson and Eugen Wierbicki. Chemical and Food Application of Radiation, Chemical Engineering Progress Symposium Series, Vol. 64, No. 83, AICHE, 87-95, 1968.



## RADAPPERTIZATION OF FOOD

- T-6-T HIGH DOSE RADIATION PROCESSING OF MEAT, POULTRY AND SEAFOOD PRODUCTS.  
E. Wierbicki, A. Anellis, J. J. Killoran, E. L. Johnson, M. H. Thomas, and E. S. Josephson (The Third International Congress of Food Science and Technology (SOS/70), Washington, DC (9-14 August 1970)).
- T-7-E FACTORS INFLUENCING ECONOMIC EVALUATION OF IRRADIATION PROCESSING.  
A. Brynjolfsson (Panel on Radiation Processing Techniques of Special Interest to Developing Countries, Seoul, Korea, 28 September - 2 October 1970).
- T-8-T THE OBJECTIVES AND PRESENT STATUS OF IRRADIATION OF MEAT AND MEAT PRODUCTS.  
E. S. Josephson (Study Group Meeting on Food Irradiation for the South East and East Asian Countries, Bangkok, Thailand, 13-17 December 1971).
- T-9-W DEFINITION AND CONTROL OF PROCESSING PARAMETERS FOR RADAPPERTIZATION OF BEEF FOR WHOLESOMENESS STUDIES IN THE UNITED STATES.  
A. Brynjolfsson (FAO/IAEA International Symposium on Radiation Preservation of Food, Bombay, India, 13-17 November 1972; IAEA/SM-166-40).
- T-10-T RADAPPERTIZATION OF MEAT, MEAT PRODUCTS, AND POULTRY.  
E. S. Josephson, A. Brynjolfsson, E. Wierbicki, D. B. Rowley, C. Merritt, Jr., R. W. Baker, J. J. Killoran, and M. H. Thomas (FAO/IAEA International Symposium on Radiation Preservation of Food, Bombay, India, 13-17 November 1972; IAEA/SM-166-41).
- T-11-E FACTORS INFLUENCING THE ECONOMICAL APPLICATION OF FOOD IRRADIATION.  
A. Brynjolfsson, International Atomic Energy Agency, Vienna, 1973; LEAE-PL-433/2, pp. 13-35.
- T-12-D MEASUREMENT OF DOSE DISTRIBUTION IN VARIOUS MATERIALS IRRADIATED BY 10 MEV ELECTRONS.  
J. C. Humphrey, S. E. Chappel, W. L. McLaughlin, and R. D. Jarrett, Proceedings of International Meeting on Radiation Processing, Puerto Rico, March 1975.

## RADAPPERTIZATION OF FOODS

### T-13-C CHEMICAL EFFECT OF IRRADIATING FROZEN, HYDRATED MUSCLE PROTEINS: MYOSIN AND ACTOMYOSIN.

I. A. Taub, J. W. Halliday, L. G. Holmes, J. E. Walker, and F. M. Robbins, Proceedings of the 1976 Army Science Conference (West Point, 22-25 June 1976).

## V. TECHNICAL PAPERS

### S-1-M COMPARATIVE RESISTANCE OF STRAINS OF CLOSTRIDIUM BOTULINUM TO GAMMA RAYS.

A. Anellis and R. B. Koch. Appl. Microbiol. 10, 326-330 (1962).

### S-2-D DOSIMETRY IN FOOD PRESERVATION BY IONIZING RADIATION.

R. D. Jarrett, Sr. and J. Halliday. Activities Report, Vol. 15, 143-150 (1963).

### S-3-T STORAGE STABILITY OF IRRADIATED MEATS.

F. Heiligman. Food Technology, Vol. 19, 114-116 (1965).

### S-4-T PRESERVATION OF MEATS BY STERILIZING DOSES OF IONIZING RADIATION.

E. Wierbicki, M. Simon, and E. S. Josephson. Radiation Preservation of Foods - Publication 1273, pp. 383-409; National Academy of Sciences - National Research Council, Washington, DC (1965).

### S-5-T ACCEPTANCE OF IRRADIATED FOODS.

R. Heiligman and C. E. Phillips. Activities Report, Vol. 17: 114-119 (1965).

### S-6-T PACKAGING ASPECTS OF IRRADIATION.

J. J. Killoran and G. Payne. Modern Packaging, 38, (1965).

### S-7-T CRYOGENICS IN FOOD IRRADIATION.

F. P. Mehrlich, O. P. Snyder, and G. W. Shults. Proceedings AICE (September 1965).

### S-8-T RADIATION STERILIZATION OF BACON FOR MILITARY FEEDING.

A. Anellis, N. Grecz, D. A. Huber, D. Berkowitz, M. D. Schneider, and M. Simon. Applied Microbiology, Vol. 13: 37-42 (1965).

### S-9-M SURVIVAL OF CLOSTRIDIUM BOTULINUM SPORES.

A. Anellis, N. Grecz, and D. Berkowitz. Applied Microbiology, Vol. 13: 397-401 (1965).

### S-10-M PRINCIPLES OF MICROBIOLOGICAL SAFETY AND STABILITY OF RADIATION STERILIZED FOODS.

H. M. El-Bisi. Radiation Preservation of Foods - Publication 1273 pp. 223-232; National Academy of Science - National Research Council, Washington, DC (1965).

## RADAPPERTIZATION OF FOODS

- S-11-D AN EVALUATION OF DOSIMETRY PROCEDURES APPLICABLE FOR USE IN FOOD IRRADIATION.  
N. W. Holm, R. D. Jarrett, Sr., Radiation Preservation of Foods - Publication 1273, pp. 361-382; National Academy of Sciences - National Research Council, Washington, DC (1965).
- S-12-M EFFECT OF TEMPERATURE OF LIQUID NITROGEN ON RADIATION RESISTANCE OF SPORES OF CLOSTRIDIUM BOTULINUM.  
N. Grecz, P. P. Snyder, A. A. Walker, and A. Anellis, Applied Microbiology, Vol. 13: 527 (1965).
- S-13-T LOW TEMPERATURE IRRADIATION OF MEAT.  
C. K. Wadsworth and G. W. Shults. Activities Report, Vol 18: 13-17 (1966).
- S-14-T WHOLESOMENESS OF IRRADIATED FOODS.  
An Annotated Bibliography, E. F. Reber, K. Reheja, and D. Davis. Federation Proceedings, Vol. 25 Part I: 1531-1577 (1966).
- S-15-T PACKAGING FOR RADIATION-STERILIZED FOODS: PRESENT STATUS.  
E. Wierbicki and J. J. Killoran. Activities Report, Vol. 18: 18-29 (1966).
- S-16-M INCIDENCE OF MESAPHILIC CLOSTRIDIUM SPORES IN RAW PORK, BEEF AND CHICKEN IN PROCESSING PLANTS IN THE UNITED STATES AND CANADA.  
R. A. Greenberg, R. B. Tompkin, B. O. Bladel, R. S. Kittaka, and A. Anellis. Applied Microbiology, Vol. 14: 789-793 (1966).
- S-17-C IRRADIATION DAMAGE IN LIPIDS.  
C. Merritt, Jr., P. Angelini, M. L. Bazinet, and D. J. McAdoo. Advances in Chemistry Series, No. 56: 225-240 (1966).
- S-18-P DEVELOPMENT OF FLEXIBLE CONTAINERS FOR IRRADIATED FOODS.  
I. Screening of Commercially Available Plastic Laminates.  
J. J. Killoran, J. D. Breyer, and E. Wierbicki. Food Technology, Vol. 21, 73-77 (1967).
- S-19-M RADIATION STERILIZATION OF PROTOTYPE MILITARY FOODS.  
II. Cured Ham. A. Anellis, D. Berkowitz, J. Jarboe, and H. El-Bisi. Applied Microbiology 15, 166-177 (1967).
- S-20-C IRRADIATION INDUCED GAS IN PACKAGED FOODS.  
I. Identification and Measurements. G. B. Pratt, L. E. Kneeland, F. Heiligman, and J. J. Killoran. Journal of Food Science, Vol 32: 200-205 (1967).

## RADAPPERTIZATION OF FOODS

- S-21-C VOLATILE COMPOUNDS INDUCED BY IRRADIATION IN BASIC FOOD SUBSTANCES.  
C. Merritt, Jr., P. Angelini, and D. J. McAdoo. Radiation Preservation of Foods, Advances in Chemistry Series, No. 65: 26-34 (1967).
- S-22-D RADIATION DOSIMETRY IN RELATION TO HIGH INTENSITY RADIATION SOURCES.  
R. D. Jarrett, Sr. Radiation Preservation of Foods, Advances in Chemistry Series, No. 65: 78-86 (1967).
- S-23-O US ARMY RADIATION LABORATORY.  
R. D. Jarrett, Sr., Radiation Preservation of Foods, Advances in Chemistry Series, No. 65: 156 - 170 (1967).
- S-24-T DEVELOPMENT OF RADIATION-STERILIZED CHECKEN.  
F. Heiligman, C. K. Wadsworth, and C. E. Phillips. Food Technology, Vol. 21: 108-110 (1967).
- S-25-P PACKAGING OF IRRADIATED FOODS.  
J. J. Killoran. Modern Packaging, Vol. 40: 179 (1967).
- S-26-P PACKAGING MATERIALS FOR USE DURING THE IRRADIATION OF PREPACKAGED FOODS.  
Federal Register, 121, 2543; p. 309, July 1967.
- S-27-M DETOXIFICATION OF SALMONELLA TYPHIMURIUM LIPOPOLYSACCHARIDE BY IONIZING RADIATION.  
J. J. Previte, Y. Chang, and H. M. El-Bisi, Journal of Bacteriology, Vol. 93: 1607 (1967).
- S-28-M SALMONELLOSIS - THE PROBLEM AND A POTENTIAL REMEDY.  
J. J. Previte, Activities Report, Vol. 19: 64 (1967).
- S-29-M ESTIMATION OF RADIATION RESISTANCE VALUES OF MICROORGANISMS IN FOOD PRODUCTS.  
A. Anellis and S. Werkowski. Applied Microbiology, Vol. 16, 1300-1308 (1968).
- S-30-E ENGINEERING AND ECONOMICS OF FOOD IRRADIATION.  
E. S. Josephson, A. Brynjolfsson, and E. Wierbicki. Transactions, New York Academy of Sciences, Series II, Vol. 30: 600-614 (1968).
- S-31-T RADIATION STERILIZATION OF PREFRIED AND HALIBUT PATTIES.  
R. O. Sinnhuber, M. F. Landers, T. C. Yu, M. Simon, and F. Heiligman. Food Technology, Vol. 22: 1570 (1968).

## RADAPPERTIZATION OF FOODS

- S-32-M RESISTANCE OF CLOSTRIDIUM BOTULINUM SPORES TO IONIZING RADIATION AS RELATED TO RADAPPERTIZATION OF FOODS.  
A. Anellis, H. M. El-Bisi, and D. B. Rowley. Proc. US - Japan Conference on Toxic Microorganisms, pp. 459-467 (1968).
- S-33-C MACHINE IRRADIATION SOURCES AND IRRADIATION TECHNOLOGY.  
A. Brynjolfsson. Chemical and Food Application of Radiation, Chemical Engineering Progress Symposium Series, Vol. 74, No. 83: 71-86 (1968).
- S-34-T STATUS OF THE US ARMY PROGRAM IN FOOD IRRADIATION.  
E. S. Josephson and E. Wierbicki. Chemical and Food Applications of Radiation Chemical Engineering Progress Symposium Series, Vol. 64, No. 83: 87-96 (1968).
- S-35-W WHOLESOMENESS TESTING OF IRRADIATED FOODS.  
N. Raica, Jr., Chemical and Food Applications of Radiation, Chemical Engineering Progress Symposium Series, Vol 64, No. 83: 66-79 (1968).
- S-36-D A SIGNIFICANT CORRECTION FACTOR IN GAMMA RAY DOSIMETRY.  
A. Brynjolfsson. Radiation Chemistry - I. Advances in Chemistry Series, No. 81: 550-567 (1968).
- S-37-T PROCESS CRITERIA FOR PRODUCING RADIATION STERILIZED FISH PRODUCTS.  
R. J. Learson, L. J. Ronsivalli, B. W. Spracklin, and F. Heiligman. Food Technology, Vol 23: 85-91 (1969).
- S-38-C ADDITION TO HYDROGEN ATOMS TO GLUTATHIONE DISULFIDE IN AQUEOUS SOLUTION.  
M. Simic and M. Z. Hoffman, Journal of American Chemical Society, 92, 6096, (1970).
- S-39-C SELECTIVITY IN THE REACTIONS OF  $e_{aq}^-$  AND OH RADICALS WITH SIMPLE PEPTIDES IN AQUEOUS SOLUTION.  
Optical absorption spectra of intermediates. M. Simic, P. Neta, and E. Hayon, Journal of American Chemical Society, 92, 4763 (1970).
- S-40-C PULSE RADIOLYSIS OF ALIPHATIC ACIDS IN AQUEOUS SOLUTIONS.  
III. Simple amino acids. P. Neta, M. Simic, and E. Hayon, Journal of Physical Chemistry, 74, 1214 (1970).

## RADAPPERTIZATION OF FOODS

- S-41-T US ARMY FOOD IRRADIATION PROGRAM.  
E. Wierbicki, C. K. Wadsworth, A. Brynjolfsson and E. S. Josephson. Food Irradiation (European Information Centre for Food Irradiation, Saclay, France) pp. 33-42 (January - March 1970).
- S-42-N RADIATION PRESERVATION OF FOODS AND ITS EFFECT ON NUTRIENTS.  
M. H. Thomas and E. S. Josephson. The Science Teacher, Vol. 37, No. 3 (March 1970).
- S-43-M CONDITIONS AFFECTING GERMINATION OF CLOSTRIDIUM BOTULINUM 6A SPORES IN A CHEMICALLY DEFINED MEDIUM.  
D. B. Rowley and Feeherry. Journal of Bacteriology. Vol. 104 (3): 1151-1157 (1970).
- S-44-C REDUCTIVE DEAMINATION OF OLIGOPEPTIDES BY SOLVATED ELECTRONS IN AQUEOUS SOLUTIONS.  
M. Simic and E. Hayon, Radiation Research, 48, 244 (1971).
- S-45-C RADICAL REACTIONS OF N-ETHYL MALEIMIDE IN RADIATION SENSITIZATION.  
M. Simic and E. Hayon, International Journal of Radiation Biology, 20:589 (1971).
- S-46-C PULSE RADIOLYSIS STUDY OF CYCLIC PEPTIDES IN AQUEOUS SOLUTIONS. Absorption spectrum of the peptide radical -NHCHCO-. E. Hayon and M. Simic, Journal of American Chemical Society, 93:6781 (1971).
- S-47-C OPTICAL ABSORPTION SPECTRUM OF HALF-REDUCED UBIQUINONE.  
E. S. Land, M. Simic, and A. J. Swallow. Biochimica et Biophysica Acta, 226, 239 (1971).
- S-48-C FREE RADICAL INTERMEDIATES PRODUCED IN THE PULSE RADIOLYSIS OF SIMPLE PEPTIDES IN AQUEOUS SOLUTIONS.  
E. Hayon and M. Simic. Intra-Science Chemistry Reports, 5, 357 (1971).
- S-49-T A METHOD OF CALCULATING AVERAGE STERILIZING VALUE IN CYLINDRICAL CONTAINERS.  
J. S. Cohen and M. A. Wall. Transactions of the ASAE. Vol. 42: 214-221 (1971).
- S-50-T NUCLEAR PRESERVATION OF FOOD.  
L. J. Rice. Union Carbide Outlook, Vol. 2, No. 4 (December 1971).
- S-51-C ASSAY OF PROTEOLYTIC ENZYME ACTIVITY USING A <sup>14</sup>C-LABELED HEMOGLOBIN.  
J. S. Roth, T. Losty, and E. Wierbicki. Analytical Biochemistry, Vol. 42: 214-221 (1971).

## RADAPPERTIZATION OF FOODS

- S-52-M EFFECT OF IRRADIATION TEMPERATURE IN THE RANGE -196 to -95 C ON THE RESISTANCE OF SPORES OF CLOSTRIDIUM BOTULINUM 33A IN COOKED BEEF.  
N. Grecz, A. A. Walker, A. Anellis, and D. Berkowitz. Canadian Journal of Microbiology, Vol. 17, 135-142 (1971).
- S-53-S BREMSSTRAHLUNG PRODUCTION AND SHIELDING OF STATIC AND LINEAR ELECTRON ACCELERATORS BELOW 50 MEV. TOXIC GAS PRODUCTION, REQUIRED EXHAUST RATES, AND RADIATION PROTECTION INSTRUMENTATION.  
A. Brynjolfsson and T. G. Martin III. International Journal of Applied Radiation and Isotopes, Vol. 22: 29-40 (1971).
- S-54-M ESTIMATION OF AN EQUIVALENT "12D" PROGRESS BY THE NORMAL DISTRIBUTION METHOD.  
A. Anellis and S. Werkowski. Canadian Journal of Microbiology, Vol. 17, 1185-1187 (1971).
- S-55-M INACTIVATION OF THIRTY VIRUSES BY GAMMA RADIATION.  
R. Sullivan, C. Fassolitis, P. Larkin, B. Read, Jr., and J. T. Peeler. Applied Microbiology, Vol. 22: 61-65 (1971).
- S-56-C A MODEL OF RADIATION SENSITIZATION BY QUINONES.  
M. Simic and E. Hayon. International Journal of Radiation Biology, 22, 507 (1972).
- S-57-C ON THE pKa OF THE H<sub>3</sub>NCHCOOH RADICAL.  
P. Neta, M. Simic, and E. Hayon. Journal of Physical Chemistry, 76, 3507 (1972).
- S-58-T DEVELOPMENT OF IRRADIATION STERILIZED CODFISH CAKE.  
F. Heiligman and L. J. Rice. Journal of Food Science, Vol. 37: 420-422 (1972).
- S-59-T COMPARISON OF PRE-COOKED IRRADIATED CHICKEN AND LAMB WITH AND WITHOUT PARTIAL DEHYDRATION.  
S. R. Agarwal, F. Heiligman, and E. M. Powers. Journal of Food Science, Vol. 37: 469-472 (1972).
- S-60-T EFFECT OF CONDENSED PHOSPHATES ON pH, SWELLING AND WATER-HOLDING CAPACITY OF BEEF.  
G. W. Shults, D. R. Russell, and E. Wierbicki. Journal of Food Science, Vol. 37: 469-472 (1972).
- S-61-M PRODUCTION OF TYPES A AND B SPORES OF CLOSTRIDIUM BOTULINUM BY THE BIPHASIC METHOD: EFFECT ON SPORE POPULATION, RADIATION RESISTANCE, AND TOXIGENICITY.  
A. Anellis, D. Berkowitz, D. Kemper, and D. B. Rowley, Applied Microbiology, Vol. 24: 453-462 (1972).

## RADAPPERTIZATION OF FOODS

- S-62-T RADIATION STERILIZATION OF PROTOTYPE MILITARY FOODS: LOW-TEMPERATURE IRRADIATION OF CODFISH CAKE, CORNED BEEF, AND PORK SAUSAGE.  
A. Anellis, D. Berkowitz, W. Swantak, and C. Strojan. Applied Microbiology, Vol. 24: 453-462 (1972).
- S-63-C QUALITATIVE AND QUANTITATIVE ASPECTS OF TRACE VOLATILE COMPONENTS IN IRRADIATED FOODS AND FOOD SUBSTANCES.  
C. Merritt, Jr., Radiation Research Reviews. Vol 3: 353-368 (1972).
- S-64-P CHEMICAL AND PHYSICAL CHANGES IN FOOD PACKAGING MATERIALS EXPOSED TO IONIZING RADIATION.  
J. J. Killoran. Radiation Research Reviews. Vol 3: 369-388 (1972).
- S-65-N THE NUTRITIONAL QUALITY OF IRRADIATED FOODS.  
N. Raica, Jr., J. Scott, and W. Nielsen. Radiation Research Reviews. Vol. 3: 447-457 (1972).
- S-66-C THE EFFECT OF GAMMA IRRADIATION AND HEATING ON THE PROTEOLYTIC ACTIVITY OF MEAT SAMPLES.  
T. Losty, J. W. Roth, and G. W. Shults. Journal of Agricultural and Food Chemistry, Vol. 21: 275-277 (1973).
- S-67-T NEW ADVANCES IN IRRADIATED FOODS.  
"Foods of Tomorrow" Spring 1973, pp. F3-F10; insert in Food Processing, Vol 34, No. 4, April 1973.
- S-68-T RADIATION PRESERVATION OF FOOD: PAST, PRESENT AND FUTURE.  
E. S. Josephson and E. Wierbicki. Activities Report, Vol. 25: 48-59 (1973).
- S-69-T PROGRESS AND FUTURE TASKS IN FOOD IRRADIATION.  
International Atomic Energy Agency (IAEA) Bulletin, Vol. 15: 2-9 (1973).
- S-70-T STORING MEAT PRODUCTS (WITHOUT REFRIGERATION) FOR SEVERAL YEARS.  
IAEA Bulletin, Vol. 15: 18-22 (1973).
- S-71-M COMPARATIVE RESISTANCE OF NONSPOROGENIC BACTERIA TO LOW-TEMPERATURE GAMMA IRRADIATION.  
A. Anellis, D. Berkowitz, and D. Kemper. Applied Microbiology, Vol. 25: 517-523 (1973).
- S-72-M GAMMA RADIATION INACTIVATION OF COXSACKIEVIRUS, B-2.  
R. Sullivan, P. Scarpino, A. Fassolitis, E. Larkin, and J. Peeler. Applied Microbiology, 26, 14-17 (1973).



## RADAPPERTIZATION OF FOODS

- S-73-C COMPARISON BETWEEN THE ELECTRON TRANSFER REACTIONS FROM FREE RADICALS AND THEIR CORRESPONDING PEROXY RADICALS TO QUINONES. M. Simic and E. Hayon. Biochemical and Biophysical Research Communication, 50, 364 (1973).
- S-74-T EFFECT OF SODIUM CHLORIDE AND CONDENSED PHOSPHATES ON WATER-HOLDING CAPACITY, pH AND SWELLING OF CHICKEN MUSCLE. G. W. Shults and E. Wierbicki. Journal of Food Science, 38: 991-994 (1973).
- S-75-T SHELF STABLE CURED HAM WITH LOW NITRITE-NITRATE ADDITIONS PRESERVED BY RADAPPERTIZATION. E. Wierbicki and F. Heiligman. Proceedings, International Symposium on Nitrite in Meat Products, Zeist, 11-14 September 1973. Centre for Agricultural Publishing and Documentation (PUDOC), Wageningen, The Netherlands, 1974; pp. 189-212.
- S-76-M THE CHARACTERIZATION OF VOLATILES PRODUCED BY MICROBIAL METABOLISM ON RADURIZED AND NON-RADURIZED POULTRY AT REFRIGERATED TEMPERATURES. L. R. Freeman. Ph.D. Thesis. University of Massachusetts, Amherst, Massachusetts; September 1973.
- S-77-N NUTRITIONAL EVALUATION OF FOOD PROCESSING Chapter 14: Other Processing Methods. E. S. Josephson, M. H. Thomas and W. K. Calhoun. AVI Publishing Co., P. O. Box 831, 250 E. State Street, Westport, CT 06880; 1974.
- S-78-P EVALUATION OF THE TINPLATE CONTAINER FOR PACKAGING OF IRRADIATION STERILIZED FOODS. J. J. Killoran, E. Wierbicki, G. B. Pratt, K. R. Rentmeester, E. W. Hitchler, and W. A. Fourier. "Chemistry of Food Packaging Materials" in Advances of Chemistry Series, 1974. The American Chemical Society, 1155 Sixteenth Street, N.W., Washington, DC 20036.
- S-79-T SOLUBILIZED FISH MUSCLE AS A FOOD BINDING MATERIAL. F. J. King, F. Heiligman, and E. Wierbicki, Marine Fisheries Review, 36: 18-20 (1974).
- S-80-T STATUS OF THE RADAPPERTIZATION OF MEATS. D. B. Rowley, A. Anellis, E. Wierbicki, and R. W. Baker. Journal of Milk and Food Technology, Vol. 37, 86-93 (1974).
- S-81-T CALCULATION OF THERMAL PROCESS FOR THE STERILIZATION OF CANNED BEEF. J. S. Cohen. Transactions of the ASAE, Vol. 17: 52-55 (1974).

## RADAPPERTIZATION OF FOODS

- S-82-T CURED MEATS WITH REDUCED NITRITE PRESERVED BY RADIATION.  
E. Wierbicki, F. Heiligman, and A. E. Wasserman. Presented at the 20th European Meeting of Meat Research Workers, Dublin, Ireland, 15-20 September 1974. (US Army Natick Laboratories.)
- S-83-M EVALUATION OF MEDIA, TIME AND TEMPERATURE OF INCUBATION, AND METHOD OF ENUMERATION OF SEVERAL STRAINS OF CLOSTRIDIUM PERFRINGENS SPORES.  
W. J. Clifford, A. Anellis, and E. W. Ross, Jr. Applied Microbiology 27, 784-792 (1974).
- S-84-M STATISTICAL ESTIMATION OF 12D FOR RADAPPERTIZED FOODS.  
E. W. Ross, Jr., Journal of Food Science, 39, 800-806 (1974).
- S-85-C ACID-BASE PROPERTIES OF FREE RADICALS IN SOLUTIONS.  
E. Hayon and M. Simic. Accounts of Chemical Research, 7: 114 (1974).
- S-86-C FORMATION AND DECAY OF HYDROXY RADICALS OF SOME PYRIMIDINE DERIVATIVES IN WATER  
M. G. Simic and E. Hayon, FEBS Letters, 44, 334 (1974).
- S-87-C PULSE RADIOLYSIS STUDY OF IMIDAZOLE AND HISTIDINE IN WATER.  
P. S. Rao, M. G. Simic, and E. Hayon, Journal of Physical Chemistry, 79: 1260 (1975).
- S-88-C FREE RADICAL REDUCTION OF HEMIN-C.  
H. Goff and M. G. Simic. Biochimica et Biophysica Acta, 392: 201 (1975).
- S-89-T THE USE OF IONIZING RADIATION FOR PRESERVATION OF FOOD AND FEED PRODUCTS.  
E. S. Josephson, A. Brynjolfsson, and E. Wierbicki, In Radiation Research, Academic Press, Inc., pp. 96-117 (1975).
- S-90-S SHIELDING MATERIALS, CHAPTER 9, VOLUME II, ENGINEERING COMPENDIUM ON RADIATION SHIELDING.  
Edited by R. G. Jaeger et al., sponsored by International Atomic Energy Agency, Vienna. Published by Springer-Verlag-Berlin, Heidelberg, New York 1975.
- S-91-O COBALT-60 IRRADIATOR DESIGNS.  
A. Brynjolfsson. Radiation Laboratory, US Army Natick Laboratories, Natick, MA 01760 USA. Reprint from Technical Developments and Prospects of Sterilization by Ionizing Radiation, International Conference, Vienna, Austria. 1-4 April 1974.

## RADAPPERTIZATION OF FOODS

- S-92-C CHEMISTRY OF PEROXY RADICALS AND ITS IMPLICATION TO RADIATION BIOLOGY.  
M. G. Simic, in "Fast Processes in Radiation Chemistry and Biology," Eds. G. E. Adams, E. M. Fielden, and B. D. Michael, J. Wiley, New York, 1975, p. 167.
- S-93-C FREE RADICAL REDUCTION OF FERRICYTOCHROME-C.  
M. G. Simic, I. A. Taub, J. Tucci, P. A. Hurwitz. Biochemical and Biophysical Research Communication, 62: 121 (1975).
- S-94-C CHEMICAL CHANGES ASSOCIATED WITH FLAVOR IN IRRADIATED MEATS.  
C. Merritt, P. Angelini, E. Wierbicki, and G. W. Shults. Journal of Agricultural and Food Chemistry, Vol. 23: 1037 (1975).
- S-95-M RADIATION RESISTANCE OF SPORES OF SOME CLOSTRIDIUM PERFRINGES STRAINS.  
W. J. Clifford and A. Anellis. Applied Microbiology, 29, 861-863 (1975).
- S-96-T PRESERVATION OF MEATS BY IONIZING RADIATION - AN UPDATE.  
E. Wierbicki, A. Brynjolfsson, H. C. Johnson, and D. B. Rowley. Rapports' Papers - Paper No. 14, 21st European Meeting of Meat Research Workers, Berne, Switzerland, 31 August - 5 September 1975.
- S-97-M LOW-TEMPERATURE IRRADIATION OF BEEF AND METHODS FOR EVALUATION OF A RADAPPERTIZATION PROCESS.  
A. Anellis, E. Shattuck, D. B. Rowley, E. W. Ross, Jr., D. N. Whaley, and V. R. Dowell, Jr. Applied Microbiology, 30: 811-820 (1975).
- S-98-M INFLUENCE OF POSTIRRADIATION INCUBATION TEMPERATURE ON RECOVERY OF RADIATION-INJURED CLOSTRIDIUM BOTULINUM 62A SPORES.  
M. S. U. Chowdhury, D. B. Rowley, A. Anellis, and H. S. Levinson. Applied and Environmental Microbiology, 32: 172-178 (1976).
- S-99-T EFFECTS OF SALT AND TPP ON TEXTURE, ORGANIC VOLATILES AND SENSORY CHARACTERISTICS OF IRRADIATED OR NONIRRADIATED PORK.  
G. W. Shults, J. J. Howker, and E. Wierbicki. Journal of Food Science, Vol. 41: 1096-1101 (1976).
- S-100-T EFFECTS OF NaCl, PHOSPHATES AND CURING INGREDIENTS OF SHRINKAGE OF LEAN PORK MEAT AND THE QUALITY OF SMOKED HAM.  
E. Wierbicki, J. J. Howker, and G. W. Shults. Journal of Food Science, 41: 1116-1121 (1976).

## RADAPPERTIZATION OF FOODS

- S-101-T VARIABLES AFFECTING THE ACCEPTABILITY OF IRRADIATED STERILIZED GROUND BEEF.  
Effects of Food Grade Phosphates, NaCl, Fat Level and Grinding Methods. J. S. Cohen, G. W. Shults, and V. C. Mason. Journal of Food Science, Vol. 42: 338-343 (1977).
- S-102-W IRRADIATED FOOD VALIDITY OF EXTRAPOLATING WHOLESOMENESS DATA.  
I. A. Taub, P. Angelini, and C. Merritt, Jr., Journal of Food Science, 41, 942 (1976).
- S-103-T EFFECTS OF SODIUM NITRATE AND SODIUM NITRITE ADDITIONS AND IRRADIATION PROCESSING ON CORNED BEEF.  
G. W. Shults, J. S. Cohen, J. J. Howker, and E. Wierbicki. Journal of Food Science - In Press, 1977.
- S-104-T EFFECTS OF FAT LEVEL AND RADAPPERTIZATION DOSE LEVEL ON THE QUALITY OF PORK.  
G. W. Shults, V. C. Mason, and J. S. Cohen. Journal of Food Science - In Press 1977.
- S-105-T FLAVOR AND TEXTURAL CHANGES IN RADAPPERTIZED CHICKEN AS AFFECTED BY IRRADIATION TEMPERATURE, NaCl AND TPP ADDITIONS.  
G. W. Shults, J. S. Cohen, and V. C. Mason. Journal of Food Science - In Press 1977.
- S-106-T FOOD IRRADIATION IN THE UNITED STATES - CURRENT STATUS AND FUTURE PLANS.  
US Army Natick Development Center, E. S. Josephson, A. Brynjolfsson, and H. C. Johnson. Proceedings of the 12th Japan Conference in Radioisotopes, Japan Atomic Industrial Forum. 26-27 November 1975.
- S-107-T LOW DOSE FOOD IRRADIATION AT "NATICK."  
E. S. Josephson, F. Heiligman, J. J. Howker, and E. Wierbicki, Proceedings - FAO/IAEA Advisory Group Meeting on Low Dose Irradiation of Agricultural Products, Rio de Janeiro, Brazil, 27-31 October 1975. To be published by IAEA/FAO, Vienna, Austria.
- S-108-C RADIATION CHEMISTRY OF AMINO ACIDS AND PEPTIDES IN AQUEOUS SOLUTIONS.  
M.G. Simic, Journal of Agricultural Food Chemistry - In Press.

## RADAPPERTIZATION OF FOODS

- S-109-C ELECTRON REACTIONS WITH CYTOCHROME-C IN ETHYLENE GLYCOL-WATER GLASSES AT  $-196^{\circ}\text{C}$ .  
F. Heinmets. Journal of Physical Chemistry - In press.
- S-110-C INTERMEDIATES IN THE RADIOLYSIS OF AMINO ACIDS AND PEPTIDES.  
M. G. Simic, to be published in Journal of Food Science.
- S-111-C CHEMICAL ASPECTS OF IRRADIATING FROZEN AQUEOUS SYSTEMS.  
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P. Neta, M. G. Simic, M. Z. Hoffman. Journal of Physical Chemistry
- S-113-T THE NATIONAL FOOD IRRADIATION PROGRAM CONDUCTED BY THE DEPARTMENT OF THE ARMY.  
A. Brynjolfsson. Presented at the Symposium, Institute of Food Technologists, Anaheim, CA, 6-9 June 1976.
- S-114-T IRRADIATION AS A CONCEIVABLE WAY OF REDUCING NITRITES AND NITRATES IN CURED MEATS.  
E. Wierbicki, F. Heiligman, A. E. Wasserman. Proceedings, Second International Symposium on Nitrate in Meat Products, Zeist, 7-10 September 1975. PUDOC, Wageningen, The Netherlands (1976).

PAPERS PRESENTED AT FIRST INTERNATIONAL CONGRESS  
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- M-1-W Technology of Next Meats for the Wholesomeness Studies - Chicken and Pork.  
G. W. Shults, ABMPS No. 48 Interim Report, April 1974, Natick, MA.

Paper outlines the technological requirements, technical and commercial applications, and quality parameter of two items to be used for wholesomeness testing of radappertized meats. Presented to the NAS - NRC Committee on Food Irradiation.

- M-2-T Low Nitrate/Nitrite Ham.  
E. Wierbicki, ABMPS No. 48 Interim Report, April 1974, Natick, MA.

The paper outlines research in the reduction of curing additives in cured meats. The objective was to lower the total additive content for radappertized ham. Presented to the NAS - NRC Committee on Food Irradiation.

- M-3-T Storage Studies of Irradiated Foods.  
F. Heiligman, ABMPS No. 48 Interim Report, April 1974.

The paper described storage stability of six radappertized items. Storage results up to 4 years were reported. Presented to the NAS - NRC Committee on Food Irradiation.

- M-4-T Processing Technology of Irradiated Beef, Appendix E.  
E. Wierbicki. NAS/NRC, Task Group on Feeding Study Protocol, US Army Natick Laboratories, Natick, MA, 20 November 1970.

- M-5-T ABMPS Report No. 16 for Committee on Radiation Preservation of Food Appendices F-G.  
E. Wierbicki. National Academy of Science-National Research Council, Contract No. DAAG-17-70-C-0090, 23-29 January 1972.

- M-6-T Key Technology Parameters of Radappertized Foods.  
E. Wierbicki, ABMPS Report No. 38, Committee on Food Radiation Research, NAS/NRC, Washington, DC, August 1973 (pages 19-22).

- M-7-W Key Technology Parameters of Radappertized Meats (Beef, Chicken, Pork, Ham).  
E. Wierbicki, NAS/NRC, Task Group on Microbiological Safety of Irradiated Foods. NLABS, 12-14 January 1972.

- M-8-W Beef for the Wholesomeness Studies - Industrial Procurements.  
E. Wierbicki, NAS-NRC, ABMPS Report No. 48, Appendix E, (pages 37-39), Washington, DC, April 1974.

- M-9-C Radiation Chemistry of Food and Food Related Systems.  
I. A. Taub, In Minutes, 1974 Annual Meeting, Interdepartmental Committee on Radiation Preservation of Food, Natick, MA, April 1975.
- M-10-C Radiolysis of Frozen Aqueous Systems: Polycrystalline Chloroacetic Acid Solutions at  $-40^{\circ}\text{C}$ .  
I. A. Taub and R. A. Kaprielian. In Minutes, 1974 Annual Meeting, Interdepartmental Committee on Radiation Preservation of Food, Natick, MA, April 1975.
- M-11-C Electron Spin Resonance Spectra of Irradiated Myosin.  
J. W. Halliday, In Minutes, 1974 Annual Meeting, Interdepartmental Committee on Radiation Preservation of Food, Natick, MA, April 1975.
- M-12-C Electrophoretic Evidence for Aggregation of Irradiated Myosin.  
J. E. Walker, In Minutes, 1974 Annual Meeting, Interdepartmental Committee on Radiation Preservation of Food, Natick, MA, April 1975.
- M-13-C Effect of Irradiation on Proteins: Myosin and Actomyosin.  
F. M. Robbins. In Minutes, 1974 Annual Meeting, Interdepartmental Committee on Radiation Preservation of Food, Natick, MA, April 1975.
- M-14-C Radiolysis of Iron-Containing Food Component System.  
P. A. Hurwitz, In Minutes, 1974 Annual Meeting, Interdepartmental Committee on Radiation Preservation of Food, Natick, MA, April 1975.

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- B - Books
- T - Technical Papers (presented at special conferences)
- M - Technical Papers for Management
- S - Scientific Papers

### Suffixes - (General area)

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Howker, J. J. R-25-T, R-27-T, R-28-T, R-32-T, R-33-T, R-34-T,  
S-99-T, S-100-T, S-103-T, S-107-T, S-117-T, S-118-T,  
S-127-P

Huber, D. A. S-8-T

Humphreys, J. C. R-18-D, T-12-D

Hurwitz, P. A. S-93-C, M-14-C

Jaeger, R. G. S-90-S

Jarboe, J. S-19-M

Jarrett, R. D. R-18-D, T-12-D, S-2-D, S-11-D, S-22-D, S-23-O,  
S-131-D

Johnson, E. L. T-6-T

Johnson, H. C. S-96-T, S-106-T

Josephson, E. S. B-21-C, T-1-T, T-3-T, T-4-T, T-5-T, T-6-T,  
T-8-T, T-10-T, S-4-T, S-30-E, S-34-T, S-41-T,  
S-42-N, S-79-T, S-77-N, S-89-T, S-106-T, S-107-T,  
S-136-N

Kahan, R. S. R-33-T

Kauffman, F. L. R-7-T, R-12-T

Kaprielian, R. A. S-111-C, S-124-C, M-10-C

Kamper, D. S-61-M, S-71-m

Ketchum, H. W. B-7-E, B-20-E

Killoran, J. J. R-13-P, T-6-T, T-10-T, S-6-T, S-15-T, S-18-P,  
S-20-C, S-25-P, S-64-P, S-78-P, S-127-P, S-128-P

King, F. J. S-79-T

Kittaka, R. S. S-16-M  
Kneeland, L. E. R-15-C, S-20-C  
Koch, R. B. S-1-M  
Kooij, J. V. S-116-T, S-133-W  
Krushchev, V. G. B-14-T  
Land, E. S. S-47-C  
Landers, M. F. S-31-T  
Larkin, E. P. S-55-M, S-72-M  
Learson, R. J. S-37-T  
Levinson, H. S. S-98-M  
Long, F. E. R-5-P  
Losty, T. S-51-C, S-66-C  
MacDonald, B. A. S-121-O  
Maes, E. S-123-C  
Martin, T. G., III R-4-S, R-16-S, R-31-S, S-53-S, S-132-S  
Mason, V. C. S-101-T, S-104-T, S-105-T, S-116-W, S-117-T, S-118-T  
Maxcy, R. B. R-20-M  
McAdoo, D. J. S-17-C, S-21-C  
McLaughlin, W. L. R-18-D, T-12-D  
Mehrllich, F. P. S-7-T  
Merritt, C., Jr. B-21-C, T-10-T, S-17-C, S-21-C, S-63-C, S-94-C,  
S-102-W, S-135-C  
Metlitskii, L. V. B-14-T  
Meyer, R. A. R-2-C  
Neta, P. S-39-C, S-40-C, S-57-C, S-112-C  
Nielsen, W. S-65-N

Osburn, J. W., Jr. B-7-E, B-20-E  
 Payne, G. O., Jr. R-1-P, R-5-P, S-6-T  
 Pederson, A. J. R-3-T  
 Peeler, J. T. S-55-M, S-72-M  
 Phillips, C. E. S-5-T, S-24-T  
 Powers, E. M. S-59-T  
 Pratt, G. B. R-15-C, S-20-C, S-78-P, S-82-P  
 Previte, J. J. S-27-M, S-28-T  
 Raheja, K. S-14-T  
 Raica, N., Jr. S-35-W, S-65-N  
 Rao, B. Y. K. R-19-T  
 Rao, P. S. S-87-C  
 Read, R. B., Jr. S-55-M  
 Reber, E. F. S-14-T  
 Rees, C. W. S-122-O  
 Rentmeester, K. R. S-78-P  
 Rhee, C. S-129-M  
 Rice, L. J. R-21-T, S-50-T, S-58-T  
 Robbins, F. M. T-13-C, M-13-C  
 Rogachev, V. N. B-14-T  
 Ronsivalli, L. J. R-14-T, S-37-T  
 Ross, E. M., Jr. S-83-M, S-84-M, S-97-M  
 Roth, J. S. S-51-C, S-66-C  
 Rowley, D. B. R-8-M, R-30-M, T-2-M, T-10-T, S-32-M, S-43-M,  
 S-61-M, S-80-T, S-96-T, S-97-M, S-98-M, S-130-M  
 Russell, D. P. S-60-T  
 Scarpino, D. P. S-72-M

Schneider, M. D. S-8-T

Scott, J. S-65-N

Shattuck, E. S-97-M

Shauwaert, F. S-123-C

Shults, G. W. P-1-T, P-2-T, P-3-T, P-4-T, P-5-T, P-7-T, R-19-T,  
R-20-T, R-22-T, R-23-T, R-24-T, R-25-T, R-26-T,  
R-27-T, R-28-T, R-29-C, R-32-T, R-35-T, S-7-T,  
S-13-T, S-60-T, S-66-C, S-74-T, S-94-C, S-99-T,  
S-100-T, S-101-T, S-103-T, S-104-T, S-105-T,  
S-117-T, S-118-T, M-1-W

Simic, M. G. S-38-C, S-39-C, S-40-C, S-44-C, S-45-C, S-47-C,  
S-48-C, S-56-C, S-57-C, S-73-C, S-85-C, S-86-C,  
S-87-C, S-88-C, S-92-C, S-93-C, S-108-C, S-110-C,  
S-112-C, S-126-C

Simon, M. S-4-T, S-8-T, S-31-T

Sinnhuber, R. O. R-10-T, S-31-T

Snyder, O. P. T-2-M, S-7-T, S-12-M

Spiegl, C. H. R-1-P, R-5-P

Spracklin, B. W. S-37-T

Strojan, C. S-62-T

Sullivan, R. S-55-M, S-72-M

Swallow, A. J. S-47-C

Swantak, W. S-62-T

Taub, I. A. T-13-C, S-93-C, S-102-W, S-111-C, S-124-C, S-125-C,  
S-126-C, M-9-C, M-10-C

Thomas, M. H. R-9-N, T-6-T, T-10-T, S-42-N, S-77-N, S-136-N

Thompson, M. H. R-7-T

Tobback, F. S-123-C

Tocci, J. S-93-C

Tompkin, R. B. S-16-M

Wadsworth, C. K. S-13-T, S-24-T, S-41-T

Walker, A. A. S-12-M, S-52-M

Walker, J. E. T-13-C, S-125-C, M-12-C

Wall, M. A. S-49-T

Wasserman, A. E. S-82-T, S-114-T

Waters, M. E. R-7-T

Werkowski, S. S-29-M, S-54-M

Whaley, D. N. S-97-M

Wiatre, C. L. S-129-M

Wierbicki, E. R-9-N, R-17-T, R-19-T, R-20-T, R-22-T, R-23-T, R-24-T,  
R-25-T, R-26-T, R-27-T, R-28-T, R-29-T, R-32-T,  
R-33-T, R-34-T, P-2-T, P-5-T, P-7-T, T-5-T,  
T-6-T, T-10-T, S-4-T, S-15-T, S-18-P, S-30-E, S-34-T,  
S-41-T, S-51-C, S-60-T, S-68-T, S-74-T, S-75-T,  
S-88-P, S-79-T, S-80-T, S-82-T, S-89-T, S-94-C,  
S-96-T, S-99-T, S-100-T, S-103-T, S-107-T, S-114-T,  
S-116-W, S-117-T, S-118-T, S-127-P, S-128-P, M-2-T,  
M-4-T, M-5-T, M-6-T, M-7-T, M-8-T

Yu, T. C. S-31-T