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*Further studies*  
EXAMINATIONS ON RADIOACTIVE SUBSTANCE PERMEABILITY OF SOME  
MEAT AND MEAT PRODUCTS PACKING MATERIALS

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## EXAMINATIONS ON RADIOACTIVE SUBSTANCE PERMEABILITY OF SOME MEAT AND MEAT PRODUCTS PACKING MATERIALS

The utilisation of materials that are being applied for packing animal origin foodstuffs, especially meat and meat products, is of manifold importance. One of the most important factors in this respect is no doubt the protection against subsequent exterior contamination of these victuals by various materials harmful in the first place to the public health, among which a rather important place is being taken by some radioactive isotopes.

Basic properties of the major part of materials that are being used for to pack meat and meat products (such as the permeability for water, steam, smoke, oxygen and other gases, fats and alike, elasticity, strength mechanical, thermic and chemical resistance etc.) are in the essence already known for. In literature, however, one finds no data on the permeability of these packing materials for biologically important radionuclides found in radioactive precipitations which of late have been a matter of increased interest and considerations.

The hygiene evaluation of consumption values of the animal origin <sup>allerg.</sup> foodstuffs contaminated with biologically



important radionuclides, constitutes nowadays a problem of first class importance. Within the framework of this in itself very complex problem an extraordinary place is being taken by the question of how to find means for optimal protection of foodstuffs against external radiocontamination.

It is for these reasons that we have carried out examinations on <sup>synthetic</sup> protective properties of some materials used <sup>currently</sup> for meat and meat processed products packaging.

#### Routine Techniques

In our examination series we have used four sorts of materials applied currently for meat and meat products packagings such as: 1) Polyamid - the so-called "Rilsan", 2) the tricit folio, 3) PV Chloride, the so-called "Cry-o-Vac" and 4) Polyethilene. Examinations on the permeability rate of these materials against radionuclide solutions were carried out so that packing material samples were taken and fixed on 15 mm diametre glass tubes. Tubes prepared in this way were added 1 ml each of radioactive solution of the radionuclide examined. The glass tubes containing radioactive materials were then immersed up to a fixed level into larger glass containers filled up with 20 ml each of isotonic solution of an analogous inactive compound. In intervals after 1, 3, 6, 12, 24 and 48 hours out of every larger container taken was 0,5 ml of the solution, put onto planchette, dried off and radiometrically examined.

All experiments were carried out at 19°C under the air pressure of 760 mm/Hg.

For radiobiological examinations used were neutral solutions of chlorides from some biologically important radionuclides such as Sr-90, J-131, Cs-137 and Ce-144. The concentrations of the aforementioned radionuclides examined had specific activities of  $6 \times 10^{-5}$  mCi/ml and  $1.2 \times 10^{-4}$  mCi/ml.

Radiometric examinations for Beta-emitters were carried out by "Philips" scintillation counter of 46% efficiency and for gamma-emitters by "Philips" GM counter of 8% efficiency.

### Discussion

Examinations of permeability rates in packing materials for radioactive solutions of the radionuclides quoted have shown the following:

1. The radionuclides Sr-90 and Cs-137 do not penetrate <sup>even</sup> ~~penetrate~~ all the packing materials in use within 48 hours;

2. Radionuclides J-131 and Ce-144 do not penetrate the Poliyamid, PVC and Polyethilene within 48 hours. The Tricitefolio is permeable to the radioactive nuclides J-131 and Ce-144 in a very short period of time (after half an hour already). Penetration by radionuclides J-131 and Ce-144 bears a characteristic feature in itself as the concentration of the radioisotopes penetrated increases steadily and progressively within the first 12 hours reaching the saturation point whereafter



the radionuclide concentration remains at an approximately constant unchanged level;

3. With the increase of specific activity increased also will be the volume of the active stuff penetrating the material examined.

### Conclusion

The materials examined by us - Polyamid ("Rilsan"), PVC ("Cry-o-Vac") and Polyethilene which are used as emballage for meat und meat preducts are not permeable to radionuclide solutions Sr-90, J-131, Cs-137 and Ce-144 within 48 hours. They therefore offer a full protection to the animal origin foodstuffs against external radioccontamination by fluid radioactive precipitations.

### UNTERSUCHUNGEN EINIGER PACKUNGSMATERIALEN FÜR FLEISCH UND FLEISCHPRODUKTEN AUF DIE DURCHLÄSSIGKEIT FÜR RADIOAKTIVEN SUBSTANZEN

#### Zusammenfassung

In dieser Arbeit wurde festgestellt dass Polyamid "Rilsan"), PVC ("Cry-o-vac") und Poliethilene, die für die Packung von Fleisch und Fleischprodukten verwendet werden, für Lösungen von Radionukliden Sr-90, J-121 und Ce-144 in der Zeit von 48 Stunde auf 19°C nicht durchlässig sind.

EXAMENS DE LA PÉRMEABILITÉ DES SUBSTANCES RADIOACTIVES DE  
CERTAINES MATERIAUX POUR L'AMBALLAGE DE VIANDE ET DES  
PRODIUTS CARNÉS

Resumé

Dans ce travail on etait constanté que Polyamid ("Rilsan"), PVC ("Cry-o-vac") et Polyethylene, les matières plastiques q'on utilisent pour l'emballage de viande et des produits carnés, ne sont pas perméables pour les solutions de radionuclide Sr-90, J-131 et Ce-144 pendant 48 heures à 19°.