interbureau

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE Food and Drug Administration

VOLUME 6 No. 6, Consecutive No. 36 MAY 1970

Helen L. Reynolds, Editor
Nancy J. Palmer, Laura A. Kovach, and Alberta E. Blair, Assistants
Dorothy H. Mahoney and Joanne Aitken, Page Makeup

IN THIS ISSUE

Collaborative Study of the Determination of Ammonia as an Index of Decomposition in Crabmeat by Kurt Steinbrecher. 281

Spectrofluorometric Determination of Rauwolfia Serpentina Tablets and Whole Root by Charles C. Clark 288

Application of Neutron Activation Analysis to Food Products: A Bibliography by James T. Tanner and Melvin Friedman. 294

Polarographic Determination of Nitrates in Aqueous Media Containing Nitrites by Albert L. Woodson 299

Correlation of Organoleptic Evidence with pH, Volatile Bases, and Indole as Indices of Decomposition in Raw, Frozen Shrimp by Billy G. Miles. 304

Differential Effects of DDT and Polychlorinated Biphenyls on the Central Nervous System by Thomas J. Sobotka. 313

Microbiological Contamination Bibliography (Continued) by Harriet M. Oxley 320

Publications List. 325

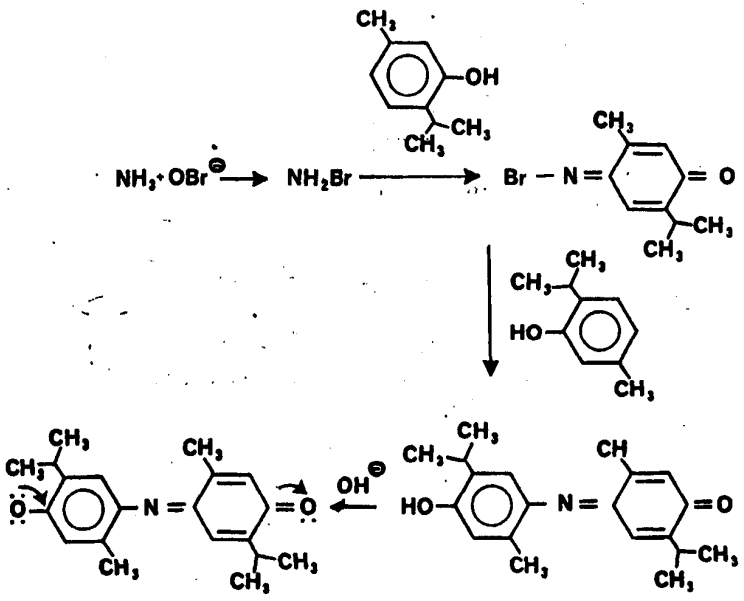
Cumulative Index to Interbureau By-Lines, Vols. 1-6. 328

MONS 087044

COLLABORATIVE STUDY OF THE DETERMINATION OF AMMONIA AS AN INDEX OF DECOMPOSITION IN CRABMEAT

By Kurt Steinbrecher, Seattle District

The study by Burnett (1) showed that a general correlation existed between the concentration of ammonia in crabmeat and its degree of decomposition by organoleptic standards. The method is based on the color formation observed after the reaction of ammonia, thymol, and alkaline bromine water. The reaction scheme may be suggested to be analogous to the indophenol mechanism proposed by Rollater et al. (2):



MONS 087045

Fernandez-Flores and Salwin (3) modified the method, applied it to cod fish, and noted an 8-fold increase in sensitivity. With some slight modification this method was adapted to crabmeat and collaboratively studied.

Collaborative Study

Eleven collaborators representing 7 Food and Drug laboratories, 2 Bureau of Commercial Fisheries laboratories, and 1 university laboratory participated in the study.

The samples were prepared in the following manner: Fresh frozen Dungeness crab was allowed to thaw in the shell at room temperature. It was sampled organoleptically from time to time, and meat at a particular stage of decomposition was removed from the shell, ground 3 times through a meat grinder with thorough mixing, and frozen for subsequent distribution to collaborators. Collaborators were requested to analyze 6 samples:

I. Early Class 1.

II. Late Class 1.

III. Borderline Classes 1 and 2.

IV. Middle Class 2.

V. Middle Class 3.

VI. Middle Class 3.

The definition of the classes conforms to the usage of Hillig et al. (4).

METHOD

(Use NH_3 - free water throughout; ordinary distilled water is suitable.)

Reagents

(a) Bromine solution.--Dissolve 1.0 ml bromine in 100 ml 0.4N NaOH (solution is stable 3 days in dark bottle).

(b) Thymol solution.--10% w/v in ethyl alcohol (solution is stable 3 days in dark bottle).

MONS 087046

(c) Ammonia standard solution.--Dissolve 0.314 g NH_4Cl, previously dried 1 hr at 100°C, in water and dilute to 100 ml. Transfer 1.0 ml to 100 ml volumetric flask and dilute with water (10 μg NH_3/ml).

(d) n-Butyl alcohol.

(e) 3N NaOH.

(f) Phosphotungstic acid.--2.5% w/v aqueous solution.

Procedure

Place 20 g prepared sample in 500 ml conical glass-stoppered flask. Add 180 ml phosphotungstic acid solution. Shake vigorously 2 min and filter through paper (Whatman No. 1, or equivalent), collecting filtrate in 250 ml glass-stoppered conical flask. Pipet 1.0 ml filtrate (representing 0.1 g crabmeat) into 50 ml glass-stoppered conical flask. Save remainder of filtrate.[1] Add 1.0 ml phosphotungstic acid solution to separate flask for blank.

To each flask add 9.0 ml water; then add 2.0 ml thymol solution and 5.0 ml bromine solution in that order, mixing thoroughly after each addition. Let stand 10-15 min. Add 1.0 ml 3N NaOH, mix, and let stand at least 20 min.

Transfer each solution to separate 125 ml separatory funnel. Rinse flasks with 10 ml water, adding rinse to proper funnel. Add 30.0 ml n-butyl alcohol and shake vigorously. Discard lower aqueous phase and drain alcohol into glass-stoppered conical flask through glass funnel plugged with glass wool and containing ca 45 g anhydrous sodium sulfate. Measure absorbance of solution at 682 nm in 1 cm cell with blank in reference cell.

Standard Preparation

Transfer 0, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, and 7.0 ml standard ammonia solution to separate 50 ml glass-stoppered conical flasks. Add 1.0 ml phosphotungstic acid solution to each flask. Dilute contents in each flask to 10 ml with water and proceed with preparation of standard solution as in procedure, beginning with "then add 2.0 ml thymol solution...". Using portion of 0 standard as blank, measure absorbance of all 8 standard solutions at 682 nm in 1 cm cell against blank in reference cell.

[1] If final absorbance reading is > 1.0 absorbance unit, dilute filtrate with phosphotungstic acid solution so that 1.0 ml dilute solution will produce an absorbance reading below this level.

Results and Discussion

To minimize errors resulting from reading concentrations from a graphic representation of the standard curve, we decided to derive the equation of the standard curve by the least squares method and to obtain the concentration values by substituting sample absorbances in the equation derived. To reduce calculation errors, collaborators were asked to report absorbance values only for the standards and absorbance values and dilutions performed for the samples. All calculations converting absorbance values to μg NH_3/g crabmeat were performed by the Associate Referee.

It soon became apparent that we would need to be cautious about evaluating the results and drawing conclusions. A majority of the collaborators in some way did not follow the instructions. In several cases the method was modified; in others several runs were reported so that the Associate Referee had to select the data to be used in the study.

Nevertheless, each set of results was carefully scrutinized and a series of values from each collaborator was selected that was thought to be representative of the method as it was intended to be performed.

Table 1 lists the amount of ammonia found in the crabmeat samples in μg NH_3/g crabmeat.

On the basis of the two-tailed ranking test for 11 laboratories and 6 materials (5), results from Collaborator 8 were eliminated from further calculations. The means with their standard deviations for the remaining samples are shown in Table 2.

Certain preliminary conclusions may be drawn from the data obtained in this study. There appears to be a direct relationship between the amount of ammonia present in crabmeat and its stage of decomposition, according to organoleptic criteria. However, the results do not present as sharp demarcations between classes of decompositon as might be desired. It can be seen by examining the data for the ammonia content (Table 2) that values for Early Class 1 and Late Class 1 overlap; in fact, the mean value for Late Class 1 is less than that of Early Class 1, though the standard deviation for Early Class 1 is greater, indicating a greater scatter of those values. Borderline Classes 1 and 2 also overlap in many cases with Early and Late Class 1, though the average is somewhat higher. On the basis of mean values, there seems to be a better spread between the value of ammonia in the samples in Middle Class 2 and those in Borderline Classes 1 and 2, and also between the values of Middle Class 2 and Middle Class 3.

MONS 087048

Table 1. Collaborative results of ammonia content in 6 samples, μg NH_3/g crabmeat

Coll.	Early Class 1	Late Class 1	Borderline Classes 1-2	Middle Class 2	Middle Class 3	Middle Class 3
1	373	342	389	1311	2012	1972
2	485	300	604	513	1730	1665
3	303	286	449	756	1853	1800
4	234	234	346	1271	1185	1862
5	320	306	566	1174	1268	668
6	249	316	277	502	1197	1128
7	265	299	367	695	1877	3185
8[a]	634	380	742	2278	2521	3385
9	413	363	581	1237	2684	2819
10	259	256	347	906	1860	1692
11	370	198	334	1330	2470	2390

[a] These results eliminated from further calculations.

Table 3 lists the ranges of values obtained ± one standard deviation (68% of the population) and ± two standard deviations (95% of the population) of the mean. It can be seen for example, that selecting the value 600 μg NH_3/g crabmeat as the dividing line between definite decomposition (Class 2) and undecomposed meat (Class 1) would yield useful results in 68% of the cases, since no undecomposed samples have values higher than 543 and no decomposed samples have values lower than 636. The more realistic 95% criterion, however, shows overlap, with some undecomposed meat classed as decomposed and some decomposed classed as undecomposed. If a limiting value were set at approximately 800 μg NH_3/g crabmeat, it would not include all decomposed samples, but no good or borderline samples would be rejected.

Most collaborators found some difficulty reproducing the standard curve. The actual values of the absorbances of duplicates varied, as well as the slopes, both on repetition by the same investigator and by comparison with other investigators. Variation in replicate sample

Table 2. Ammonia content of crabmeat according to its stage of decomposition

Class		Mean, μg NH_3/g	Std Dev.
Early Class 1	(n-10)	328	82
Late Class 1	(n-10)	290	49
Borderline Classes 1-2	(n-10)	426	117
Middle Class 2	(n-10)	970	334
Middle Class 3	(n-20)	1866	621

Table 3. Range of ammonia content of crabmeat according to its stage of decomposition

Class	Mean, μg NH_3/g ±1 Std Dev.	±2 Std Dev.
Early Class 1	246 ± 410	164 ± 492
Late Class 1	241 ± 339	192 ± 388
Borderline Classes 1 and 2	309 ± 543	192 ± 660
Middle Class 2	636 ± 1304	302 ± 1638
Middle Class 3	1245 ± 2487	624 ± 3108

MONS 087050

color formation paralleled that of the standard solutions. Such variation seems to account for the relatively large standard deviations of the ammonia content values and hence for the limitation of usefulness of the method, as it stands, in assigning the state of decomposition to the sample. This defect was not apparent to the Associate Referee in his preliminary investigation where relatively good reproducibility on repeated analyses had been obtained.

More work is needed to indicate the cause for the variation in color formation. For example, the bromine solution must be definitely alkaline for consistent color development to take place. Further modifications of conditions - reagents, concentrations, manipulations - must be studied to assure greater reproducibility of results.

Recommendations

It is recommended that further work on details of the method be undertaken, and that with the achievement of greater reproducibility and precision an additional collaborative study be initiated.

Acknowledgments

The Associate Referee wishes to thank the following collaborators: J. N. Gaffke, Jr., Seafoods Laboratory, Oregon State University, Astoria, Ore.; J. Spinelli, Bureau of Commercial Fisheries, Seattle, Wash.; M. H. Thompson, Bureau of Commercial Fisheries, Pascagoula, Miss.; and the following members of the Food and Drug Administration: T. S. Smith, Baltimore; W. A. Hallam, Boston; B. L. McGill, Dallas; R. M. Hose, Kansas; B. G. Miles, New Orleans; A. Weber, New York; D. L. Andersen and S. E. Artoe, Seattle.

References

(1) Burnett, J. L., J. Ass. Off. Anal. Chem. 48, 624-627 (1965).

(2) Bolleter, W. T., Bushman, C. J., and Tidwell, P. W., Anal. Chem. 33, 592-594 (1961).

(3) Fernandez-Flores, E., and Salwin, H., J. Ass. Off. Anal. Chem. 51, 1109-1110 (1968).

(4) Hillig, F., Shelton, L. R., Jr., Loughrey, J. H., and Eisner, J., J. Ass. Off. Anal. Chem. 41, 763-764 (1958).

(5) Youden, W. J., Statistical Techniques for Collaborative Tests, AOAC, Washington, D.C., 1967, pp. 27-29.

This report of the Associate Referee was presented at the 83rd Annual Meeting of the AOAC, Oct. 13-16, 1969, at Washington, D. C.

MONS 087051

Interbureau By-Lines No. 6
May 1970

SPECTROFLUOROMETRIC DETERMINATION OF RAUWOLFIA SERPENTINA TABLETS AND WHOLE ROOT

By Charles C. Clark, Baltimore District

Rauwolfia serpentina, the powdered root obtained from the plant of the same name, is employed as a hypotensive.

An assay has been developed in this laboratory for Rauwolfia serpentina in both ground whole root and dosage forms. It combines modern extraction techniques with the sensitivity of fluorescence.

Identical assays are provided for both the raw material and the dosage forms in the NF XII and the 10th edition of Official Methods of Analysis of the AOAC. The method is capable of yielding consistent and reliable data if large amounts of highly colored tablet excipients are not present. However, the method is time-consuming, occupying a working day in excess of 8 hr, and uses a 4 hr Soxhlet extraction, 30 shakeouts, a solvent evaporation step, and a 20 min derivative-formation time in a heated water bath. An amount of sample equivalent to 50 tablets is frequently needed for a single assay. Sample blank absorbance values frequently account for 30% or more of the total absorbances obtained.

An improvement over this official method, in terms of time required, is the method of Kunze, Barkan, and Banes (1). This method eliminates the Soxhlet extraction and the solvent evaporation steps but maintains the 30 shakeouts, heated water bath, and large amount of sample needed.

Reserpine and rescinnamine are the principal active alkaloids in Rauwolfia serpentina, with trace amounts of other alkaloids also present (2). Any unofficial assay devised for this product would have to measure these nitrite-sensitive alkaloids in the same ratio as in the official assay. The problem, then, is essentially one of determining simultaneously 2 different active ingredients present in varying proportions.

Fluorometric excitation and emission spectra of both reserpine and rescinnamine derivatives have been published (3, 4). Both alkaloids have identically shaped emission spectra with their maximum emissions at the same wavelength (Fig. 1). The excitation spectra (Fig. 2) of the 2 alkaloids are not identically shaped but do have the maximum fluorescences at the same wavelength. Work in this laboratory also demonstrated that, if the excitation wavelength is held at this maximum, the ratio

MONS 087052

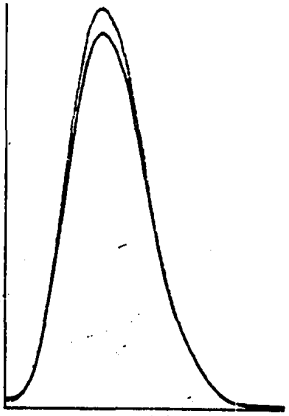


FIG. 1--Emission scan of rescinnamine (----) and reserpine (——), 420-660 nm (both compounds about 0.2 μg/ml).



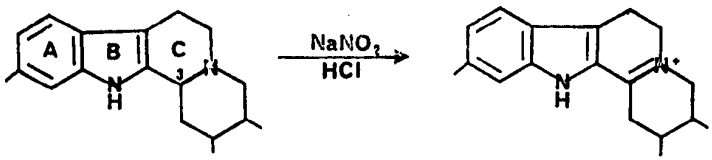
FIG. 2--Excitation scan of rescinnamine (----) and reserpine (——), 420-660 nm (both compounds about 0.2 μg/ml).

of the fluorometric responses of the nitrous acid derivatives of these 2 alkaloids are in the same ratio as their absorbances at 390 nm. This information indicated that a fluorometric method for Rauwolfia serpentina was feasible.

The nitrous acid derivative, thought to be the 3-dehydro form of the parent molecule (Fig. 3) is about 12 times as fluorescent as the parent molecule (5). The difference in spectra between the nitrous acid derivative and the parent molecule is probably due to epimerization at C_3 and unsaturation in ring C.

The strong fluorescence of this derivative allows one to use a much smaller sample and eliminates the solvent evaporation step. The smaller sample can be refluxed directly in the solvent, thus eliminating the Soxhlet extraction apparatus.

The derivative formation follows the USP XVII method for reserpine. These conditions have been established as optimum for the reserpine assay (6). Work in this laboratory indicates that these conditions are also suitable for the determination of rescinnamine even though it has a slightly different derivative formation rate as shown in Fig. 4.



Reserpine 3-Dehydroreserpine

FIG. 3--Derivative formation of reserpine.

Rauwolfia serpentina tablets are frequently coated with a dye which is not removed in the sample cleanup. The presence of dyes can lead to low results by absorption of light at the activation and/or emission wavelengths. An internal standard is incorporated in this assay to compensate for this absorption. A sample blank is also employed to correct for fluorescing products, such as oxidation products of reserpine and rescinnamine, originally present in the sample and not removed in the cleanup.

Method

Reagents

(a) Methanolic HCl.--Add 25 ml concentrated HCl to 75 ml methanol Cool to room temperature before use.

(b) Sodium nitrite solution.--Dissolve 300 mg $NaNO_2$ in 50 ml water and dilute to 100 ml with methanol. Prepare fresh daily.

(c) Sulfamic acid solution.--Dissolve 5 g sulfamic acid in 100 ml water.

(d) Standard solution.--(A) Dissolve 6.25 mg reserpine in 10 ml $CHCl_3$ and dilute to 100 ml with methanol. (B) Dilute 10 ml (A) to 100 ml with methanol. (C) Dilute 10 ml (B) to 100 ml with methanol. Solutions (B) and (C) are stable at least 1 month if kept in the dark.

Apparatus

Chromatographic column.--Lower layer: 3 g Celite plus 2 ml saturated $NaHCO_3$ solution. Upper layer: 3 g Celite plus 2 ml 0.5N H_2SO_4.

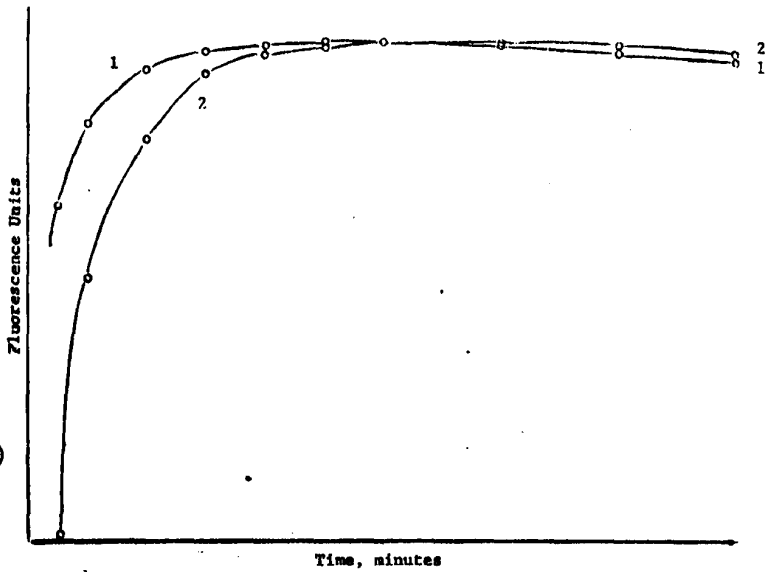


FIG. 4--Derivative formation rate for reserpine (1) and rescinnamine (2).

Procedure

Powder a minimum of 20 tablets and pass through 60 mesh sieve. Mix composite thoroughly. Weigh amount of sample equivalent to ca 250 µg total alkaloids into 250 ml Erlenmeyer flask equipped with air condenser. Add 100 ml 95% ethanol and reflux on steam bath 30 - 60 min. Cool to room temperature, add 100 ml $CHCl_3$, stopper securely, and shake solution vigorously 30 min. Transfer to 250 ml volumetric flask, dilute to volume with $CHCl_3$, and filter through paper. Transfer 50 ml aliquot of filtrate to 250 ml separatory funnel containing 200 ml 0.5N H_2SO_4 and shake funnel vigorously 2 min. Drain lower layer (may be slightly turbid) onto chromatographic column. Collect eluant in 200 ml volumetric flask containing 50 ml methanol. Extract aqueous solution in separatory funnel with 4 portions of 25 ml $CHCl_3$, draining each extract onto column after previous one enters column. Dilute eluant to volume with $CHCl_3$ and mix.

MONS 087055

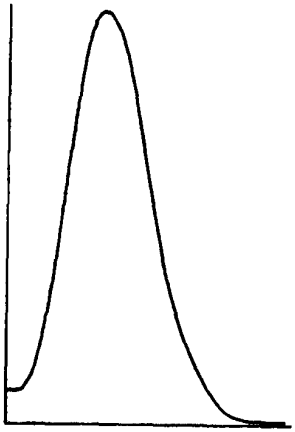


FIG. 5--Emission spectrum of a typical sample of Rauwolfia serpentina, 420-660 nm.

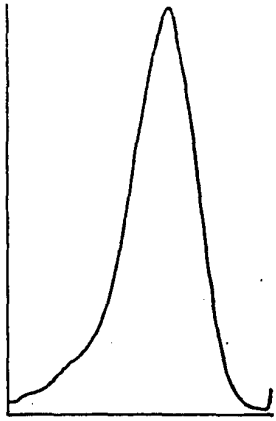


FIG. 6--Excitation spectrum of a typical sample of Rauwolfia serpentina, 260-480 nm.

Transfer 25 ml aliquots of this solution to each of three 50 ml volumetric flasks labeled A, B, and C. To flasks A and B add 10 ml methanol. To flask C add 10 ml standard solution C. Add 5 ml 50% aqueous methanol to flask A. To flasks B and C add 5 ml $NaNO_2$ solution. Add 5 ml methanolic HCl to all 3 flasks. Mix thoroughly. After 30 min, add 2.5 ml sulfamic acid solution to all 3 flasks and dilute samples to volume with methanol. Mix and determine fluorescence after 15 min, mixing and venting solution to dispel nitrogen during this time.

Use the following instrumental conditions: activation wavelength 400 nm (uncorrected), emission wavelength 502 nm (uncorrected). Use minimum activation and emission slit widths consistent with good quantitation according to manufacturer (on our Hitachi Perkin-Elmer MPF-2A, this is 10 nm and 12 nm, respectively). The sensitivity used is dependent upon slit widths.

% Reserpine - rescinnamine group alkaloids =

$$\frac{\text{Sample B - Sample Blank A}}{\text{Standard C - Sample B}} \times \frac{\text{mg Standard}}{\text{g Sample}} \times \frac{\text{(Av. g/Tablet) x 4}}{\text{mg Tablet declaration}}$$

Results

Figures 5 and 6 show typical emission and excitation spectra of Rauwolfia serpentina samples. Results are presented in Table 1 for the analysis of tablets by both the NF XII and fluorometric methods.

Table 1. Comparison of NF XII and fluorometric method

	Rauwolfia serpentina, %	
Sample[a]	NF XII	Fluorometric Method
1	0.192	0.191 0.192 0.193 0.190
2	0.150	0.152
3	0.138	0.140
4	0.160	0.162
5	0.150	0.152
6	0.186	0.188

[a]Sample 1 is Rauwolfia serpentina NF. All other samples are red sugar-coated tablets.

REFERENCES

(1) Kunze, F.M., Barkan, S., and Banes, D., J. Ass. Off. Anal. Chem. 51, 157-159 (1968).

(2) Banes, D., Wolff, J., Fallscheer, H.O., and Carol, J., J. Amer. Pharm. Ass., Sci. Ed. 45, 708 (1956).

(3) Mader, W.J., Haycock, R.P., Sheth, P.B., and Connolly, R.J., J. Ass. Off. Anal. Chem. 43, 291-295 (1960).

(4) Missan, S.R., Ciaccio, L.L., McMullen, W.H., Pazdera, H.J., and Grenfell, T.C., J. Amer. Pharm. Ass., Sci. Ed. 49, 7 (1960).

(5) Haycock, R.P., Sheth, P.B., and Mader, W.J., J. Amer. Pharm. Ass., Sci. Ed. 48, 479 (1959).

(6) Mader, W.J., Haycock, R.P., Sheth, P.B., and Connolly, R.J., J. Ass. Off. Anal. Chem. 44, 13-17 (1961).

MONS 087057

Interbureau By-Lines No. 6
May 1970

APPLICATION OF NEUTRON ACTIVATION ANALYSIS TO FOOD PRODUCTS: A BIBLIOGRAPHY

James T. Tanner and Melvin Friedman
Division of Food Chemistry and Technology

For about 4 years the Food and Drug Administration, utilizing the Naval Research Laboratory reactor, has applied neutron activation analysis to various samples of foods, drugs, and biological materials. Neutron activation analysis is especially attractive for measuring both trace and major amounts of elements in foods: (1) It is a sensitive method of analysis; (2) it is free of reagent and laboratory contamination; and (3) the method of measurement depends on the nuclear properties of the element and consequently matrix effects are unimportant.

In the past 10 years many research workers have come to realise the importance of the application of neutron activation analysis to food products and so the literature in the field has burgeoned. This bibliography was compiled so that research workers interested in the application of neutron activation analysis to foods could have more ready access to relevant literature.

This bibliography derives from a search of Nuclear Science Abstracts through November 30, 1969 and therefore covers the literature through September 1969. The key words used were: activation analysis, animal feeds, dairy products, diet, food, food chains, fruits, meats, nutrients, and vegetables.

1. Adamek, A., Obrcesnik, I., Kukula, F., and Krivanek, M., Substoichiometric determination of traces of thallium and platinum by activation analysis. Nucl. Activ. Tech. Life Sci. Proc. Symp. Amsterdam 1967 pp. 189-194.

2. Bergner, K. G., Problems and methods in food analysis. Deut. Apoth.-Ztg. 107, 215-220 (1967).

3. Buchanan, J. D., Activation analysis with a triga reactor. Proc. Inter. Conf. Mod. Trends Activation Anal. College Station, Tex. 1961, pp. 72-77.

4. Buchanan, J. D., and Guinn, V. P., Analysis of foods by neutron-activation techniques. Food Technol. 17, 17-22 (1963).

MONS 087058

5. Ching, H. S., Ke, C. H., and Lin, C. Y., Determination of bromine and iodine in sodium glutamate by neutron activation analysis. J. Chinese Chem. Soc. (Taiwan) 10, 92-100 (1963).

6. Christell, R., Erwall, L. G., Ljanggren, K., Sjostrand, B., and Westermark, T., Methods of activation analysis for mercury in the biosphere and in foods. Proc. Intern. Conf. Modern Trends Activation Anal. College Station, Tex. 1965, pp. 380-382.

7. Das, H. A., Hoede, D., and Zonderhuis, J., Determination of bromine in wheat, flour, and bread by neutron activation analysis. Reactor Centrum Nederland, Petten, Rept. No. RCN-106 1969.

8. Das, H. A., Van Raaphorst, J. G., Hoede, D., and Zonderhuis, J., The determination of mercury in potato flour. Intern. J. Appl. Radiation Isotopes 17, 252-253 (1966).

9. Das, H. A., Van Raaphorst, J. G., Menger, J. W., and Galesloot, T. E., Manganese determinations at the nanogram level in dairy products. Nucl. Activ. Tech. Life Sci. Proc. Symp. Amsterdam 1967 pp. 379-387.

10. Fer, A., and Fourcy, A., Rapid simultaneous determination of traces of bromine and arsenic in plant materials using neutron activation and distillation. Nucl. Appl. 6, 360-364 (1969).

11. Fourcy, A., Use of activation analysis for agricultural products and foodstuffs. Bull. Inform. Sci. Tech. (Paris) No. 99, 57-70 (1965) (French; English summary).

12. Geisman, J. R., Carey, W. E., Gould, W. A., and Alban, E. K., Distribution of arsenic residues by activation analysis. J. Food Sci. 34, 295-298 (1969).

13. Grummitt, W. E., and Lahaie, G., Strontium, barium, and calcium in some components of human diet. At. Energy Can. Ltd. AECL-1680 1963.

14. Guinn, V. P., Activation analysis in the petroleum and chemical industry. Activation Analysis, Principles and Applications, Lenihan, J. M. A., and Thomson, S. J. (Eds.), Academic Press, New York, 1965, 129-132.

15. Guinn, V. P., Neutron activation analysis and its application to the analysis of food products. J. Amer. Oil Chem. Soc. 45, 767-774 (1968).

16. Haller, W. A., Rancitelli, L. A., and Cooper, J. A., Instrumental determination of trace elements in plant tissue by neutron activation analysis and Ge(Li) gamma-ray spectrometry. J. Agr. Food Chem. 16, 1036-1040 (1968).

17. Hoffman, C. M., Brunelle, R. L., Pro, M. J., and Martin, G. E., Determination of trace component distribution in illicit spirits by neutron activation analysis (NAA), atomic absorption (AA), and gas-liquid chromotography (GLC). J. Ass. Off. Anal. Chem. 51, 580-586 (1968).

18. Kim, C., and Silverman, J., Mercury content of worldwide samples of wheat. Trans. Amer. Nucl. Soc. 11, 54 (1968).

19. Koch, R. C., and Roesmer, J., Application of activation analysis to the determination of trace elements in meat. Proc. Intern. Conf. Mod. Trends Activation Anal. College Station, Tex. 1961, pp. 95-101.

20. Koch, R. C., and Roesmer, J., Application of activation analysis to the determination of trace element concentrations in meat. Nucl. Sci. Eng. Corp. Rept. No. NSEC-56 1961.

21. Koch, R. C., and Roesmer, J., Application of activation analysis to the determination of trace element concentrations in meat. J. Food Sci. 27, 309-320 (1962).

22. Kosta, L., and Byrne, A. R., Activation analysis for mercury in biological samples at nanogram levels. Talanta 16, 1297-1303 (1969).

23. Kosta, L., Ravnik, V., and Dumanovic, J., Determination of nitrogen in plant seeds by fast neutron activation analysis. Panel Meeting on New Approaches to Breeding for Improved Plant Protein, Roestanga, Sweden, 1969, pp. 161-168.

24. Krivanek, M., and Kukula, F., Substoichiometric determination of platinum by activation analysis. Isotopenpraxis 3, 441-443 (1967) (Russian).

25. Kruger, P., and Gruverman, I. J., Neutron activation analysis for characterisation of induced activities in irradiated foods. Proc. Intern. Conf. Mod. Trends Activation Anal. College Station, Tex. 1961, pp. 46-49.

26. Lambert, J. P. F., and Simpson, R. E., Note on the analysis of nutrient broth by neutron activation analysis. J. Ass. Off. Anal. Chem. 51, 999-1002 (1968).

27. Leddicotte, G. W., Ultratrace-element research in the life sciences using activation analysis. Isotopes Radiation Technol. 5, 200-206 (1968).

MONS 087060

28. Lee, B. K., and Murphy, G., Determination of arsenic content of American cigarettes by neutron activation analysis. Cancer 23, 1315-1317 (1969).

29. Magno, P. J., and Knowles, F. E., Jr., Determination of strontium in environmental media using neutron activation. Anal. Chem. 37, 1112-1115 (1965).

30. Malvano, R., and Grosso, P., Iodine activation analysis in materials of biological interest. J. Nucl. Biol. Med. 12, 86 (1968).

31. McConnell, K. P., Use of activation analysis in studies of selenium in the mammalian organism. Proc. Intern. Conf. Mod. Trends Activation Anal. College Station, Tex. 1961, pp. 137-140.

32. Meinke, W. W., Does irradiation induce radioactivity in food. Nucleonics 12(10), 37-39 (1954).

33. Mercer, W. A., Application of radiochemical techniques in food processing research. Radioisotope tracer techniques in evaluation and improvement of industry practices for removal of pesticide residues from foods. Natl. Canners Ass. West. Res. Lab. Berkeley, Calif. Rept. No. SAN-1022 1963.

34. Moeller, D. W., and Leddicotte, G. W., Neutron activation analysis of whole milk for stable strontium. Oak Ridge Natl. Lab. Rept. ORNL-2866 1960, pp. 22, 29.

35. Molinski, V. J., Wahl, W. H., and Strain, W. H., Analysis of vanadium in milk powder by neutron-activation analysis using a rapid radiochemical separation of 3.77-minute vanadium-52. Trans. Amer. Nucl. Soc. 6, 398 (1963).

36. Nishigaki, S., Activation analysis in soil/plant relation studies in South-East Asia. Plant Nutrient Supply and Movement, IAEA Vienna, Technical Report Series No. 48, 122-124 (1965).

37. Prapuolenis, A. A., and Bakas, J. M., The determination of phosphorus and nitrogen in herbage flour by fast neutron activation analysis. Radiochem. Radioanal. Letters 1, 19-23 (1969).

38. Rarbe, R., Determination of total strontium in vegetables, comparison of activation analysis with flame photometry. Grenoble Univ. France Rept. No. NP-17124 1966 (French).

39. Rayudu, G. V. S., Tiefenbach, B., and Jervis, R. E., Neutron activation determination of trace mercury in Canadian foods. Trans. Amer. Nucl. Soc. 11, 54-55 (1968).

MONS 087061

40. Rossi, M. L., D' Agastino, M. D., Mostrand, J. W., Jr., and Favale, A. J., Activation research in the aerospace industry. Proc. Intern. Conf. Mod. Trends Activation Anal. College Station, Tex. 1961, pp. 114-118.

41. Samuelsson, E.,G. Determination of trace elements in milk and milk products by means of neutron activation analysis. *Radioisotopes and Radiation in Dairy Science and Technology*, IAEA, Vienna, 1966, pp. 221-237.

42. Shinbori, Y., Radioactivation analysis of trace elements in refined soybean oils. I. Iron, cobalt, and nickel Yakugaku 17, 430-435 (1965) (Japanese).

43. Shinbori, Y., and Kuwahara, H., Radioactivation analysis of trace arsenic in refined soybean oils, sunflower oils, and rape seed oils. Yakugaku 18, 147-148 (1969) (Japanese).

44. Shinbori, Y., and Tashio, Y., Radioactivation analysis of trace elements in refined soybean oils. 2. Determination of copper and zinc. Yakugaku 17, 606-610 (1968) (Japanese).

45. Smales, A. A., and Pate, B. D., The determination of sub-microgram quantities of arsenic by radioactivation. III. The determination of arsenic in biological material. Analyst 77, 196-202 (1952).

46. Souliotis, A. G., Combined radiochemical - neutron activation analysis method for the determination of sulfur and phosphorus in high-purity paper and beer. Anal. Chem. 36, 811-814 (1964).

47. Souliotis, A. G., Grimanis, A. P., and Tsanon, N. A., Determination of chloride in beer by radioactivation analysis. Analyst 90, 499-501 (1965).

48. Spronk, N., Nuclear activation in the animal sciences. Nucl. Activ. Tech. Life Sci. Proc. Symp. Amsterdam 1967, pp. 335-352.

49. Union Carbide, Radioisotope sales campaigns opened by G.E. and U.C. U.C. expects to quadruple its analysis business. Nucleonics 21(2), 28 (1963).

50. Wood, D. E., Fast neutron activation analysis for nitrogen in grain products. Kaman Nucl. Colorado Springs, Colo. Rept. No. KN-65-186, 1965.

51. Wood, D. E., Liquid-loop activation analysis system. Trans. Amer. Nucl. Soc. 10, 451 (1967).

52. Yule, H. P., Reactor neutron activation analysis instrumental sensitivities in six matrix materials. Anal. Chem. 38, 818-821 (1966).

MONS 087062

Interbureau By-Lines No. 5
March 1970

POLAROGRAPHIC DETERMINATION OF NITRATES IN AQUEOUS MEDIA CONTAINING NITRITES

Albert L. Woodson, Chicago District

A drug formulated to contain the following ingredients per tablet was assayed for nitrate and nitrite content:

Sodium nitrite	65 mg
Potassium nitrate	135 mg
Powd. Ext. Echinacea	6.5 mg
Powd. Ext. Chionanthus	6.5 mg
Powd. Ext. Iris	6.5 mg
Sodium Glycocholate	6.5 mg

The nitrite was satisfactorily assayed by an AOAC colorimetric procedure (1).

For the assay of the nitrate concentration the phenoldisulfonic acid procedure (2) was modified to eliminate the interference of nitrite ions. This modification consisted of treating the acidified solution of the sample with urea, which destroys the nitrite ion by converting it to nitrogen. The nitrate assay value obtained by this modified procedure was low: 75% of the label declaration. For a check analysis, the author successfully utilized aqueous polarography for the nitrate assay.

This polarographic assay is based on the catalytic effect of the nitrate concentration on the polarographic reduction wave of uranium (3).

A 2×10^{-4} M solution of uranyl acetate, $UO_2(C_2H_3O_2)_2$, in 0.01M HCl-0.1M KCl yields two polarographic reduction waves at approximate half-wave potentials -0.2 and -0.9 v vs. the standard calomel electrode. The wave at -0.2 v represents the reduction of uranium (+6) to uranium (+5); the wave at -0.9 v represents the reduction of uranium (+5) to uranium (+3) (3). In the presence of nitrate ions the uranium wave at -0.9 increases (3); as the uranium ions are reduced, these reduced ions are immediately reoxidized by the nitrate ions. These reoxidized uranium ions are reduced again and this pattern of polarographic reduction-nitrate oxidation-polarographic reduction is continued until the solution has been depleted of the oxidizer, the nitrate ions. The net result is an increase in the height of the second wave in the polarographic reduction profile of uranium. This catalytic effect of the nitrate ion is proportional to the concentration of nitrate ions as low as 5×10^{-4} M (3).

MONS 087063

The nitrite ion in aqueous acid media forms nitrous acid, which is polarographically reducible at -1.0 v. Therefore, any polarographic assay of a mixture of nitrate and nitrite ions would be inaccurate because of the close proximity of the two half-wave potentials: -0.9 v for the nitrate ion and -1.0 v for the nitrite ion. However, since nitrous acid is easily destroyed by sulfamic acid (it converts nitrous acid to nitrogen), the addition of sulfamic acid to the solution before polarography eliminates the interference of the nitrite ion (3).

Method

Reagents and Apparatus

(a) Sulfamic acid solution.--About 0.75M.

(b) Uranyl acetate.--$UO_2(C_2H_3O_2)_2.2H_2O$, Fisher Certified Reagent.

(c) Potassium nitrate.--Fisher Primary Standard.

(d) Sargent XV polarograph.--With standard calomel reference electrode.

Solutions

(a) Polarographic electrolyte.--Dissolve 86.9 mg uranyl acetate in 1 L solution containing 0.01M HCl and 0.1M KCl. The uranyl acetate concentration of this solution is 2×10^{-4}M.

(b) Standard potassium nitrate.--Dissolve 97.8 mg primary standard in 100 ml water. This solution contains 0.978 mg KNO_3/ml.

Procedure

Accurately weigh portion of powdered sample equivalent to ca 130 mg potassium nitrate into 100 ml volumetric flask. Add ca 30 ml water and shake on mechanical shaker 15 min. Dilute with water to volume, mix well, and filter.

Add 2 ml aliquot of filtered sample solution, 1 ml water, 2 ml sulfamic acid solution, and 15 ml polarographic electrolyte to small Erlenmeyer flask. Mix well, let stand 10 min, de-aerate with nitrogen 5 min, and then polarograph. Scrub nitrogen before introduction into polarographic cell by passing it through scrubber containing polarographic electrolyte.

Determine recovery as follows: Mix 2 ml filtered sample solution, 1 ml standard potassium nitrate solution, 2 ml sulfamic acid solution, and 15 ml polarographic electrolyte. Run sample and recovery determinations in triplicate.

Plot height of diffusion current vs. mg potassium nitrate/ml. Measure diffusion current at -1.1 v as indicated in Fig. 1.

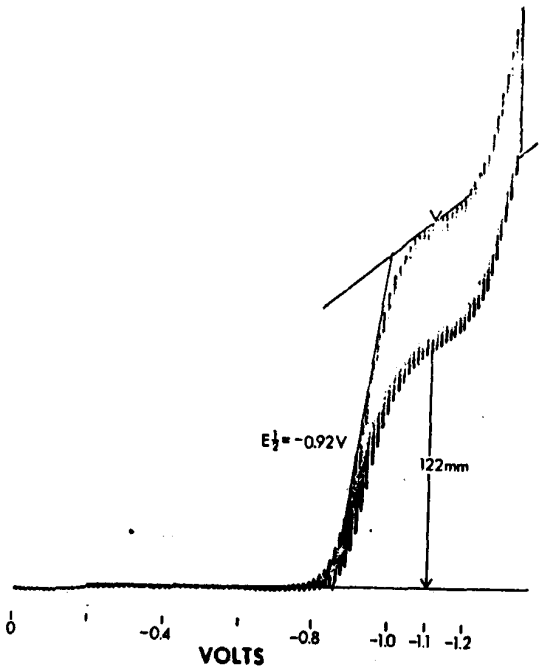


FIG. 1--Second wave in the polarographic reduction profile of uranium.

Results and Discussion

The results of the sample assays are shown in Table 1; the results of the recovery determinations are shown in Table 2. These data indicate that this procedure may be successfully employed for the polarographic determination of nitrates in the presence of nitrites.

The preparation of a standard potassium nitrate curve shows the linearity of the nitrate concentration-wave height profile in the range of 0.078-0.195 mg/ml (Fig. 2).

Table 1. Results of polarographic assay of sample

Sample	E 1/2, volt	mg/Tablet		% of Declaration
		Found	Declared	
1	-0.90	129.1	130	99.3
2	-0.90	132.0	130	101.5
3	-0.90	130.3	130	100.2
Av.	-0.90	130.5	130	100.3

A typical polarographic wave obtained with the sample solution is shown in Fig. 1. The wave at -0.2 v, which represents the reduction of uranium (+6) to uranium (+5), is not seen on this typical polarogram because the sensitivity of the Sargent XV has been lowered in order to confine the wave at -0.9 v to the available chart space. If the sensitivity of the instrument were set at 0.04 μA/mm, the wave at -0.2 v would appear, but the wave at -0.9 v would be off the chart.

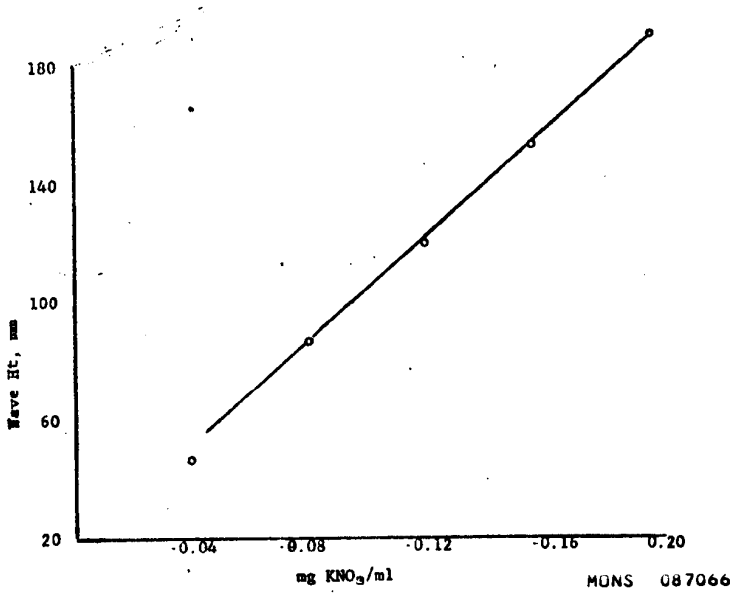


FIG. 2--Nitrate concentration vs. wave height profile.

Table 2. Results of recovery of nitrate by polarographic assay

Assay	E 1/2, volt	mg KNO_3 Added	Found	% Recovery
1	-0.91	0.978	0.96	98.2
2	-0.92	0.978	0.98	100.2
3	-0.91	0.978	0.96	98.2
Av.	-0.913	0.978	0.967	98.9

References

(1) Official Methods of Analysis, 10th Ed., AOAC, Washington, D.C., 1965, secs. 23.013-23.014.

(2) Official Methods of Analysis, 10th Ed., secs. 32.306-32.308.

(3) Brezina, M. and Zuman, P., Polarography in Medicine, Biochemistry and Pharmacy, Interacience Publishers, Inc., New York, 1958, pp. 111, 112, 114, 115.

MONS 087067

Interbureau By-Lines No. 6
May 1970

CORRELATION OF ORGANOLEPTIC EVIDENCE WITH pH, VOLATILE BASES, AND INDOLE AS INDICES OF DECOMPOSITION IN RAW, FROZEN SHRIMP

Billy G. Miles,[1] New Orleans District

Food scientists are in need of a unified scientific approach to determining the state of decomposition of shrimp. No single approach - organoleptic, bacteriological, or chemical - has been devised which is completely satisfactory for such a purpose.

This study was undertaken to determine if any direct correlation exists between organoleptic classification and values for pH, volatile base, and indole as obtained from a single portion of shrimp. Such examinations have previously been conducted on shrimp, but to our knowledge not on the same portion of shrimp; therefore, no direct correlation of values can be made (1).

Previous investigators have reported two principal types of decomposition in raw shrimp: putrefactive and ammoniacal. The putrefactive type occurs when shrimp, before icing, are exposed to a temperature favorable for bacterial incubation. Once started, this type of decomposition proceeds fairly rapidly even though the shrimp are subsequently well iced. Ammoniacal decomposition occurs in shrimp which have been held under well iced conditions until decomposed. This type of decomposition is slow and is characterized by an odor of free ammonia, in addition to other odors associated with decomposition (2).

The shrimp used in this study were of the putrefactive type and were organoleptically classified as follows:

Class I - No odor or a slight fish odor characteristic of the usual commercial product.

Class II - Decomposed. A slight but definite odor recognizable as indicative of decomposition.

Class III - Advanced decomposition. An intense persistent odor recognizable as indicative of pronounced decomposition, definite and unmistakable.

---

[1]Present address: San Juan Section, New York District. This paper was submitted as a progress report of the Associate Referee on Decomposition in Shellfish.

MONS 087068

These shrimp (white, brown, and pink) were commercially available raw, frozen, peeled, and deveined. They were hard frozen when received.

Shrimp were thawed and individually classified organoleptically. Individual 50 g portions of Class I, II, or III were weighed and used to determine pH, volatile base, and indole. When determinations could not be made on the same day as the organoleptic examination, individual 50 g portions were immediately hard frozen and stored; when time permitted, they were thawed, classified organoleptically, and used to determine pH, volatile base, and indole. In no case did more than a week elapse between the original organoleptic examination and other tests.

Since published procedures were not available for determining a series of indices on the same 50 g portion, established methods for indole (2) and volatile bases (3) were combined and modified as follows:

(A) Distillation procedure: (1) A calcium hydroxide trap was placed between distillation flask and condenser. (2) Antifoam A spray was used instead of alcohol in the distillation flask.

(B) Volatile bases (3): The distillate was collected in 0.1N HCl and back-titrated with 0.1N NaOH to pH 7, using a pH meter with a glass and calomel electrode.

(C) Indole (4): (1) The titrated volatile bases distillate was quantitatively transferred to a 1000 ml separatory funnel containing 10 ml of 10% HCl and 10 ml of a saturated solution of sodium sulfate. Three 1-minute extractions were made with 30 ml portions of $CHCl_3$. The $CHCl_3$ extracts were drained into a 125 ml separatory funnel through an absorbent cotton plug. (2) Color was developed as in the established indole method.

Experimental

Reagents and Apparatus

(a) Color reagent, purified acetic acid, dilute hydrochloric acid, and indole standard solution.--All from sec. 18.036 (4).

(b) Distillation apparatus.--(1) A separate steam generator should be used for each unit. Steam generator may be made from 2 L Erlenmeyer flask connected to all-glass steam distillation apparatus, ammonia distilling apparatus (JD-1710 Scientific Glass Apparatus Co., Inc., Bloomfield, N. J., or equivalent with minimum use of rubber tubing). (2) Distilling flask. (3) Trap flask, 800 ml $\overline{S}$ Kjeldahl, connected through a (4) spray trap via rubber tubing to a trap flask which is connected to a (5) straight bore condenser through the spray trap. An 800 ml beaker is an effective receiver (Fig. 1). The $\overline{S}$ joint is cut away from the spray trap on the sample flask and a rubber tube is used to connect the sample spray trap to the spray trap on the trap flask.

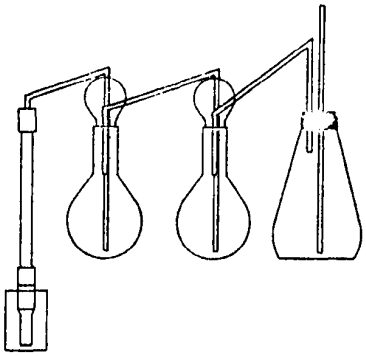


FIG. 1--Schematic of distillation apparatus.

(c) pH meter.--Reading to two decimal places (glass and calomel electrode).

(d) Calcium hydroxide.--(Baker analyzed reagent 1372 or equivalent). 15 g of $Ca(OH)_2$ is dissolved in 1000 ml of water. 150 ml is used in the trap flask for each determination.

Organoleptic Examination

The shrimp were thawed, the organoleptic examination was performed to note classification, and samples were weighed in individual 50 g portions.

pH Determination

The 50 g portions of shrimp were placed in a 1 qt. Waring Blendor and blended for 2-3 min. The pH of the blended shrimp was taken with a pH meter (glass and calomel electrode) and recorded to two decimal places.

Determination of Volatile Bases

Eighty to 100 ml of water and a 10 second burst of Dow Corning Antifoam A pressurized spray was added to the previously blended 50 g portion of shrimp and blended for 2 min. The blend was quantitatively transferred to a distillation apparatus (Fig. 1). A 500 ml portion was distilled into a beaker containing 50 ml of 0.1N HCl (condenser tip is immersed into the 0.1N HCl in the receiving beaker). (Note: The calcium hydroxide solution in the trap flask

must be boiling before distillation begins.) The distillate was titrated to pH 7 with 0.1N NaOH (pH meter), corrected for back titration, and the value multiplied by 20 to correct to the quantity of 0.01N NaOH in 100 g of shrimp ("volatile bases").

Indole Determination

The titrated distillate from the volatile base determination was transferred to a 1000 ml separatory funnel containing 10 ml of a saturated solution of sodium sulfate and 10 ml of 10% HCl. The aqueous phase was extracted 1 min with three 30 ml portions of $CHCl_3$ (USP). The $CHCl_3$ was drained through an absorbent cotton plug in the stem of the 1000 ml separatory funnel into a 125 ml separatory funnel containing 10 ml of the color reagent and shaken for 2 min. Then 9 ml of color reagent (bottom layer) was drained into a 50 ml glass-stoppered cylinder and diluted to 50 ml with acetic acid. The color developed immediately upon shaking. Using a visible recording spectrophotometer, the spectrum was recorded from 650 to 425 nm against a reagent blank. The quantitative absorbance maximum was read at 567 nm and a background correction was made by drawing a straight line from the absorbance peak at 650 nm to that at 425 nm. Background absorbance (the point at which the line crosses 567 nm) is subtracted from total absorbance at 567 nm. Indole standard solutions containing 0, 20, 30, and 40 µg indole were prepared and taken through the procedure, and an indole standard curve was prepared. The amount of indole in the shrimp sample was calculated from the standard indole curve and multiplied by a factor of 2 to obtain µg indole in 100 g of shrimp.

Recovery of indole by this method is 96.9 - 100% if the calcium hydroxide trap is boiling vigorously before distillation is begun. If the calcium hydroxide in the trap is not boiling vigorously, indole recovery values drop to 85 - 90%.

Results and Discussion

The results of the determination of the three classes of organoleptic shrimp are listed in Table 1. pH, volatile bases, and indole were determined on 35 portions of white, brown, or pink shrimp in Class I, 15 portions in Class II, and 23 portions in Class III.

The pH, indole content, and volatile bases values show a steady increase as the shrimp progress from Class I through Class III.

Table 1 also shows that the indices overlap into several organoleptic classes. Some indices do not properly represent the organoleptic classification. The reasons for this deviation are not known.

Table 1. Experimental data on white, brown, and pink shrimp (not listed separately)

pH	Indole, µg/100 g	Volatile Bases, ml 0.01N NaOH/100 g	pH	Indole, µg/100 g	Volatile Bases, ml 0.01N NaOH/100 g
	Organoleptic Class I			Organoleptic Class II	
7.13	8.4	173	7.59	46.2	268
7.08	9.6	163	7.56	71.2	276
7.12	0	217	7.57	40.0	255
7.80	10	143	7.42	44.0	274
7.87	20	208	7.82	6.0	363
7.07	8	260	7.50	64	258
7.12	8.4	264	7.72	24	87
7.09	0	216	7.81	15	212
7.10	8.4	163	7.72	30.4	270
7.09	8.8	167	7.86	24	326
7.08	8.0	192	7.81	35	234
7.13	0	174	7.45	28.4	222
7.40	12.4	175	7.52	17	239
7.20	8.0	125	7.58	30.6	224
7.25	8.0	142	7.46	29.2	209
7.30	0	211			
7.48	14.0	205		Organoleptic Class III	
7.30	3.0	192			
7.52	0	33	7.67	90.0	368
7.43	0	61	7.91	156.0	366
7.35	0	68	7.99	70.0	251
7.48	0	52	7.81	400.0	422
7.30	0	37	7.98	14.0	165
7.46	0	52	7.25	54.0	298
7.70	8	150	7.90	62.0	277
7.57	4	87	7.87	25.0	144
7.26	0	119	7.45	46.0	277
8.03	11	310	7.98	19.0	206
7.31	0	297	8.22	155.8	149
7.37	0	101	8.00	171.2	326
7.47	0	166	8.02	42.0	252
7.53	0	162	7.95	26.0	230
7.62	11.4	203	7.70	128.6	359
7.43	14.0	72	7.72	120.4	399
7.40	10.4	65	7.69	102.4	340
			7.41	28.0	468
			7.70	90	503
			7.72	54.4	423
			7.60	74.0	660
			7.83	115.0	662
			7.76	94.0	715

MONS 087072

Table 2. Organoleptic and chemical indices of decomposition in shrimp (from Table 1)

	Class I	Class II	Class III
pH Av.	7.37	7.63	7.79
Range	7.07 - 8.03	7.42 - 7.86	7.25 - 8.22
Indole, g/100 g			
Av.	5.5	33.6	110.4
Range	0 - 20	6.0 - 71.2	14.0 - 400
Volatile Bases, ml 0.01N NaOH			
Av.	155	248	359
Range	33 - 310	87 - 363	144 - 715

Table 2 summarizes the results for pH, indole content, and volatile bases obtained on the 3 organoleptic classes of the shrimp. Separate lots of brown shrimp and pink shrimp were examined by the organoleptic technique previously discussed. The separated shrimp samples were examined immediately and then again after the same lot of shrimp was allowed to decompose in plastic bags at room temperature for 24 hr. The values for organoleptic class, pH, indole content, and volatile bases on the separated brown and pink shrimp increased as shown in Tables 3 and 4. Since this study was conducted on commercially prepared shrimp, all previous history of the shrimp is unknown. The deviations of some values could be the result of chemicals used on the shrimp, variations with type of shrimp, and general handling before and after freezing.

Conclusion

Each set of values reveals a noticeable upward trend as the shrimp decompose. These results are of value as additional data to help correlate the findings from organoleptic determination of shrimp quality. The 4 indices should be further evaluated on individual species of commercial shrimp under known conditions and beginning with live shrimp.

MONS 087073

Table 3. Organoleptic class, pH, indole content, and volatile base values for brown shrimp and the same lot held 24 hr at room temperature

pH	Organoleptic Class	Indole, ug/100 g	Volatile Bases, ml 0.01N NaOH/100 g
		Fresh Shrimp	
7.40	I	12.4	175
7.20	I	8.0	125
7.25	I	8.0	142
7.30	I	0.0	211
7.48	I	14.0	205
7.30	I	3.0	192
Av. 7.32		7.56	175
		Stored Shrimp	
7.41	III	28.0	468
7.70	III	90.0	503
7.72	III	54.4	423
7.76	III	74.0	660
7.83	III	115.0	662
7.76	III	94.0	715
Av. 7.70		75.9	572

MONS 087074

Table 4. Organoleptic class, pH, indole content, and volatile base values for pink shrimp and the same lot held 24 hr at room temperature

pH	Organoleptic Class	Indole, µg/100 g	Volatile Bases, ml 0.01N NaOH/100 g
		Fresh Shrimp	
7.52	I	0	33
7.43	I	0	61
7.35	I	0	68
7.48	I	0	52
7.30	I	0	37
7.46	I	0	52
Av. 7.42		0	50
		Stored Shrimp	
7.57	III	12	131
7.54	III	16	159
7.60	III	14	139
7.56	III	26	180
7.62	III	20	208
7.70	III	26	155
Av. 7.60		19	162

MONS 087075

References

(1) Campbell, C., J. Ass. Off. Anal. Chem. 45, 731-732 (1962).

(2) Duggan, R. E., and Strasburger, L. W., J. Ass. Off. Anal. Chem. 29, 177-188 (1946).

(3) Hillig, F., Shelton, L. R., Jr., Loughrey, J. H., and Eisner, J., J. Ass. Off. Anal. Chem. 41, 763-776 (1958).

(4) Official Methods of Analysis, 10th Ed., Association of Official Agricultural Chemists, Washington, D. C., 1965, secs. 18.036-18.038.

Interbureau By-Lines No. 6
May 1970

DIFFERENTIAL EFFECTS OF DDT AND POLYCHLORINATED BIPHENYLS ON THE CENTRAL NERVOUS SYSTEM

By Thomas J. Sobotka, Division of Pesticide Chemistry and Toxicology

Refined chemical procedures have only recently been developed which enable DDT to be differentiated from polychlorinated biphenyls (PCB) in single samples (personal communication from Judith Armour, DPCT, to be published in JAOAC, July 1970). Because these two classes of compounds are difficult to separate and because they are both found in wildlife species, it is possible that effects previously attributed to DDT may in fact be due to Aroclor residues. The present work was undertaken to determine whether central behavioral and physiological systems are similarly or differentially affected by DDT and polychlorinated biphenyls. Two representative samples of the PCB class were investigated, namely, Aroclor 1260 and Aroclor 1254.

Methods

Adult male mice (Flander's Research Farm) were used throughout the study. Animals were housed in groups of 15-20 with constant lighting and temperature. Food and water were provided ad libitum.

All compounds were dissolved in corn oil and administered orally at volumes equivalent to 0.01 ml/g body weight.

Open-Field Activity (Exploratory Activity). - The apparatus to measure exploration of the DDT and Aroclor 1260 groups was different from that used to gauge exploratory activity of the Aroclor 1254 groups. Therefore, only the DDT and Aroclor 1260 groups can be validly compared. However, the data from the Aroclor 1254 groups will be presented for completeness.

Exploratory behavior for the DDT and Aroclor 1260 groups was measured by the use of a large rectangular box (10 x 18 x 6") with marked grid floor. Twenty-four hours after dosing, each animal was tested individually. The number of squares traversed per minute was recorded for a 5 min period. The average minute activity was used as the exploratory activity.

Exploration by the Aroclor 1254 groups was determined in circular photoactivity chambers (18" diameter x 15" high). Twenty-four hours after dosing, each mouse was placed in a photoactivity chamber and the number of light beams crossed per minute for 5 min was recorded. The average minute activity was used as the exploratory activity.

MONS 087077

In order to gauge the rate at which the mice were habituating to the novel environment during their 5 min exposure, the difference between the average activity of the first 2 min and the last 2 min was calculated. A large difference (the average activity of the last 2 min being smaller) was taken to imply a rapid suppression of motor exploration, i.e., a high degree of habituation; conversely, a smaller difference would indicate relatively little motor suppression or habituation to the novel environment. The use of a decline in exploratory activity over a period of time as an index of habituation is based on the methods of Carlton (1).

DDT was given in doses of 0, 1.0, 10.0, and 25.0 mg/kg (total number of mice = 60). Aroclor 1260 was administered at 0, 1.0, and 10.0 mg/kg (total number of mice = 39). Aroclor 1254 was given at doses of 0, 0.5, 1.0, and 10.0 mg/kg (total number of mice = 48).

Passive Avoidance. - Fear-induced suppression of motor activity (passive avoidance) was measured in a standard passive avoidance situation (2). The apparatus consisted of a small Plexiglas chamber (3.5 x 6.5" with a grid floor) adjoining a larger chamber (13.5 x 13.5" with a grid floor) with a door between them. Four hours after dosing, each mouse was placed in the small chamber facing away from the door. The door was immediately opened, thereby activating a timer. The time (latency) to enter the larger chamber was recorded. As soon as the animal stepped into this chamber, the door was closed and an 8 ma/0.2 sec shock was delivered through the grid floor. The mouse was then returned to its home cage. On the following day the animal was given a single post-shock (fear) test. The latency to enter the large "shock" chamber was recorded but no shock was given.

DDT (80 mice), Aroclor 1260 (81 mice), and Aroclor 1254 (48 mice) were administered in oil in single oral doses of 0, 0.5, 1.0, and 10.0 mg/kg.

Maximum Electroshock Seizure. - Four hours after dosing, maximum electroshock seizure was induced by a 30 ma/0.2 sec pulse delivered via saline wetted corneal electrodes. The durations of the following seizure components were measured: tonic flexion, tonic extension, and clonus. In addition, the ratio of tonic flexion/tonic extension was calculated.

The following doses of DDT (61 mice), Aroclor 1260 (46 mice), and Aroclor 1254 (40 mice) were given: 0, 0.5, 1.0, and 10.0 mg/kg.

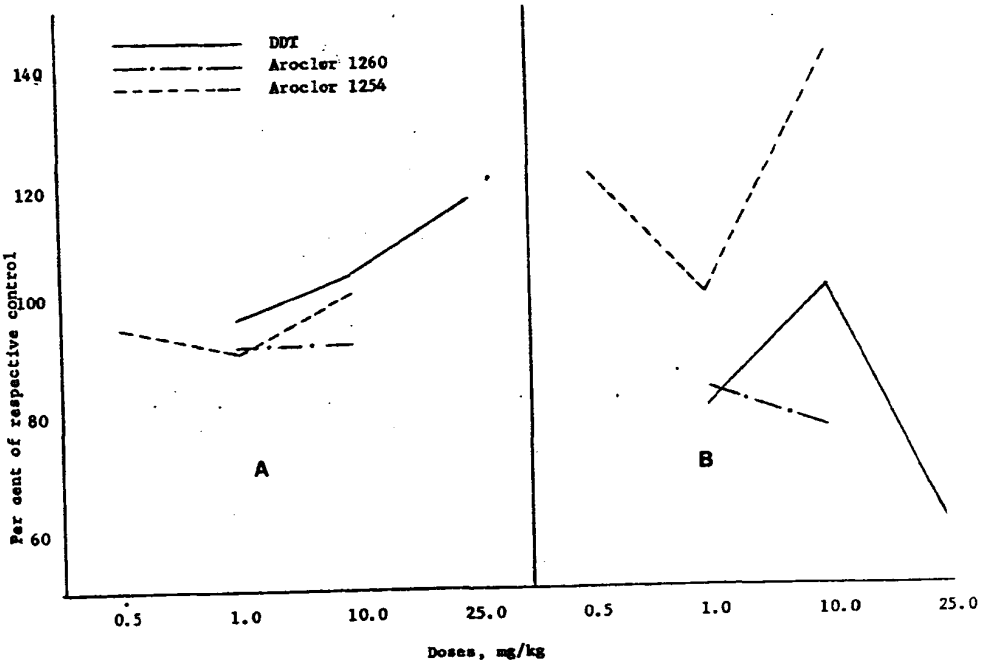


FIG. 1--Effect of DDT, Aroclor 1260, and Aroclor 1254 on (A) exploratory behavior and (B) habituation (4 hr pretreatment).

MONS 087079

Results

All results are expressed as per cent of control. Figure 1A depicts the changes in exploratory activity induced by DDT and Aroclor 1260. At 1.0 and 10.0 mg/kg there does not appear to be any marked differences between the effects of the 2 compounds. The Aroclor 1260 groups do, however, tend to exhibit a slightly lower exploratory activity. A similar low exploration is seen with the Aroclor 1254 group at 1.0 mg/kg.

The habituation scores seen in Fig. 1B similarly do not differentiate between DDT and Aroclor 1260. Aroclor 1254 does induce a facilitation of habituation. But this effect cannot be validly compared with the DDT or Aroclor 1260 groups since different apparatus was used.

In contrast to exploratory and habituation scores, a clear distinction between DDT and both of the Aroclor compounds is seen in the passive avoidance behavior. As shown in Fig. 2, the DDT-treated mice entered the shock (stress) chamber faster, while the Aroclor

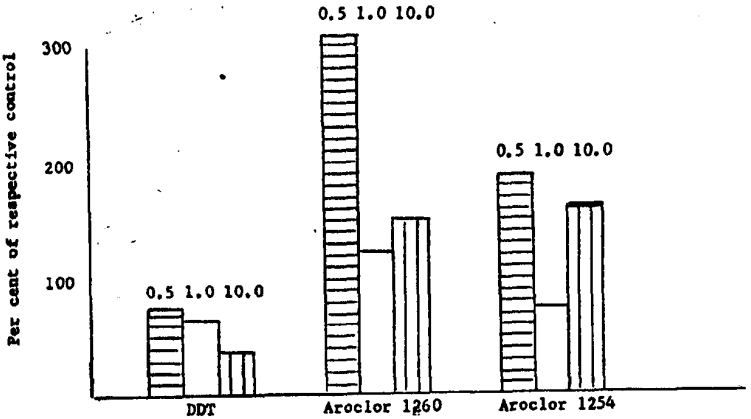


FIG. 2--Effects of DDT, Aroclor 1260, and Aroclor 1254 on latency to enter a shock-stress chamber (all agents were given 24 hr before shock and 48 hr before testing latency to enter shock chamber).

MONS 087080

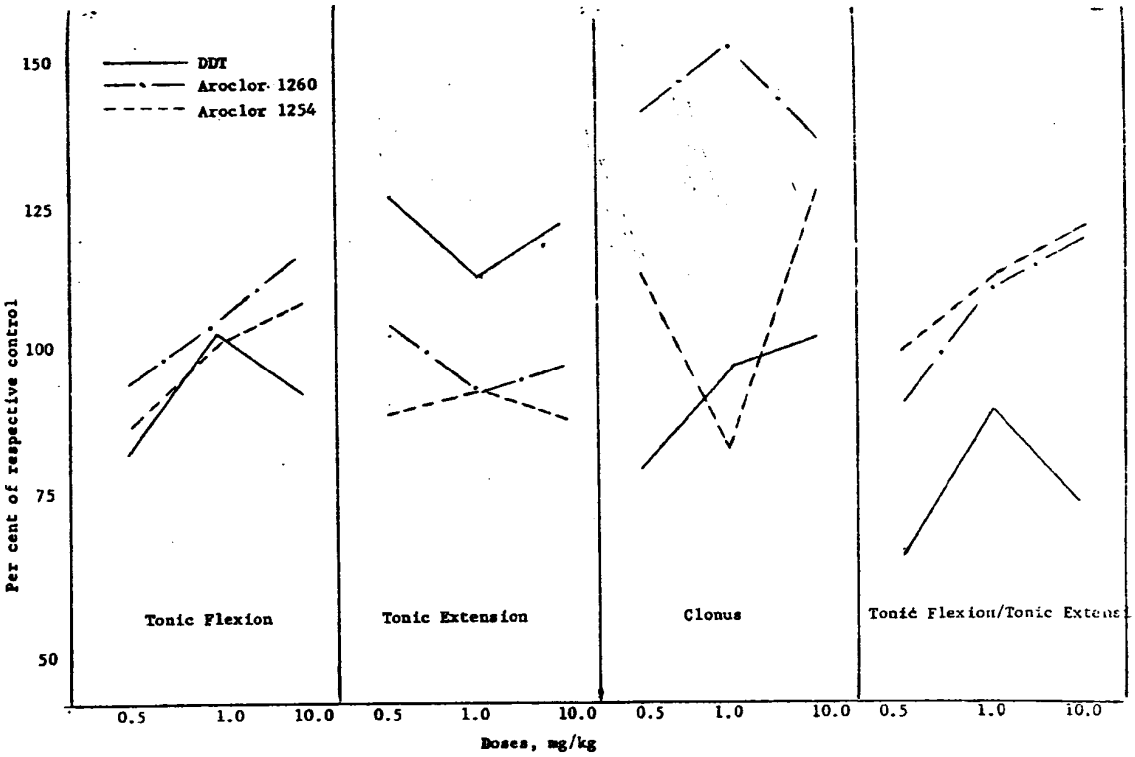


FIG. 3--Effect of DDT, Aroclor 1260, and Aroclor 1254 on maximum electroshock seizure 4 hr after dosing.

MONS 087081

1260- and 1254-treated animals generally took a much longer time to enter the stress chamber when compared to their respective controls.

Further distinction between DDT and Aroclor compounds can be seen in their effects on MES pattern (Fig. 3). Mice treated with either Aroclor 1260 or 1254 exhibited a prolonged duration of clonus (Aroclor 1260 was more effective in this than was Aroclor 1254) and an increased tonic flexion/tonic extension ratio, and tended to have a decreased tonic extensor duration. Each of these effects is the opposite of that found after DDT treatment. Animals treated with DDT had a prolonged tonic extensor phase and a depressed tonic flexion/tonic extension ratio, and tended to have a decreased or unchanged clonic phase compared to controls.

Discussion

The present work has shown that DDT and polychlorinated biphanyls (specifically, Aroclor 1260 and Aroclor 1254) exert differential effects on the central nervous system.. The behavioral inhibition induced by shock stress (3) is attenuated by DDT as seen by the facilitation of entrance into the shock (stress) chamber. The Aroclor compounds resulted in the opposite effect. These agents prolonged the latency to enter the shock chamber, thereby enhancing the inhibitory effects of stress.

The general level of central neuronal excitability is also differentially affected. The depression of the tonic flexion/tonic extension ratio (resulting from a decreased duration of tonic flexion and a prolongation of tonic extension) by DDT reflects an overall increase in brain excitability (4).

DDT also tended to exert a depressant effect on the clonic phase of MES. In contrast, the Aroclor compounds increased the tonic flexion/tonic extensor ratio (resulting primarily from the decreased duration to tonic extension). This reflects an overall decrease in central physiological excitability. The clonic phase, which is thought to be due to an active inhibitory system (5), is generally prolonged by the Aroclor compounds, especially Aroclor 1260.

The possibility exists that DDT may attenuate central inhibitory systems, while polychlorinated biphenyls may enhance central inhibitory systems, but further experimentation is necessary.

In summary, the present work not only has shown that the differential effects exerted by DDT and polychlorinated biphenyls distinguish these two classes of compounds, but also indicates that they exert opposite effects on the central nervous system.

MONS 087082

References

(1) Carlton, P., in Progress in Brain Research, Vol. 28, Bradley, P., and Fink, M. (Eds.), Elsevier, New York, 1968, pp. 48-60.

(2) Weiss, J., McEwen, B., Silva, M., and Kalput, M., Science 163, 197-199 (1969).

(3) Stein, L., Chemistry of Reward and Punishment: Psychopharmacology - A Review of Progress 1957-1967, Public Health Service Publication No. 1836, Efron, D. (Ed.), U. S. Government Printing Office, Washington, D. C., 1968, pp. 105-123.

(4) Woodbury, D., and Vernadakis, A., in Methods in Hormone Research 5, Dorfman, R. (Ed.), Academic Press, New York, 1966, pp. 1-57.

(5) Gastaut, H., and Fischer-Williams, M., "The Physiopathology of Epileptic Seizures" in Handbook of Physiology (Neurophysiology), Section 7, Vol. 1, Field, J. (Ed.), American Physiological Society, Washington, D. C., 1959, pp. 329-363.

MONS 087083

Interbureau By-Lines No. 6
May 1970

MICROBIOLOGICAL CONTAMINATION BIBLIOGRAPHY (Continued)[1]

Compiled by Harriet M. Oxley, Science Information Facility

1. Anonymous, Use of Disinfectants in the food industry. Voeding Techniek 3, 905-908 (1969).

2. Auclair, J., et al., Methods of sampling dairy products for bacteriological analysis. Ann. Nutr. 23, A5-A25 (1969).

3. Avakian, O. A., Detection of Cl. botulinum in raw materials, partly manufactured goods and finished products of canned goods by the luminescent-serologic method. Gig. Sanit. 33, 110 (1968).

4. Basille, D., et al., Methods for bacteriological testing of fresh cheeses and yogurts. Ann. Nutr. 23(3), A39-A48 (1969).

5. Beers, W. H., et al., Isolation and characterization of Clostridum botulinum Type B toxin. J. Biol. Chem. 244, 4473-4479 (1969).

6. Beliakov, V. D., et al., On food posioning caused by Salmonella anager. Gig. Sanit. 34, 46-48 (1969).

7. Bibergan, E. I., et al., Use of Ivanov medium in the isolation of Salmonella and Shigellae. Lab. Delo. 6, 369 (1968).

8. Bilbrough, J., Food sterilization by microwave radiation. Non-Ionis. Radiat. 1, 70-72 (1969).

9. Bory, J., Gases released by Clostridium oedematiens grown in a sodium thioglycolate medium under vacuum. Ann. Inst. Pasteur 11, 222-225 (1969).

10. Braun, D. D., Some ways of improving sanitary hygienic indices of articles made of low pressure polyethylene and polypropylene for use in the food industry and in private life. J. Hyg. Epidem. 13, 254-263 (1969).

11. Broeke, R.. Ten, Staphylococcus aureus and staphyloccal enterotoxins in dried milk. Neth. Milk Dairy J. 23, 223-224 (1969).

12. Brooks, J. B., et al., Differentiation between Clostridium sordelli and Clostridium bifermentans by gas chromatography. J. Bact. 100, 528-530 (1969).

[1] See Interbureau By-Lines 5, 229-232 (1970).

13. Burgasov, P. N., The evolution of botulism. V. The evolution of the pathogenic properties of Clostridium botulinum. Zh. Mikrobiol. 45, 3-7 (1968).

14. Cherubin, C. E., et al., The epidemiology of salmonellosis in New York City. Amer. J. Epidem. 90, 112-125 (1969).

15. Clem, J. P., Sanitation guidelines for the breaded-shrimp industry. U. S. Fish Wildlife Bur. Commer. Fish. Circ. 308, 1-14 (1968).

16. Davis, J. G., Microbiological standards for foods. Lab. Pract. 18, 39-44, Passim (1969).

17. Durhan, E., et al., Resistance of spores of Clostridium botulinum 33A to combinations of ultraviolet and gamma rays. Appl. Microbiol. 18, 44-50 (1969).

18. Forget, A., et al., Correlation between virulence and other characteristics of Clostridium perfringens Type A. Appl. Microbiol. 18, 668-676 (1969).

19. Foster, E. M., The problem of Salmonellae in foods. Food Technol. 23, 1178, 1180-1182 (1969).

20. Galesloti, T. E., et al., The microbiology of spray-dried milk products with special reference to Staphylococcus aureus and Salmonella. Ned. Melk-Zuiveltijdschr. 22(4), 158-172 (1968).

21. Gimeno, E. J., et al., Study of the control of Salmonellae in meats exported from the Republic of Argentina. Bull. Office Int. Epizoot. 68, 299-306 (1967).

22. Grinmaer, T. V., Comparison of media with antibacterial preparations in the bacteriological diagnosis of dysentery. Lab. Delo. 6, 370-371 (1968).

23. Hall, J. R., Enhanced recovery of Salmonella montevideo from onion powder by the addition of potassium sulfite to lactose broth. J. Ass. Off. Anal. Chem. 52, 940-942 (1969).

24. Harrison, J. M., et al., Microbiological evaluation of Pacific shrimp processing. Appl. Microbiol. 18, 188-192 (1969).

25. Heidelbaugh, N. D., et al., Effect of processing on recovery of polio virus from inoculated foods. J. Food Sci. 34, 239-241 (1969).

26. Holbrook, R., et al., The performance of a stable version of Baird-Parker medium for isolating Staphylococcus aureus. J. Appl. Bact. 32, 187-192 (1969).

27. Iveson, J. B., et al., Strontium chloride and strontium selenite enrichment broth media in the isolation of Salmonella. J. Hyg. 67, 457-464 (1969).

28. Johnson, M. G., et al., Death of Salmonella typhimurium and Escherichia coli in the presence of freshly reconstituted dehydrated garlic and onion. Appl. Microbiol. 17, 903-905 (1969).

29. Kielwein, G., Nutrient medium for the selective cultivation of pseudomonas and aeromonads. Arch. Lebensmittelhyg. 20(6), 131-133 (1969).

30. Kudo, H., Basic study of fluorescent antibody technics. Jap. J. Clin. Path. 17, 522-529 (1969).

31. Labeyrie, S., et al., Chromogenesis of erythrogenic colonies of Pseudomonas aeruginosa in a synthetic medium. C. R. Acad. Sci. (D) 266, 1898-1900 (1968).

32. Lang, K., Culturing of salmonellae and shigellae from milk and dairy products by an enrichment technique. I. Inhibitory effect of the enrichment substrate on milk bacteria. Arch. Lebensmittelhyg. 20(6), 121-128 (1969).

33. Lebert, F., et al., Bacteriological analysis of melted cheeses. Ann. Nutr. 23(3), A49-A80 (1969).

34. Mehringer, W., Packaging problems in the preservation of food by irradiation. Fette-Seifen Anstrichmettel 71, 516-521 (1969).

35. Meisel-Mikolajczyk, F., et al., Serological properties of bacterial fractions of the Clostridium perfringens type A strains causing acute food poisoning. Bull. Acad. Pol. Sci. (Biol.) 17, 227-231 (1969).

36. Mekhedov, L. N., Factors participating in alpha-toxin production by Cl. perfringens BP6K in media of known chemical composition. I. Mechanism of the stimulating effect of excess arginine on toxin formation. Zh. Mikrobiol. 46(8), 117-124 (1969).

37. Mohs, H. J., Hygiene of deep-frozen foods. Bacteriological investigations during manufacture of deep-frozen vegetables. Gordian 69(1630), 374-376 (1969).

38. Mollenhauer, H. P., Food control and food standards for consumer protection in developing countries. Food Drug Cosmet. Law J. 24, 259-267 (1969).

39. Murray, J. G., An approach to bacteriological standards. J. Appl. Bact. 32, 123-135 (1969).

40. Neri, M. G., et al., Virulent bacteriophages specific for Pseudomonas aeruginosa. G. Microbiol. 14(2/3), 107-114 (1966).

41. Patterson, J. T., Salmonellae in meat and poultry, poultry plant cooling waters and effluents and animal feeding stuffs. J. Appl. Bact. 32, 329-337 (1969).

42. Peeters, H., et al., The isolation of Salmonella with Taylor's medium. T. Gastroent. 12, 79-81 (1969).

43. Prost, E., et al., The meaning of Clostridium perfringens in food hygiene. Med. Weterynar. 24, 579-582 (1968).

44. Rappole, C. L., Sanitary control in on-premise cooking and freezing of food. Cornell Hotel Restaurant Admin. Quarterly 10(2), 13-19 (1969).

45. Ryskina, T. B., On the evaluation of the method of indication of Shigella by means of media containing antibiotics. Lab. Delo. 1, 50-51 (1967).

46. Sainclivier, M., et al., Technics for the bacteriological examination of butter. Ann. Nutr. 23(3), A27-A38 (1969).

47. Sata, K., Radiation sterilization of medical devices and supplies. 6. Disposable syringes and needles. Eisei Kagaku 15, 22-25 (1969).

48. Schmidt, E. W., Chemical preservatives to inhibit the growth of Staphylococcus aureus in synthetic cream pies acidified to pH 4.5 to 5.0. Food Technol. 23, 1197-1199 (1969).

49. Schothorst, M. van, Salmonella in dried milk. Neth. Milk Dairy J. 23, 222-223 (1969).

50. Shimizu, Y., et al., A study on the pearly layer formation of Clostridium botulinum. Kitasato Arch. Exp. Med. 38(1/4), 87-91 (1965).

51. Smith, R., Maintenance, Sanitation Report. Food Can. 29(8), 33-41, 48 (1969).

52. Sullivan, R., et al., Thermal destruction of adenovirus 12 and reovirus 1 and Herpes simplex in milk. J. Dairy Sci. 52, 897 (1969).

53. Susuki, A., et al., A survey on the Salmonella contamination of imported meats during 1965-66. Bull. Nat. Inst. Hyg. Sci. 85, 188-195 (1967).

54. Ulisko, I. N., et al., Laboratory diagnosis of Sonne Shigella by the immunofluorescent method. Zh. Mikrobiol. 45, 14-18 (1968).

55. Vernon, E., Food poisoning and Salmonella infections in England and Wales. Public Health 83, 205-223 (1969).

56. Vitez, I., Research regarding the production of anaerobic toxins. I. Clostridium botulinum toxin type A and type B. Acta Pharm. Hung. 38, 355-360 (1968).

57. Vitez, I., Research regarding the production of anaerobic toxins. II. Type A Clostridium perfringens toxins. Acta Pharm. Hung. 38, 405-410 (1968).

58. Weissman, M. A., et al., Incidence of Salmonellae in meat and meat products. Appl. Microbiol. 17, 899-902 (1969).

59. Wojton, B., et al., Influence of curing salts on the behavior of clostridia in canned pasteurized hams stored at various temperatures. Bull. Vet. Inst. Pulawy 12(1-4), 67-68 (1968).

Interbureau By-Lines No. 6
May 1970

PUBLICATIONS LIST

FOODS, HEALTH

Microbiological Contamination

Houghtby, G. A., and Kaysner, C. A., Incidence of Clostridium botulinum Type E in Alaskan Salmon. Appl. Microbiol. 18, 950-951 (1969).

Chemical Contamination

Pesticides

58-70 Biros, F. J., Enhancement of Mass Spectral Data by Means of a Time Averaging Computer. Anal. Chem. 42, 537-540 (1970).

6-70 Cranmer, M., and Freal, J., Gas Chromatographic Analysis of Pentachlorophenol in Human Urine by Formation of Alkyl Ethers. Life Sci. (Pt II) 9, 121-128 (1970).

214-70 Lawrence, Jr H., Barron, R. P., Chen, Jo-Yun T., Lombardo, P., and Benson, W. R., Note on Identification of a Chlordane Metabolite Found in Cheese and Milk. J. Ass. Offic. Anal. Chem. 53, 261-262 (1970).

Robens, Jane F., Teratogenic Activity of Several Phthalimide Derivatives in the Golden Hamster. Toxicol. Appl. Pharmacol. 16, 24-34 (1970).

Sphon, J. A., and Damico, J. N., The Mass Spectra of Some Chlorinated Aromatic Pesticidal Compounds. Org. Mass Spectrometry 3, 51-62 (1970).

Williams, Clara H., β-Glucuronidase Activity in the Serum and Liver of Rats Treated with Parathion. Toxicol. Appl. Pharmacol. 16, 533-539 (1970).

Food and Color Additives

44-70 Chen, Jo-Yun T., Oates, Nancy C., and Firestone, D., 3,5-Dialkyl Phenols and Their Allyl Substitution Products: Infrared Absorption Spectra and Interpretation of Characteristic Frequency Shifts. J. Ass. Offic. Anal. Chem. 53, 275-287 (1970).

73-70 Hobin, Nancy K., Turbidimetric Determination of Soluble Sulfates in Water-Soluble Color Additives. J. Ass. Offic. Anal. Chem. 53, 242-243 (1970).

89-70 Howard, J. W., Fazio, T., and Watts, J. O., Extraction and Gas Chromatographic Determination of N-Nitrosodimethylamine in Smoked Fish: Application to Smoked Nitrite-Treated Chub. J. Ass. Offic. Anal. Chem. 53, 269-274 (1970).

7-70 Legator, M. S., Mutagenic Effects of Environmental Intrusions. Quart. Bull. AFDOUS 34(1), 3-5 (1970).

Mayer, V. W., and Legator, M. S., Induction by N-Methyl-N'-nitro-N-nitrosoguanidine and UV Light of Petite Mutants in Aerobically and Anaerobically Cultivated Saccharomyces cerevisiae. Mutation Res. 9, 193-198 (1970).

Seward, C. R., Mitchell, G. Vaughan, Argrett, Loretta C., and Hove, E. L., Oxidation of α-Tocopherol to α-Tocopherylquinone by Carbon Tetrachloride-Ethanol Solvent. Lipids 4, 629-630 (1969).

68-70 Singh, Manjeet, Determination of 5,7'-Disulfo-3,3'-dioxo-$\Delta^{2,2'}$ biindoline, Disodium Salt, and 5-Sulfo-3,3'-dioxo-$\Delta^{2,2'}$ biindoline, Sodium Salt, in FD&C Blue No. 2. J. Ass. Offic. Anal. Chem. 53, 250-251 (1970).

72-70 Stein, C., Determination of 2-[(2-Hydroxy-1-naphthyl)azo]-6-naphthalenesulfonic Acid in D&C Red Nos. 10, 11, 12, and 13. J. Ass. Offic. Anal. Chem. 53, 240-241 (1970).

Natural Poisons

Armbrecht, B. H., Shalkop, W. T., Rolline, L. D., Pohland, A. E., and Stoloff, L., Acute Toxicity of Aflatoxin B_1 in Wethers. Nature 225, 1062-1063 (1970).

Drug Residues

Lakata, G. D., Methods Evaluation in the Chemical Analysis of Drugs in Animal Tissues. J. Ass. Offic. Anal. Chem. 53, 224-226 (1970).

78-70 Wright, W. W., Detection of Antibiotics in Animal Tissues. J. Ass. Offic. Anal. Chem. 53, 219-223 (1970).

Other Health Hazards

Levander, O. A., Young, M. L., and Meeks, S. A., Studies on the Binding of Selenium by Liver Homogenates from Rats Fed Diets Containing Either Casein or Casein Plus Linseed Oil Meal. Toxicol. Appl. Pharmacol. 16, 79-87 (1970).

Robens, Jane F., Teratogenic Effects of Hypervitaminosis A in the Hamster and the Guinea Pig. Toxicol. Appl. Pharmacol. 16, 88-99 (1970).

DRUGS

Hazards

63-70 Alleva, J. J., Waleski, Mary V., and Alleva, F. R., The Zeitgeber for Ovulation in Rats: Non-Participation of the Pineal Gland. Life Sci. 9(Pt I), 241-246 (1970).

50-70 Brunner, Charlotte A., and Kunze, Frieda M., Analysis of Mestranol in Combination with Norethindrone or Norethynodrel by Partition Chromatography and UV Measurement. J. Ass. Offic. Anal. Chem. 53, 234-237 (1970).

5-70 Quaife, Mary L., and Friedman, Leonard, Failure of the Vitamin E-deficient Rat to Show Decreased Liver Codeine-O-demethylase Activity. Proc. Soc. Exp. Biol. Med. 133, 849-852 (1970).

Wojtowicz, E. J., A Column Chromatographic Method for the Determination of Sulfanilamide in Pharmaceutical Preparations Containing Sulfacetamide or Its Sodium Salt. J. Pharm. Sci. 59, 240-241 (1970).

Yen, Helen C. Y., Krop, S., Mendez, Halina C., and Katz, M. H., Effect of Some Psycho-active Drugs on Experimental "Neurotic" (Conflict-Induced) Behavior in Cats. Pharmacology 3, 32-40 (1970).

HAZARDOUS SUBSTANCES

Brown, D. J., Determination of Ethylene Oxide and Ethylene Chlorohydrin in Plastic and Rubber Surgical Equipment Sterilised with Ethylene Oxide. J. Ass. Offic. Anal. Chem. 53, 263-267 (1970).

LABORATORY TECHNIQUES

Jaffee, M., and Ford, L. A., On the Nature of Quenching. Intern. J. Appl. Radiation Isotopes 21, 49-52 (1970).

CUMULATIVE INDEX TO INTERBUREAU BY-LINES VOLS 1-6[1]

Abramoff, J., phenylmercuric acetate in complex drugs by single-sweep polarography, 2:271
  application of the AOAC conjugated azoreagen method to complex creams, 1:101 (corr. 1:150)
  submilligram quantities of atropine sulfate in single tablets and composites, 3:93
Acetonitrile, impurity in, 6:233
Acetyl-p-aminophenyl sulfanilamide, in medicated feeds, 2:267
Adulteration, vegetable fat in butter, 6:19
Aflatoxins, decontamination procedure, 1:243
  See also Mycotoxins
Alcohols, by GLC, 2:221
Aldrin-dieldrin residues, in sugar beets, 2:217, 3:97
Alexander, T. C., analysis of LSD preparations, 2:149 (corr. 3:38)
  assay of lysergic acid amides in morning glory seed, 1:87
  See also Koch, S. A.
Allantoin, in dermatologic preparations, 4:57
Aminacrine, fluorometric assay, 2:85
Ammonia, index of crabmeat decomposition, 6:281
Amphetamine, assay of mixtures with other drugs, 4:179
Amplifiers, in laboratory instrumentation, 6:119
Andrus, C. M., and Snow, S. W., UV absorption data of pharmaceuticals, 4:121
Andrew, M. L., collaborative study of griseofulvin particle size, 1:245
Anesthetic gases, analysis, 3:119
Antibiotics, assay techniques, 6:79
  assay of steroids in, interferences, 1:279
  neomycin-hydrocortisone mixtures, 1:209
  non-sterile, Pseudomonas aeruginosa in, 3:157
  penicillin contamination, 4:49
  procaine penicillin in feeds, 1:97
  sterility testing, 3:1
Antihistamines, column chromatography, 6:85
  TLC, 3:171
Aroclor 1254 and 1260, behavioral studies, 6:313
Arsenic, in swine liver tissues, 2:165
  total diet samples, 1:251
Ascorbic acid, and the common cold, bibliography, 3:229
  oxalic acid contamination, 3:85
Ashing techniques, antibiotics, 6:79
Atomic absorption, vitamin B_{12} assay, 4:23
Atropine sulfate, tablets and composites, 2:93
Authentic data, cheese, shrinkage, 1:9, 1:13, 1:26, 2:95, 2:96, 2:98, 2:100
  Concord grape juice, 2:137 (corr. 3:96)
  crabmeat, drained weight, 2:259
  cranberries, 4:67
  prunes, 2:103, 4:161
  raspberries and strawberries, 4:61
Automated analysis, computer-assisted, 3:73
Automated injection system, GLC, 6:57
Automation, at the National Center for Drug Analysis, 3:37
  microbiological assays, 6:31
Availability, drugs, therapeutic equivalency, 2:11
Bacterial contamination, Salmonella in frog legs, 2:69
Bacterial growth in mouthwash containing preservative, 6:169
Bacterial studies, micro-slide gel-diffusion test, 3:247
  motility test, 3:241
  preparation of frozen vegetables, 4:109
Bakish, M., and Cull, G., experiences with analysis of LSD samples, 4:119
Banes, D., scientific evidence in court testimony, 3:189
  some scientific aspects of the Krabiosen case, 2:245
Barbiturates, by GLC, 1:203
Barcklow, P. C., and Skymanski, N. A., identification of commercial triethylenetetramine and tetraethylenepentamine by TLC and NMR spectroscopy, 3:163
Barry, T. L., see Bellman, S. W.
Beaver, L. A., see McHarney, F. G.
Behavior studies, DDT, Aroclor 1254, and Aroclor 1260, in rats, 6:313
Bellman, S. W., submicrogram quantities of iodine in vitamin-mineral preparations by oscillopolarography, 2:229 (corr. 2:270)
  See also Kram, T. C.
Bellman, S. W., and Berry, T. L., combined GLC-mass spectrometry, 6:187
Bellman, S. W., Tutcsen, J. W., Heagy, J., and Hopes, T. N., structure elucidation of "LSD", 3:113 (corr. 3:170)
Benson, W. R., and Jones, H. A., chemical literature of pesticides, 3:35
Benzoic acid, in Whitfield's ointment, 2:155
Berturzi, F. P., extraction of chlorinated pesticides from samples of low moisture content grains and foods, 3:27
Bethea, E., and Hillig, F., determination of trimethylamine nitrogen in extracts and in volatile fractions of fish, 1:153
Beyer, K., see Martin, R. J.
Beyer, K., and Dechert, D. D. identification of LSD and LSD tartrate by TLC, 4:21
Bianchi, R., see Rosenstein, J.
Bianchi, R., and Gruenfeld, M., identification of petroleum distillates, 6:9
Bibliography, ascorbic acid and the common cold, 3:229
  column trap chromatography, 3:57
  cyclamates, 6:43, 6:99
  drug information aids, 3:5
  iron in nutrition, 3:251
  microbial contamination, 6:229, 6:320
  mycotoxins, 3:95, 3:134, 3:193, 3:241, 4:133, 4:203, 4:237, 4:297, 5:92, 5:135, 5:177, 5:220, 5:271, 5:36
  neutron activation analysis, food products, 5:394
  pesticide information aids, 3:35
  quaternary ammonium compounds in food, 6:263
  steroids, 6:161
Bioassay of LSD, with fish, 3:201
Blakely, J., and Bolzer, G., determination of sulfisoxazole and acetylsulfisoxazole by Bratton-Marshall method, 3:127
Blomquist, V. H., see Boland, F. E.; Worrem, J. C.
Blomquist, V. H., and Dade, W. W., relation between percent by weight of rat and Howard mold count in comminuted large fruit products, 1:213
Boland, F. E., Blomquist, V. H., and Katvin, B., chemical composition of fresh cranberries, 4:64
  chemical composition of fruits, 4:61
Bond, J., see Duggan, B.
Bowman, F. W., sterility testing of antibiotics, 3:1
Bowman, F. W., and Knoll, E. W., laminar flow for environmental control and sterility testing, 3:110

[1]The index for Volume 6 is included in the cumulative index; no separate index will be printed.

MONS 087092

...ov, A., Mayland, L. G., Kantor, H. M., and Weiss, F. J., substances that interfere with assay of corticosteroids in antibiotic preparations, 1:279
...mson, W. L., Inexpensive improvised IR gas cell, 1:133
  see also Hayden, A. L.; Samuel, O. R.
...ewer, J. F., see Dow, M. L.
...ciani, J. C., analysis and identification of dimethyltryptamine, 2:115
Muhr, C. A., evaluating data of multiple samples from a single drug code, 4:157
Burke, J., pesticides in human milk and tissue, 2:205
Butter, vegetable fat adulteration, 4:119
Byron, W. R., see Giles, A. L., Jr.
C-Salum, in foodstuffs, polarography, 4:107
Calcium sulfate, adsorbent for TLC, 3:237
Calhoun, M. F., case history of Pseudomonas aeruginosa in non-sterile antibiotic products, 2:157
Campbell, E. J., evaluation of Barber-Colman automatic injection system, 4:57
Carbaryone, in foods, 2:237
Carbinoxamine, GLC, 2:117
Carcinogenicity, testing color additives by mouse-skin painting, 3:105
Carol, J., genetic equivalency, 4:113
  recent progress in thyroid assay research, 3:125
  39 years of change as seen from within FDA, 4:247
Carotenoids, in shrimp, 2:189
Carson, H. A., medicinal gas analysis, 3:119
Catman, E. P., micro-slide gel-diffusion detection of staphylococcal enterotoxins in food, 3:247
Casterline, J. L., Jr., see Williams, C. H.
Celeste, A. C., see Polito, M. V.
Cell biology, genetic effects of chemicals, 1:133
  genetics, 2:253
Cereal products, filth, 3:313
  noodles, sterols as cholesterol, 4:229
  white mineral oil in, 2:297
Check sample program, FDA regulatory laboratories, 3:69
Cheese, packaged, shrinkage studies, 1:9 (corr. 1:146), 1:13, 1:26, 1:95, 1:96, 1:98, 1:100, 1:102
  sorbic acid assay, 2:81
Chloral hydrate, chlorobenzene contaminants, 1:297
Chlorinated cleansers, in milk, 2:31
Chlorpheniramine, in combination with other cold preparations, 3:81
Chloroform in liniment, polarography, 3:161
Cheeolate, estimating shell fn, 4:39
Cholesterol, sterols in egg noodles, 4:229
Cholinesterase, toxicity of Bamel to rats, 4:177
Chu, R. C. L., assay of allantoin in dermatologic preparations, 4:57
Clark, C. C., analytical uses of near IR spectroscopy, 4:115
  spectrofluorometric determination of Bacanillin expenting tablets and whole root, 4:280
Cold preparations, analysis, 2:81
Color additives, in food, paper electrophoresis, 1:225
  mouse-skin painting study, 3:105
  strip electrophoresis, 1:227
  UV spectra, 4:192
Computerization, automated analysis, 3:73
  drug methods retrieval, 3:207
  glassware procurement and inventory control, 3:33
  NMR literature retrieval, 4:269
  publication procurement, 3:215
Confectionary analysis, mineral oil on hard candy, 2:47
  quassyn, 3:23
Confectionary manufacturing, analytical entomology, 2:109
Cornelissen, P. E., see Kampe, L. R.
Cornelissen, P. E., and Kampe, L. R., fate of aldrin-dieldrin residues in sugar beet processing, 3:91
Cornatt, R. W., TLC method for rodent urine contamination, 2:235
Corticosteroids, decomposition analysis, 4:151
  TLC separation and reaction with sulfuric acid, 3:7
Cosmetics, GLC of propellents, 1:219
  mouse-skin painting study, 3:105
  tonsilosan, bacterial growth in, 4:169
Counterfeit drugs, barbiturates and amphetamines, identification of constituents, 3:127
Crabmeat, ammonia as index of decomposition, 4:281
  frozen, drained weight, 3:269
Crackers, filled, packaged, shrinkage study, 2:227
Craig, D. M., extraction apparatus for quantitative isolation of compounds from thin layer chromatograms, 2:145
Crawford, R. N., see Major, A., Jr.
Cuzi, G., see Bakich, M.
Cushman, M., see Rodricks, J. V.
Cyclamates, bibliography, 4:43, 4:99
Dada, W. W., see Blomquist, V. H.
Dairy products, manure in, 1:77
Dameska, W. M., TLC: detection of chlorinated pesticides, prewashing of adsorbent, addition of silver nitrate, 1:85
Damico, J. N., mass spectrometry: some practical applications to current problems in Division of Food Chemistry, 1:287
DDT, effect on central nervous system, 4:313
Dechert, D. D., method for drying spectrophotometric cells, 1:83
  rapid identification test kit for materials containing ergot-type alkaloids, 4:17
  see also Beyer, E.; Martin, R. J.
Dechert, D. D., and Jakobsons, R., LSD analysis, 4:31
Decomposition, crabmeat, ammonia as an index of, 4:281
  fish, 1:153
  fish, organoleptic examination techniques, 3:121
  nitroglycerin, with magnesium oxide, 4:193
  shrimp, carotenoid pigments, 2:189
    organoleptic and chemical indices, 4:306
Decontamination, aflatoxins, 1:243
Dermatologic preparations, allantoin in, 4:57
Dexbrompheniramine, in combination with other cold preparations, 3:81
DeKan, F., optical rotary dispersion and its applications, 3:81
Diaz, R., see Zosburg, R.
Diazepam, decomposition product, 3:161
Dichlorobenzene, contaminant in chloral hydrate, 1:297
Dick, R., responsibilities of Food and Drug Administration under Tea Act, 1:317
Dieldrin-aldrin residues, sugar beets, 2:217, 3:91
Dieldrin, residues, carrots, 1:263
Diethylstilbestrol, in animal feeds, polarography, 1:307
Digitoxin and digoxin, gitoxin in, 4:25
Diisodehydroxyquin, UV and IR spectroscopy, 4:179
Dimethylsulfoxide, by GLC, 2:279
N,N-Dimethyl tryptamine, and intermediates, identification, 3:27
  identification by TLC, 2:113
3,5-Dinitrobenzamide in medicated feeds, 2:267
  in poultry tissue, 4:75
Dithiocarbamates, acid hydrolysis method, 1:255
  chemistry of, 2:177
DMT, see N,N-Dimethyl tryptamine
DNBA, see 3,5-Dinitrobenzamide
Doherty, J., radiometric method for measurement of acetylcholinesterase activity in rat blood, 4:85
Dolimpio, D., see Legater, M.
Douglas, C. C., GLC analysis of phenols combined with other substances, 2:21
Dow, M. L., evaluation of tablet pulverizers for drug sample preparation, 4:197
Dow, M. L., Kirchhoefer, R. D., and Brower, J. F., rapid identification and estimation of gitoxin in digitonin and digoxin tablets by TLC, 4:25
Drug abuse, amphetamines and barbiturates, identification of manufacturer, 3:127
  Control act, 3:113

MONS 087093

Dru[illegible] analysis, automation, 5:137
  [illegible] trap chromatography, bibliography, 1:137
Drug House Control Act, 3:113
[illegible] extraction technique, 5:15
[illegible]ate, test kit, 5:137
fluorometry, 5:135
information retrieval, 5:267
informational aids, 3:5
IR spectroscopy, 1:3
Kjeldahl cans, 2:245
near UV spectroscopy, 6:116
NMR, 6:257
nonaqueous titration techniques, 3:125
optical rotary dispersion, 5:81
pill manufacturer identification, 3:127
polarography, 2:1
statistical concepts, 6:157
sterility testing, 6:190
tablet pulverizer, 4:197
TLC on porous glass, 5:61
UV spectroscopy, data compilation, 4:121
X-ray fluorescence, 6:140
Drug residues in animal tissues, arsenic in swine liver, 2:165
3,5-dinitrobenzamide in poultry, 4:175
Drugs, allantoin, 4:57
  aminocrine, 2:85
  amphetamine, 4:279
  antifungal preparations, 5:279
  antihistamines by column chromatography, 6:85
    by TLC, 3:171
  atropine sulfate, 2:93
  barbiturates, by GLC, 1:203
  carbinoxamine, by GLC, 2:117
  chloroform in liniment, 2:161
  cold preparation, 3:81
  conjugated estrogens, 6:143
  contaminants in chloral hydrate, 1:297
  corticosteroids, 1:279, 5:7, 6:151
  counterfeit, identification, 5:95
  diazepam decomposition product, 3:161
  difiodohydroxyquin, 6:179
  N,N-dimethyl tryptamine, 2:113, 3:27
  estrogens, 1:101, 3:225
  generic equivalency, 6:113
  gitonin in digitonin and digoxin tablets, 6:25
  gold sodium thiosulfate injectables, 4:107
  griseofulvin particle size, 1:245
  hexachlorophene and resorcinol, 1:105
  hexestrol and phenobarbital, 1:201
  iron, 2:241
  LBJ, 1:113 (corr. 1:170)
  LSD, 1:149 (corr. 1:153), 2:153, 4:3, 4:10, 4:15, 4:16, 4:31, 4:219, 5:201
    by IR, 3:155, 4:24, 4:26
    by paper chromatography, 4:19
    by TLC, 4:21
    field test, 3:177
  lysergic acid amides, 1:87
  medicinal gases, 3:119
  menadione sodium bisulfate, 3:285
  methenamine, 2:109
  3-methyl-3,4-methylenedioxyphenethylamine, 4:271
  novocain-hydrocortisone mixture, 1:209
  nitrates by polarography, 6:299
  nitroglycerin, 4:193
  nomenclature, 2:307
  ophthalmic preparations, 4:113
  ortriphylline and theophylline by TLC, 3:159
  peyote identification, 4:29
  phenols in combinations, 2:21
  phenylephrine in ophthalmic preparations, 4:113
  phenylmercuric acetate by polarography, 2:271
  psilocybin, 3:107

Drugs (continued)
  pyridoxine HCl and oxolinic HCl, 3:183
  quinacrine hydrochloride, 4:295
  quinidine surface contamination, 6:237
  Rauwolfia preparations by fluorometry, 6:288
  stability, 2:29
  steroids, 1:269, 4:35
    abstracted bibliography, 6:161
  sulfamethazine in feeds containing procaine penicillin, 3:197
  sulfisoxazole and acetylsulfisoxazole, 2:127
  symptomimetics, 4:261, 6:275
  thalidon by polarography, 2:11
  therapeutic availability, 5:11
  thyroid assay, 3:125
  Whitfield's ointment, 2:155
Duggan, B., and Mond, J., GLC profiles of sugars occurring in natural products, 4:147
Dye extraction technique, pharmaceutical analysis, 3:15
Edge, J., drug analytical methods retrieval, 5:207
Egg content, analytical constants in food, 3:33
Eggs, incubator reject, 1:59 (corr. 1:146)
Egli, K. L., physiological effects of d-lysergic acid diethylamide tartrate on Betta splendens (Siamese fighting fish) and Lebistes reticulatus (guppies), 5:201
Hiduson, H. F., FDA Institute for Advanced Analytical Chemistry, 3:295
Electrophoresis, disc, differentiation of meat species, 2:131
  fish species identification, 1:81
  paper, for color additives, in food, 1:225
  strip, color additives, 1:227
Emission spectroscopy, applications, 2:289
Endelman, A., statistical background for sample size formula, 2:15 (corr. 2:114)
Endrin residues, effect of processing of carrots, 1:263
Enzyme analysis, acetylcholinesterase, 4:85
Enzymes, cholinesterase measurement of Bacol toxicity, 4:177
Equipment check programs, FDA regulatory laboratories, 3:69
Erickson, J. P., bacterial growth in mouthwash containing preservative, 6:161
  destruction of Salmonella in frog legs during cooking, 3:69
Erney, D. R., steroid analysis by GLC, 1:269
Estrin, B., see Boland, F. E.
Estrogens, colorimetric assay, 3:225
  conjugated, 6:145
  in complex creams, 1:101
Estrone, with progesterone and testosterone, 4:35
Everett, R. L., screening method for rodenticides in bait samples, 4:51
Experimental data, line of best fit, 4:247
Fatty acids, in vegetable oils, unusual oils, marine oils, margarines, 2:5
Feeds, acetyl-p-nitrophenyl sulfonilamide and 3,5-dinitrobenzamide in, 2:267
  carbarsone in, 2:237
  diethylstilbestrol in, 1:307
  nitrofurazone and furazolidone in, 1:151
  3-nitro-4-hydroxyphenylarsonic acid contaminant, 4:285
  sodium p-aminobenzoate interference in sulfamethazine assay, 2:91
  sulfamethazine and procaine penicillin in, 1:97 (corr. 2:92)
Fehringer, N. V., analysis of mono- and dichlorobenzene contaminants in chloral hydrate solution and capsules, 1:297
  TLC using microscope slides as plates, 1:197
Fein, A., see Rosenstein, J.
Fernandes-Flores, E., modified method for separate determination of nitrofurazone and furazolidone in feed, 1:151
  See also Prochaska, M.
Fig paste, insect filth in, 2:39, 2:65, 4:223
Filth, baked goods and alimentary pastes, 3:313
  insects in fig paste, 2:39, 2:65, 4:223
  manure, in dairy products, 1:77
  rodent urine, TLC, 2:235

MONS 087094

Finocchiaro, J. H., dithiocarbamates, 2:177
Finsterwalder, C. K., chlorinated compounds in milk due to cleansers, 2:31
Fish, as test organism for LSD, 5:201
  carbonat, decomposition, 6:261
  drained weight, 3:259
  decomposition, trimethylamine, 1:153
  laboratory examination of decomposition odors, 5:121
  protein concentrate, isopropanol in, 4:71
  shrimp, carotenoid pigments, 2:189
    organoleptic and chemical indices of decomposition, 6:304
  species identification, 1:81
    mackerel, 3:33
    snapper, 3:153
  tuna, pyrophosphate in, 3:67
Fitzgerald, J. W., bibliography on quaternary ammonium compounds in foods, 6:263
Flame photometer, preparation for use, 1:163
Fluorides, in solder fumes, specific fluoride electrode, 6:125
Fluorometric analysis, antimerrine in drugs, 2:85
  drugs, 6:133
  quinacrine hydrochloride, 4:255
  quinidine sulfate as contamination, 4:237
  Rauwolfia reserpine, 6:288
  sterols, in egg noodles, 4:229
Food additives, 3,5-DNBA in poultry tissue, 6:175
  formaldehyde, 2:203
  isopropyl alcohol in fish protein concentrate, 4:71
  mineral oil on hard candy, 3:47
  mineral oil (white) in bakery products, 2:297
  rubber materials extractives, 2:163
  sorbitol by GLC, 3:169
Food and Drug Administration, early problems, 1:187
  Institute for Advanced Analytical Chemistry, 3:295
  new laboratory building, 2:147, 2:201
  30 years of change, 4:247
Formaldehyde, in foods, by colorimetry, 5:283
French, B. L., see Maneke, D. D.
Freeman, C. C., mackerel or Jack mackerel?, 5:51
Frith, J. C., iron in nutrition: selected references with annotations, 2:251
Frog legs, Salmonella in, 2:69
Fox, R., identification and determination of α-methyl-3,4-methylenedioxyphenethylamine, 4:271
Fricke, F. L., determination of dimethylsulfoxide by GLC, 2:279
Fricke, F. L., and Keppel, G. E., isolation and identification of sunaryl in dietary candy and chewing gum, 3:123
Friedman, M., see Tanner, J. T.
Fruit, chemical composition, 4:161
  committed, tot and Howard mold count, 1:213
  Concord grape juice, 3:137 (corr. 3:96)
  cranberries, chemical composition, 4:167
  drinks, tin and iron in, 1:147
  fig paste, insect filth in, 2:39, 2:45
  figs, filth in, 4:223
  prunes, 2:183, 4:141
Fry, R. E., Jr., determination of line of best fit (least-squares) for curvilinear data, 4:247
Furosemide, in feed, 1:151
Gajan, R. J., polarographic determination of cadmium in foodstuffs, 4:107
  See also Prochazka, M.
Gas cell, infrared, contamination, 4:291
  improvised, 3:305
Gas chromatography, alcohols, 2:221
  aldrin-dieldrin residues, 2:91
  barbiturates, 1:203
  carbinoxamine, 2:117
  cleaning of electron capture tritium source, 4:70
  column for pesticide analysis, 2:71
  dimethylsulfoxide, 3:179
  isopropyl alcohol in fish protein concentrate, 4:71
  methenamine, 2:109
  milk, chlorinated elements in, 2:31
Gas chromatography (continued)
  optical isomers of sympathomimetic amines, 4:275
  pesticides, automatic injection system, 6:57
    in milk and cream, 2:205
  pesticide distillation, 5:19
  phenols in pharmaceutical combinations, 2:21
  propellents in cosmetics, 1:19
  separation of solvent mixtures, 6:175
  sorbitol, 3:169
  steroids, 1:29
  sugars in natural products, 4:147
  Teflon heat shields for injection diaphragms, 1:36
  trace amounts of trichlorobenzene in foods, 3:193
  vegetable fat adulteration in butter, 6:19
  xylene and toluene paint thinners, 2:195, 2:219 (corr. 4:222)
Gas chromatography-mass spectrometry, 6:182
Gauze, medicinal, 3:119
Gecan, J. S., analytical entomology of confectionery manufacturing, 3:189
Gel-diffusion, staphylococcal enterotoxins, 3:247
Generic equivalency of drugs, 6:113
Genetics, cell biology, 2:253
  effects of chemicals, 1:133
Gerritz, H. W., effect of processing on endrin and dieldrin residue content of carrots, 1:263
Giles, A. L., Jr., and Byron, W. R., mouse-skin painting study of 2 colors and several cosmetical ingredients compared with DMBA, 3:105
Gitoxin, TLC with digitoxin and digoxin, 6:25
Giuffrida, L., cleaning instructions for electron capture tritium source, 4:70
Giuffrida, L., and Ives, N. F., improvements for GLC column used for pesticide analysis, 2:71
Glass, porous, as TLC adsorbent, 5:61
Glassware procurement and inventory control, automated, 5:33
Gold sodium thiosulfate, polarography, 4:103
Goldhammer, C. S., the expert witness IV. case of incubator eggs, 3:59 (corr. 3:146)
Goldstein, B. P., see Nielsen, J. K.
Goldstein, M., detection of mineral oil on hard candy, 3:47
Goldston, E. R., see Stakelum, G. S.
Graham, J. H., colorimetric assay of natural estrogens, 3:325
Graham, R. E., selected abstracted bibliography on steroids, 6:161
  special problem in corticosteroid decomposition analysis, 6:151
Graham, W. A., separation and identification of color additives in foods by paper electrophoresis, 1:225
Grains, chlorinated pesticides in, extraction of low-moisture samples, 3:27
  lead in, by polarography, 3:213
Grant, R. C., scheme for rapid separation and identification of antihistamines by TLC, 5:171
  TLC of some sympathomimetics, 4:201
  TLC separation and identification of some corticosteroids by their reaction with sulfuric acid, 5:7
Green, S., see Lagator, M.
Gratch, F. H., identification of N,N-dimethyl tryptamine and its intermediates, 3:27
Grimmett, J. A., differentiation of species of meat by disc electrophoresis, 2:133
Griseofulvin, particle size, 1:265
Gross, F. C., GLC analysis of propellents in cosmetic aerosols, 1:219
Gruenfeld, M., analysis of hazardous substances, 6:1
  analysis of some aromatic hydrocarbons, alkyl and aryl halides, and alcohols in crude samples by NMR, 6:157
  infrared gas cell contamination due to sorption of gaskets, 4:291
  NMR spectra of some commercial turpentines and their determination, 4:89
  separation of some solvent mixtures on several GLC columns, 6:175
  See also Bianchi, R.

MONS 087095

Greenfeld, M. and Bulay, A. F., kerosene in wood stain, 3:273
turpentine: review of information and proposed methods of determination, 3:273
xylene and toluene in viscous paints and similar products, 3:219 (corr. 4:222)
Gunderson, R. L., methodic data on prune juice concentrate and dried prune composition, 2:193
Gas determination of alcohols in miscellaneous products, 2:221
[illegible], J. R., see Keevan, M. P.
[illegible], M. J., see Ray, F. A., Jr.
Halogenogens, N,N-dimethyl tryptamine and its intermediates, 3:27
by TLC, 2:17
drug abuse control acts, 3:113
[illegible], 3:113
[illegible], 2:140(corr. 3:[illegible]), 2:153), 4:31, 4:119
background information, 4:3, 3:10, 4:15, 4:16
field test, 3:27
[illegible] chemistry, 3:26
infrared, 3:27[illegible], 4:26
paper chromatography, 4:19
thin layer chromatography, 4:21
Lysergic acid action in morning glory seeds, 1:87
Methyl-3,4-methylenedioxyphenethylamine, identification, 4:21
peyote, identification, 4:29
psilocybin, identification and quantitation, 3:107
test kit for ergot-type alkaloids, 4:17
Harp, A., see Wagator, M.
Hayden, A. L., see Stewart, O. R.
Hayden, A. L., and Swanson, W. L., micro-potassium halide plate technique, 2:265 (corr. 3:22)
Hazardous substances, combined GLC-mass spectrometry, 4:182
pulidlinex for analysis, 4:1
kerosene in wood stain, 3:223
MSR of toxic solvents, 4:157
petroleum distillates, by GLC, 4:9
separation of solvent mixtures by GLC, 4:175
solder fluxes, fluorides in, 4:225
triethylene-tetramine and tetraethylene-pentamine, 3:163
turpentine, 3:263, 4:89
viscosity, 3:313
xylene and toluene in paints, 3:195, 3:219 (corr. 4:222)
Heagy, J., see Nelson, T. W.
Hefne, K. E., Jr., see Washington, P. M.
Hexachlorophene and resorcinol in presence of parabens, 1:105
Hexestrol and phenobarbital, 3:201
Hilliig, F., see Bethea, R.
Holak, W., vitamin B_{12} by atomic absorption, 4:23
Hopes, T. M., N,N-diethyl lysergamide (LSD) and LSD-like compounds. I. Background information, 4:3
identification of LSD by IR spectrophotometry, 4:26
See also Bellman, S. W.
Howard, B. F., Teflon washers as heat shields for GLC injection diaphragms, 3:16
Hurdle, C., see Washington, P. M.
Human milk and tissue, pesticides in, by GLC, 3:205
Hundley, J. G., examination of sorbitol as its trimethylsilyl ether by GLC, 3:169
Hutton, S. D., analysis of the tributyrin (glyceryl tributyrate) content of butter as index of vegetable fat adulteration, 4:19
Hydrocortisone, effect on pyrogens test for neomycin-hydrocortisone mixture, 1:209
Ibrahim, W., new technique for preparation of TLC plates, 1:333
Index, Bureau By-Lines, Volumes 1-5, 1:67
Index, Interbureau By-Lines, Volume 1, 1:339
Volume 2, 2:302
Volume 3, 3:318
Volume 4, 4:311
Volume 5, 5:289
Information retrieval, column trap chromatography abstracts, 3:57
drug analysis, 3:5, 3:207
key word cards, 1:37
pesticides, 3:35
Infrared analysis, drugs, 1:3
gas cell contamination, 4:291
improvised gas cell, 3:103
KBr, 3:[illegible]
micropotassium halide plate technique, 2:285 (corr. 3:22)
multiple internal reflectance, 4:211
near, analytical uses, 4:116
undecylenic acid and salts in antifungal preparations, 3:279
Iodine, in vitamins, by polarography, 2:229 (corr. 2:270)
Iron, in drugs, 2:241
in fruit drinks, 1:147
in nutrition, annotated bibliography, 3:251
Isopheodrine, in combination with other cold preparations, 3:81
Isopropyl alcohol in fish protein concentrate, 4:71
Iverson, J. L., fatty acid content of vegetable oils, unusual oils, marine oils, and margarines, 2:5
Ives, N. F., see Gluffrida, L.
Jackson, H. M., review and commentary on methods used to estimate shell in chocolate products, 4:39
James, T., spectrophotofluorometry, useful tool in drug analysis, 4:33
Jaffus, H. T., spectrophotometric determination of nicotinamide in multivitamin preparations, 1:235
Jakobsons, E., see Dechare, D. D.
Joe, F. L., Jr., determination of isopropyl alcohol in fish protein concentrate using modified TotAd procedure, 4:71
determination of white mineral oil in bakery products, 2:297
See also Whitley, V. P.
Johnson, R. D., spectrophotometric determination of monodose sodium bisulfite in various dosage forms, 3:285
Jones, H. A., see Benson, W. R.
Jones, S. W., Willis, J. B., and Libby, D. A., increasing the scope and reliability of the chemical vitamin D method (USP XVII), 2:1
Kagan, B., brief view of organophosphate chemistry, 2:103
Kallmon, B. J., see Von Valin, C. C.
Kaniaski, J., spectra of colors, 4:192
Kanpe, L. R., see Cornelissen, F. E.
Kanpe, L. R., and Cornelissen, F. E., location of aldrin-dieldrin residues in sugar beets and residue analysis of adhering soil, 2:213
Kantor, N. M., see Bracey, A.
Keppel, G. E., modified acid hydrolysis method for dithiocarbamate fungicide residues, 1:255
See also Fricke, F. L.
Kerosene in wood stain, 3:223
Key word cards, 1:37, 1:108, 1:167, 1:230, 1:335
Kirchhoefer, R. D., determination of decomposition product of diazepam (valium substance) by combined instrumental analysis, 3:161
multiple internal reflection spectroscopy, 4:211
See also Dow, M. L.
Kirshbaum, A., automation of microbiological assays: yesterday, today, and tomorrow, 4:31
results of 2-year testing program of antibiotics for contamination by penicillin, 4:49
Kleinman, A., modify the method?, 3:187, 3:306
Kling, M. S., and Wells, C. E., GLC separation of optical isomers of some sympathomimetic amines, 4:273
Knoll, K. W., see Bowman, F. W.
Koch, S. A., and Alexander, T. G., investigations of spectral quality and minimum sample size on the A-60 NMR spectrometer, 3:49
Korte, D. E., extractables in rubber materials used in food processing, 2:63
Kram, T. C., and Turoczan, J. W., applications of NMR spectroscopy to regulatory drug analysis. I. rapid assay of selected compounds by internal standard procedure, 4:257
Kram, T. C., Bellman, S. W., and Turoczan, J. W., characterization and determination of impurity found in distilled-in-glass acetonitrile by NMR and mass spectrometry, 4:233
Krebiozen case, scientific aspects, 2:245
Krieger, K. L., see Taylor, J. T.

MONS 087096

Krinitz, B., automated data processing in glassware procurement and inventory control, 3:33
study to determine homogeneity of insect filth in individual cartons of fig paste, 2:39
Krinitz, B., and Robbins, A., Jr., automated data processing in publication procurement II, 5:215
LSD, hallucinogen, structure elucidation, 3:113 (corr. 3:170)
LaMotta, C. D., see Whitley, W. F.
Lambert, J. P., Snow, K. B., and Simpson, R. F., differentiation of inks on 2 similar types of drug capsules by neutron activation analysis, 4:95
Laminar flow hoods, for sterility testing, 3:110, 6:90
Larry, B., and Salwin, H., carotenoid pigments in shrimp, 3:189
Lead, in foods, 2:27
Lecrsin, polarography, 7:233
Le Sar Chemoway, Incubator-reject eggs, 1:59 (corr. 1:146)
scientific evidence, 3:167, 3:187, 3:350
Legator, M. S., cytogenic bibliography, 6:43, 6:99
Legator, M., Dollimpio, D., Green, B., Perry, M., Harp, A., Donald, K. J., Bean, V., Solymosi, L., and Bragg, J., cell biology genetics and the FDA, 2:253
Lepkovsky, H. A., early problems of the FDA, 1:187
Letter to the editor, 3:366
Levine, J., identification of mescal buttons (peyote), 4:29
Lilly, D. A., memorial, 3:236
See also Jones, E. W.; Rutor, R.
Lilyerwp, G. G., chemical composition of Concord grape juice, 2:137 (corr. 3:93)
Lisk, J., determination of LSD and iso-LSD by paper chromatography, 4:19
field test for LSD, 3:177
Lowell, G., determination of chlorpheniramine or dexbrompheniramine and phenylpropanolamine or isoephedrine in "cold" preparations, 3:81
LSD, see Lysergic acid diethylamides
Luetje, E., MRR literature retrieval by computer, 4:269
Lysergic acid diethylamide, 2:149, 2:153, 4:31, 4:119
background information, 4:3, 4:10, 4:15, 4:16
field test, 3:177
in morning glory seeds, 1:87
IR, 3:253, 5:24, 4:26
paper chromatography, 4:19
TLC, 4:21
d-Lysergic acid diethylamide tartrate, fish bioassay, 3:201
Mackerel, Pacific or Jack species, identification, 3:53
MacCullough, R. W., assay of amphetamine in formulations with thyroid, phenobarbital, atopine, and alcin, 4:279
McGowan, R. J., emission spectroscopy and its application, 7:289
McMurray, C. F., Alternative method for viscosity measurement, 1:313
McMurrey, F. G., and Beaver, L. A., determination of trace amounts of trichlorobenzene in foods, 3:195
Magnesium oxide, effect on nitroglycerin decomposition, 4:193
Major, A., Jr., and Crawford, R. H., determination of hexachlorophene and resorcinol in presence of parabens, 1:105
Major, A., Jr., and Hall, M. J., determination of tin and iron in fruit drinks, 1:147
Manske, D. D., and Trasch, D. L., identification of pesticides by extraction p-values, 3:171
Margarines, fatty acid content, 3:5
Marine, V. E., porous glass as TLC adsorbent, 5:161
Markovits, A. L., improved motility test procedure, 3:241
Martin, H. F., key word cards for simple retrieval system, 1:37, 1:108
Martin, R. J., see Siegmund, K. O.
Martin, R. J., Dobbert, D. D., and Boyer, E., N,N-diethyl lysergamide (LSD) and LSD-like compounds. II. analytical background, 4:10
Mass spectrometry, diazepam decomposition product, 5:161
N,N-dimethyl cryptamine and its intermediates, 3:27
impurity in acetonitrile, 6:233
practical applications, 1:107
Mass spectrometry-gas chromatography, 6:182
MBA, see 6-methyl-3,4-methylene-dioxyphenethylamine
Meat, species differentiation by disc electrophoresis, 3:131
Meclizine HCl, in drugs with perhidroline HCl, 3:151
Meeth, E., and Roach, G. L., Rupp values of some chlorinated pesticides by TLC, 3:295
Melchior, D. ..., quantitative GLC of xylene and toluene in certain paint thinners and plazes, 3:193
Menadione sodium bisulfite, spectrophotometry, 5:235
Metals, fluorides in by specific fluoride electrode, 6:265
trace analysis, X-ray spectroscopy of total diet samples, 4:165
Methenamine, GLC, 2:109
2-Methyl-3,4-methylenedioxyphenethylamine, identification, 4:271
Microbial contamination, bibliography, 6:229, 6:320
Microbiological assays, automation of, 5:31
Microscopic method, for manure in dairy products, 1:77
Milne, B. G., correlation of organoleptic evidence with pH, volatile bases, and indole as indices of decomposition in raw, frozen shrimp, 6:304
distinguishing between oxtriphylline and theophylline by TLC, 2:159
Miller, C. A., and Warren, J., frozen king crabmeat drained weight study, 3:259
Miller, L. C., letter to the editor, 3:306
Milk, chlorinated cleanser residues in, 2:31
human, pesticides in, GLC, 2:205
Mineral oil (white), in bakery products, 2:297
on hard candy, 3:47
Mitchell, L. C., Calcium sulfate as an adsorbent for TLC, 3:237
preparation of chromatographic plate for TLC: channel technique, 2:77
Mold count and rot, in comminuted fruit, 1:213
Moisture, in comminuted vegetable spices, 1:267
loss, cottage cheese cartons, 2:102
Monochlorobenzene, contaminant in chloral hydrate, 1:297
Moor, J. L., Authentic data on prune juice concentrate and dried prune composition, 4:141
Moquin, R. J., rapid identification of sugars and sugar alcohols by paper chromatography, 2:73
Morris, W., lead in total diet samples and typical foods, 3:27
Morrison, J. C., and Verfaillie, J. R., spectrofluorometric and TLC determination of quinidine sulfate contamination in various drugs, 6:237
Motility, improved test procedure, 3:241
Mouse-skin painting study for carcinogenicity of 2 colors, 3:105
Mouthwash, bacterial growth in, 6:169
Muller, H. J., genetic effects of chemicals, 1:133
Multiple internal reflectance spectroscopy, 4:211
Mutagenesis, chemical, 1:133
Mycotoxins, aflatoxin decontamination, 1:243
bibliography, 3:95, 3:134, 3:193, 3:241, 4:133, 4:203, 4:237, 4:297, 5:92, 5:135, 5:177, 5:220, 5:271, 5:36
index, 3:250
solvent contamination, 3:239
Myrick, J. W., automation at National Center for Drug Analysis, 3:37
Narrin, M. B., poets' corner, 1:234
Neomycin in mixture with hydrocortisone, effect of hydrocortisone on pyrogen test, 1:209
Neutron activation analysis, food products, bibliography, 4:306
ink on drug capsules, 4:95
Newton, J. H., analysis of undecylenic acid and its salts in antifungal preparations by IR spectroscopy and polarography, 5:279
Niacin, with nicotinamide, 4:91
Nicotinamide, polarography, 3:271
in multivitamins, 1:235
with niacin, 1:91
Nicotinamide, see Niacinamide
Nielsen, J. K., and Goldstein, B. P., effect of hydrocortisone on the test for pyrogens in a neomycin-hydrocortisone suspension, 1:209
Nitrofurazone, in feed, 1:151
Nitroglycerin, decomposition, with magnesium oxide, 4:193

MONS 087097

[illegible]-aminobenzoic acid, contaminant in feeds, 4:285
[illegible] antibiotic assessment, 3:23
[illegible] in chicken
Nuclear magnetic resonance, acetonitrile impurity, 4:233
  aromatic hydrocarbons, alkyl and aryl halides, and alcohols, 4:167
  diazepam decomposition product, 3:161
  literature retrieval, 4:269
  regulatory drug analysis, 4:257
  spectral quality and minimum sample size, 3:49
  trichlorine-tetramine and tetraethylene-pentamine, 3:163
  turpentines, 4:49
O'Donnell, J. T., Jr., see Van Valin, C. C.
Oils, vegetable, marine, carnauba, fatty acid content, 2:5
Oleomargarine, packaged, shrinkage, 3:287
Organoleptic analysis, decomposition odors in fish, 3:121
  incubator eggs, 1:59
  shrimp, correlation with chemical indices, 2:304
Oswald, E. J., see Lagator, M.
Oxalic acid, colorimetric analysis, 3:85
Oxley, H. M., microbial contamination bibliography, 4:229, 4:320
Oxtriphylline, differentiation from theophylline by TLC, 2:159
p-Values, pesticide analysis, 2:171
Page, D. P., qualitative and quantitative analysis of some barbiturates by GLC, 1:203
Paper chromatography, chlorinated pesticides, 1:224
  LSD and iso-LSD, 4:19
  sugar and sugar alcohols, 2:73
Parabens, effect on assay for hexachlorophene and resorcinol, 1:105
Penicillin, contamination of antibiotics, 4:49
  procaine, effect on sulfamethazine analysis, 1:97 (corr. 2:90)
Perry, M., see Lagator, M.
Pesticide analysis, automatic GLC injection system, 4:57
  extraction p-values, 2:171
  human milk and tissue, 2:205
  improved GLC column, 2:71
  interference by chlorinated cleansers, 3:31
  R_{DDD} values for TLC, 2:295
  radiological measurement of cholinesterase activity, 4:85
Pesticides, aldrin and dieldrin in sugar beets, 2:217, 3:91
  Bassol, biochemical measurements of toxicity to rats, 4:177
  chemical literature, 2:35
  chlorinated, low moisture grains, 3:27
    paper chromatography, 1:224
    TLC, 3:185
  DDT, effects on central nervous system, 4:313
  dithiocarbamates, 1:255, 2:177
  endrin and dieldrin on carrots, 1:263
  organophosphates, review of chemistry, 2:103
  polychlorinated biphenyls, effects on central nervous system, 4:313
  rodenticides in bait samples, 4:51
  trichlorobenzene in foods, 3:185
Petroleum distillates, identification by GLC, 4:9
Peyote (mescal buttons), identification, 4:29
Phenobarbital, and hexanbral, 1:201
Phenols in drug combinations, by GLC, 2:21
Phenylephrine hydrochloride, in opthalmic preparations, physiological effects, 4:113
Phenylmercuric acetate, in drugs, by polarography, 2:271
Phenylpropanolamine, in combination with other cold preparations, 3:181
Pieshecki, J. T., dye extraction methods in pharmaceutical analysis, 3:15
Peet's Corner, 1:234
Polarimetry, optical rotary dispersion, 3:81
  antifungal preparations, 3:279
Polarography, cadmium in foodstuffs, 4:107
  chloroform liniment, 4:161
  diethylstilbestrol in animal feeds, 1:307
  gold sodium thiosulfate injectables, 4:103
  in drug analysis, 2:1
  iodine in vitamins, 2:279 (corr. 3:270)
  lead in grain, 2:213
  nitrates, with nitrites, 4:209
  phenylmercuric acetate in drugs, 2:271
  riboflavin, thiamine HCl, and niacinamide, 3:271
  thallium in powdered malt extract, 2:11
Polito, M. V., and Celeste, A. C., polarographic determination of thallium in powdered malt extract, 2:11
Polito, M. V., and Romano, A., Jr., differentiation and identification of niacin and niacinamide in pharmaceuticals, 1:91
Polychlorinated biphanyls, effects on central nervous system, 4:313
Polyethylene, contaminant in paper chromatography of chlorinated pesticides, 1:224
Ponder, C., drug stability and chemical incompatibility, 3:23
Potter, W. C., see Stanley, E. R.
Potter, W. C., and Stanley, E. R., interference of sodium p-aminobenzoate in analysis of sulfamethazine in medicated feeds, 2:91
Preservatives, sorbic acid in cheese, 3:81
Prochazka, M., Gajan, R. J., and Fernandes-Flores, E., determination of diethylstilbestrol in animal feeds by oscillographic polarography, 1:307
Progesterone, with estrone and testosterone, 4:35
Propellents, in cosmetics, 1:219
Prunes and prune juice, authentic data, 3:183, 4:141
Pseudomonas aeruginosa, in non-sterile antibiotic products, 3:157
Psilocybin, identification and quantitation, 3:107
Publications, automated procurement, 3:215
Publications list, 4:18l (corr. 4:272), 4:264, 4:308, 3:49, 3:101, 3:145, 3:187, 3:237, 3:288, 3:52, 4:108, 4:184, 4:218, 4:276, 4:322
Pyridoxine hydrochloride, in drugs with meclizine hydrochloride, 2:183
Pyrogens, effect of hydrocortisone on test of neomycin-hydrocortisone mixture, 1:209
Pyrophosphate, in canned tuna fish, 3:67
Quantity of contents compendium: cheese, packaged, shrinkage, 3:9 (corr. 3:146), 3:13, 3:26, 3:95, 3:96, 3:98, 2:100
  crackers, filled, shrinkage in, 2:227
  oleomargarine, shrinkage, 3:287
  tea, shrinkage, 3:291
Quaternary ammonium compounds, in foods, bibliography, 4:263
Quinacrine hydrochloride, fluorometry, 4:293
Quinidine sulfate, contamination in drugs, 4:237
Rader, B. R., determination of moisture in comminuted vegetable spices, 1:267
Radioactivity, measurement of cholinesterase activity, 4:85
Ratay, A. F., see Gruenfeld, M.
Raumaker, D. L., see Reeves, M. P.
Rauwolfia serpentina, by fluorometry, 4:288
Reeves, M. P., Hall, J. R., Yates, P. J., and Raumaker, D. L., comparison of 2 methods used in preparing frozen vegetables for bacteriological study, 4:189
Riboflavin, by polarography, 3:271
Roach, G. L., see Heath, E.
Roberts, J. I., colorimetric determination of formaldehyde in foods, 3:283
Roberts, L. A., fluorometric determination of sterols on cholesterol in egg noodles, 4:229
  quantitative fluorometric method for quinacrine and its salts in drug preparation, 2:65
  rapid fluorometric determination of quinacrine hydrochloride in drug preparations, 4:255

MONS 087098

Rodenticides in baits, screening, 4:153
Rodricks, J. V., Cochrane, W., and Stoloff, L., solvent contamination from volatile components of fiberglass glove box, 3:239
Rodriguez, A. J., nonaqueous titration of acids and bases in pharmaceutical analysis, 5:123
Rogavin, R., drug nomenclature, 3:307
  informational aids for drug analysis, 3:5
Rowsue, A., Jr., method of analysis for LSD, 2:153
  See also Krinitz, B., Polito, M. V., Turcsan, J. M.
Rubenstein, J., Fein, A., Bianchi, R., and Williams, J., analysis of pyridoxine hydrochloride and meclizine hydrochloride combined in tablets and elixir, 3:183
Rubenfeld, with parabens, 1:105
Ruiz, V., see Legator, M.
Rut, in contaminated fruit, 1:213
Rubber material, used in food processing, extractives, 2:63
Salicylic acid, separation from benzoic acid in Whitfield's ointment, 2:155
Salmonella, in frog legs, 3:69
Salwin, M., see Lacy, D.
Samuel, O. R., Brannon, W. L., and Hayden, A. L., IR spectra of some compounds of pharmaceutical interest, 1:3
Sanitation, of confectionary manufacturing, 5:189
Schertel, H., cathode ray polarography of riboflavin, thiamine hydrochloride, and niacinamide, 3:271
Schneider, J. E., comparison of low temperature asher with wet ashing technique, 4:179
Scroggins, W. B., determination of carbarsone in feeds by colorimetric spectrophotometry, 3:237
Selzer, G., see Blakely, J.
Shapiro, R. E., mycotoxin bibliography, 3:95, 3:134, 3:193, 3:241, 4:133, 4:203, 4:237, 4:297, 5:92, 5:135, 5:179, 5:220, 5:271, 6:36
Shell, in chocolate products, 4:39
Sherman, S., polarographic method to identify and analyze chloroform in chloroform liniment, 2:161
  X-ray method of analysis, 4:140
Shorken, S., and Williams, J. C., determination of fluorides in solder fluxes using specific fluoride electrode, 6:225
Shrimp, carotenoid pigments, 2:189
  decomposition, correlation of organoleptic and chemical tests, 4:304
Shrinkage, packaged cheese and cheese products, 1:9 (corr. 1:146), 1:15, 1:26
  packaged cottage cheese, 2:95, 2:96, 2:98, 2:100
  packaged filled crackers, 2:227
  packaged oleomargarine, 2:287
  packaged tea, 2:291
Siegmund, E. G., and Martin, R. J., identification and quantitative determination of pellocybin in tablets, 2:107
Simon, H. E., possible mydriatic effect of collyrium containing 0.12% phenylephrine hydrochloride in human and rabbit eyes, 4:113
Simpson, B. B., see Lambert, J. P.
Smith, D. E., computer-assisted analysis, 2:73
Snow, K. B., see Lambert, J. P.
Snow, S. W., see Andres, C. M.
Sobotka, T. J., differential effects of DDT and polychlorinated biphenyls on central nervous system, 2:313
Sodium p-aminobenzoate, interference in assay of sulfamethazine in medicated feeds, 2:91
Solvent contamination, from fiberglass glove box, 3:239
Solvents, by combined GLC-mass spectrometry, 6:182
  hexosone, in wood stain, 2:223
  separation by GLC, 6:175
  turpentine, 2:283
  xylene and toluene by GLC, 2:105, 2:219
Solymosi, I., see Legator, M.
Sorbic acid, in cheese, 2:81
Sorbitol, GLC, 2:169
Spectra compilation, infrared, of drugs, 1:3
  UV, of color additives, 6:192
Spectrophotometer, UV-2A, difficulties, 1:278
Spectrophotometric cells, cleaning, 1:241
Sperling, A. M., decomposition of nitrofurazone in presence of magnesium oxide, 5:193
Spices, vaccinible, moisture in, 1:267
Stability of drugs, 5:123
Stakelum, G. S., and Goldston, H. H., separation and spectrophotometric determination of hexamethyl and hexobarbital in tablet preparations, 1:201
Stanley, E. R., see Potter, W. C.
Stanley, E. R., and Potter, W. C., determination of sulfamethazine in medicated feeds containing procaine penicillin, 1:97 (corr. 2:90)
Staphylococcus, enterotoxins in food, gel-diffusion detection, 5:247
Statistical analysis, sample size formula, 2:15 (corr. 2:10)
Statistical concepts in drug analysis, 6:157
Staufer, L. J., updating analytical constants for egg content of food, 3:33
Steinbrecher, K., collaborative study of determination of ammonia as index of decomposition in crabmeat, 6:281
Stephens, R. L., manure in dairy products, 1:77
Sterility of antibiotics, 5:157
Sterility testing, antibiotics, 3:1
  laminar air flow hoods, 3:110, 6:90
Steroids, abstracted bibliography, 3:161
  estrone, progesterone, and testosterone, 4:35
  GLC, 1:269
  in antibiotic preparations, interferences in assay, 1:279
  natural estrogens, 1:225
Sterols, in egg products, 3:33, 4:229
Stoloff, L., see Rodricks, J. V.
Stoloff, L., and Trager, W., recommended decontamination procedures for aflatoxin, 1:263
Sucaryl, in dietary candy and chewing gum, 3:23
Sugars, in natural products, by GLC, 4:147
  monosaccharides by TLC, 3:149
  sugar alcohols by paper chromatography, 3:73
Sulfamethazine in feeds, with procaine penicillin, 1:97 (corr. 2:90)
  interference of sodium p-aminobenzoate, 2:91
Sulfisoxazole and acetylsulfisoxazole, Bratton-Marshall assay, 2:127
Sutor, R., and Libby, D. A., colorimetric determination of oxalic acid, 3:85
Sympathomimetics, GLC of optical isomers, 4:275
  TLC, 4:261
Szymanski, H. A., see Barcklow, F. C.
Tablet pulverizers, evaluation, 4:197
Talley, H. C., FDA scientists occupy new laboratory headquarters, 2:147
Tanner, J. T., and Friedman, M., application of neutron activation analysis to food products: a bibliography, 6:294
Taylor, J. T., analysis of 3 drugs containing carbinamines by GLC, 2:117
Taylor, J. T., and Krieger, K. L., rapid GLC analysis of methenamine in pharmaceuticals, 2:109
Tea, FDA responsibilities under Tea Act, 1:317
  packaged, shrinkage study, 2:291
Testosterone, with estrone and progesterone, 4:35
Thallium, polarography, in powdered malt extract, 2:11
Theophylline, differentiation from ectriphylline by TLC, 2:159
Thoper, N. E., determination of iron in drugs, 2:241
Therapeutic equivalency, of drugs, 5:11
Thiamine HCl, polarography, 3:271
Thin layer chromatography, calcium sulfate adsorbent, 3:237
  channel technique, 2:77
  chlorinated pesticides, 1:85
  corticosteroids, 3:7
  extraction apparatus, 2:145

MONS 087099

Thin layer chromatography (continued)
  glycerin in diuretics and digoxin tablets, 4:125
  LSD and LSD tartrate, 4:121
  [illegible], 3:127
  [illegible], 3:149
  carbiphyllide and theophylline, 2:159
  [illegible], 3:127
  [illegible], 3:127
  [illegible] assessment, 3:161
  sulfadiazine sulfate as contaminant in drugs, 4:237
  Rmph values for chlorinated pesticides, 2:295
  rodent urine contamination, 3:225
  separation and identification of antihistamines, 3:171
  synephrine/ortho, 4:261
  triethylene-ortiamine and tetraethylene-pentamine, 3:163
Thrasher, J. J., abstract of literature on column "trap" chromatography, 3:87
  determination of insect fragments and rodent hairs in white flour baked goods and alimentary pastes by modified acid hydrolysis method, 3:313
Thyroid assay, recent progress, 3:225
Tin, in fruit drinks, 1:147
Titrations, nonaqueous techniques, in drug analysis, 3:125
Toluene, in paint thinners by GLC, 2:195 (corr. 4:222), 3:219
Total diet analysis, arsenic, 1:251
  lead, 2:127
  trace analysis by X-ray spectroscopy, 4:165
Treger, M., see Stoloff, L.
Tributyrin (glyceryl tributyrate), in butter, from vegetable fat contamination, 4:19
Trichlorobenzene, GLC trace amounts in foods, 3:195
Trimethylamine, in fish decomposition, 1:153
Turcan, J. W., see Bellman, S. W.; Kram, T. C.
Turcan, J. W., and Romano, A., Jr., separation and determination of salicylic and benzoic acids in Whitfield's ointment, 2:155
Turpentine, 2:283, 4:89
Umberger, E. J., therapeutic equivalency of drugs factors that can influence biologic availability, 3:11
Undecylenic acid, in antifungal preparations, 2:279
Van Valin, C. C., Kallmann, B. J., and O'Donnell, J. J., Jr., polyethylene as source of artifacts in paper chromatography of chlorinated hydrocarbon insecticides, 1:224
Vegetables, frozen, preparation for bacteriological studies, 4:189
Vorfeliis, J. R., see Morrison, J. C.
Viscosity, alternative to Saybolt Viscometer, 1:313
Vitamins, Byg, by atomic absorption, 4:23
  D, improving USP method, 2:1
  iodine in, 2:229 (corr. 2:270)
  menadione sodium bisulfite, 3:285
  niacin and niacinamide, 3:191
  niacinamide, 3:235
  riboflavin, thiamine HCl, and niacinamide, 3:271
Watlington, F. H., Hendie, C., and Heine, K. E., Jr., trace analysis of total diet samples by X-ray fluorescence spectroscopy, 4:165
Wayland, L. O., see Bracey, A.
Weber, A. L., determination of pyrophosphate in canned tuna fish, 3:67
  problems in identification of fish species, snapper, 3:153
  some considerations in laboratory examination, detection, and interpretation of decomposition odors in fish, 3:121
Weeks, J. P., Jr., Baird Model Ky-1 flame photometer: adaptation, adjustment, and calibration for general use, 1:163
  guidelines for determination of conjugated estrogens, 4:145
  phenylpropanolamine hydrochloride, pheniramine maleate, and pyrilamine maleate in syrups by column chromatography and UV spectrophotometry, 4:85
Weik, R. W., see Werren, J. C.
Weik, R. W., and Werren, J. C., packaged creamed cottage cheese shrinkage study at Sealtest Division, National Dairy Products Corp., Chambersburg, Pa., and Washington, D. C., 2:198
Weiss, F. J., see Bracey, A.
Wells, C. H., see Kling, M. S.
Werren, J. C., package cheese and cheese products shrinkage study at Kraft Foods, Springfield, Missouri, 1:19
  Sheboygan Foods Co., Plymouth, Wisconsin, 1:26
  quantity of contents compendium: packaged tea shrinkage study, 1:291
  See also Miller, G. A.; Weik, R. W.
Werren, J. C., and Blumquist, V. H., packaged cheese shrinkage study at Borden Foods Co., Van Wert, Ohio, 1:9 (corr. 1:146)
Warren, J. C., and Weik, R. W., packaged creamed cottage cheese shrinkage study at Capitol Milk Producers Coop., Inc., Frederick, Md., and Washington, D. C., 2:100
  Safeway Stores, Inc., Landover, Md., 2:197
  quantity of contents compendium: packaged oleomargarine shrinkage study, 3:287
Wheeler, W. H., dried fig and fig paste industry: relation of growing and processing practices to insect and filth content of finished product, 2:45
  insect filth in domestic fig pastes, 4:221
White, M., further studies using laminar air flow for sterility testing of pharmaceutical drugs, 4:90
Whitfield's ointment, separation of benzoic and salicylic acids, 2:155
Whiting, M. C., ascorbic acid and the common cold: selected references with annotations, 3:229
Whitley, V. F., arsenic in total diet sample, 1:251
  determination of arsenic in swine liver tissues, 2:185
  method for determination of acetyl-p-nitrophenyl sulfanilamide and 3,5-dinitrobenzamide in medicated feed premixes, 2:267
Whitley, V. F., Jow, F. L., Jr., and Lakota, C. D., residue analysis of 3,5-dinitrobenzamide (3,5-DNBA) in poultry tissue, 4:75
Wilmowski, G., colorimetric determination of sorbic acid in cheeses, 2:81
  spectrophotometric method for diiodohydroxyquin in drugs, 4:179
Wilderman, M., shrinkage study of packaged filled strawberry, 2:227
Wilkie, J. B., see Jones, S. W.
Williams, G. H., and Casterline, J. L., Jr., some biochemical measurements during chronic feeding of the carbamate Banol to rats, 4:177
Williams, J. C., see Rosenstein, J.; Sharkey, S.
Williamson, W. T., III, polarographic determination of trace amounts of lead in grains and grain products, 2:213
Womack, M. S., fish species identification by disc electrophoresis, 1:61
  identification of colors using rapid strip electrophoresis, 1:227
Woodson, A. L., analysis of drugs subject to drug abuse control act, 3:113
  analysis of estrone, progesterone, and testosterone in a suspension without separation, 4:35
  assay of gold sodium thiosulfate injectables using conventional polarography, 4:103
  determination of 3-nitro-4-hydroxyphenylarsonic acid in foods, 4:265
  polarographic determination of nitrates in aqueous media containing nitrites, 4:199
  polarography in drug analysis, 3:1
  use of operational amplifiers in the laboratory, 4:119
Wragg, J., see Legator, M.
X-ray analysis, 4:140
  total diet samples, 4:165
Xylene in paint thinners by GLC, 2:195, 2:219 (corr. 4:222)
Yarnell, F. E., pillistics, or identification of manufacturing source of barbiturate and amphetamine drugs, 3:127
Yates, P. J., see Reeves, N. P.
Zacharias, D., ID identification of LSD in capsules, liquids, sugar cubes, and tablets, 3:253, 4:26
Zaeberg, B., and Dias, R., TLC of some monosaccharides, 3:149

MONS 087100