TABLE VI.

Modified Polyamides.

No.	Monomeric reactant	Extent of reaction	Gel time	Melting range °C.[1]	Acid equiv.	Basic equiv.	Dilution ratio [2]
		per cent	*sec.*				
1	Monomeric fat acid	99.0	31	102-107	2,720	3,475	
2	Stearic acid	96.8	17	115-120	5.580	12,970	19.9
3	Stearic acid [3]	91.8	15	100-104	2,720	3,475	
4	Benzoic acid	96.3	12	100-104	2,490	12,750	15.3
5	Benzoic acid	82.3	15	92-96	2,090	2,740	
6	Abietic acid	(112)	18	100-108	4,370	5,960	16.4
7	Naphthenic acid	(136)	16	94-100	2,500	3,130	13.0
8	*n*-Dodecyl amine	90.0	36	84-90	4,570	6,820	21.6
9	*n*-Dodecyl amine [4]	95.0	36	84-90	4,675	4,450	
10	Monostearoyl ethylene diamine	85.0	36	102-108	4,700	6,650	24.6

[1] Determined with Parr melting point apparatus. [2] Determined by titration of a 30% solution in butanol with Skellysolve C; average value for ethylene diamine polyamide = 13.1. [3] Stearic acid added after ethylene diamine. [4] *n*-Dodecyl amine and ethylene diamine added simultaneously.

tions containing petroleum hydrocarbons and alcohols. It may be applied from a hot melt if properly plasticized or modified. Films of the material show excellent resistance to water, alkali, acid, oils, and grease. Research on the usefulness of this polyamide has been reported (10, 11).

Acknowledgment

The authors wish to acknowledge their indebtedness to R. E. Beal for pilot-plant preparations of esters of polymeric fat acids, and to C. H. Van Etten of the Analytical and Physical Chemistry division of this laboratory for making the methoxyl determinations.

Summary

The preparation and properties of various polyamides, copolyamides, and modified polyamides, of polymeric fat acids have been described. These polymers are of interest because of their unusual properties and because of the unsaturation and relatively high molecular weight of the polybasic acids involved. Despite the presence of tribasic acids in polymeric fat acids, ungelled polymers having molecular weights of 3,000 to 5,000 are obtainable. A brief discussion has been given concerning the application of theoretical principles of polymerization to the preparation of these polymers. Possible industrial uses for the polyamides are indicated.

LITERATURE CITED

1. Aspinall, J. Am. Chem. Soc. *63*, 852 (1941).
2. Barbot, A., Ann. Chim. *11*, 519 (1939).
3. Bradley and Johnston, Ind. Eng. Chem. *32*, 802-9 (1940).
4. Bradley and Johnston, *ibid*, *33*, 86-9 (1941).
5. Carothers, Trans. Farad. Soc. *32*, 39-53 (1936).
6. Clark, J. Assoc. Official Agr. Chem. *15*, 136 (1932).
7. Cowan, Ault, and Teeter (unpublished work).
8. Cowan and Falkenburg, Oil and Soap *20*, 153-7 (1943).
9. Cowan, Falkenburg, and Teeter, Ind Ing. Chem., Anal. Ed., *16*, 90-2 (1944).
10. Cowan, Lewis, and Falkenburg, Oil and Soap *21*, 101-7 (1944).
11. Cowan, Schwab, and Falkenburg, Modern Packaging *17*, No. 9, 113-119 (1944).
12. Cowan and Teeter, Ind. Eng. Chem. *36*, 148-52 (1944).
13. Flory, J. Am. Chem. Soc. *63*, 3083-3100 (1941).
14. Kienle and Hovey, J. Am. Chem. Soc. *51*, 509 (1929).
15. Sutter and Moffet, J. Am. Chem. Soc. *56*, 487 (1934).
16. Ralston, Pool, and Harwood, U. S. Patent 2,061,314, November 17, 1936.

Report of the Smalley Foundation Committee 1944-45

WE ARE presenting herewith the 27th report of the Smalley Foundation Committee of the American Oil Chemists' Society. During these past 27 years considerable progress has been made in the accuracy of the determination of oil and nitrogen on cottonseed meal. The results obtained in practically all determinations were slightly higher than last year, with the exception of the oil determinations. It must be understood, in gauging the accuracy of the results, that a difference of two points in either direction from the average is permitted without a deduction from the grade. We might add that the results obtained are so nearly perfect that a few hundredths of a per cent higher or. lower than in any previous year means very little as far as accuracy is concerned.

As usual, 30 samples of cottonseed meal were distributed to the collaborators. There are attached to this report four tables indicating the standing in percentage of the members taking part. Table I gives the standing of 45 collaborators who reported oil determinations on all samples. Table II gives the standing of 50 collaborators who reported nitrogen results on all samples. Table III gives the standing of 44 collaborators who reported oil and nitrogen on all samples. In these tables we have taken into consideration the results of those reports which were received within the time specified in our original announcement of the Smalley Foundation work. In Table IV we have given the standing of those collaborators who reported on all samples, but some of whose reports were received too late to be included under the rules. The winning collaborators are as follows:

The American Oil Chemists' Society Cup for the highest efficiency in the determination of both oil and nitrogen on all samples is awarded to Analyst No. 53, W. W. Wynn, Jr., Barrow-Agee Laboratories, Cairo, Illinois, with an average of 99.957%. The average efficiency is higher than that of last year, which was 99.953%. The certificate for second place goes to Analyst No. 55, D. B. McIsaac, Kershaw Oil Mill, Kershaw, S. C., who had an efficiency of 99.950%, as compared with 99.947% for last year.

The certificate for the highest efficiency in the determination of oil only is awarded to Analyst No. 55, D. B. McIsaac, Kershaw Oil Mill, Kershaw, S. C., with an average of 99.973%, as compared with 99.980% for last year. The certificate for second place goes to analyst No. 53, W. W. Wynn, Jr., Barrow-Agee Laboratories, Cairo, Illinois, with an efficiency of 99.937% as compared with 99.948% for last year.

TABLE I.

Determination of Oil.

Analyst No.	Points Off	Per Cent Efficiency
55	5	99.973
53	12	99.937
18, 27	13	99.933
39	15	99.922
60	18	99.906
28	19	99.901
59	23	99.880
7, 79	24	99.875
19	25	99.870
25	35	99.817
17, 22, 30, 65	40	99.792
37, 54	44	99.770
11	45	99.765
50	47	99.754
51	48	99.750
9	49	99.745
66, 70	51	99.734
62	53	99.723
24	54	99.718
61	57	99.703
31	60	99.687
5	69	99.640
6	77	99.598
33	85	99.557
8	87	99.546
77	95	99.504
20	98	99.489
49	99	99.484
45	103	99.464
3	119	99.379
34	120	99.374
4	130	99.323
38	141	99.265
32	173	99.098
14	199	98.963
76	212	98.894
56	263	98.628
73	555	97.107

The certificate for the highest efficiency in the determination of nitrogen is awarded to Analysts Nos. 39 and 53, namely Russell Haire, Planters Manufacturing Company, Clarksdale, Miss., and W. W. Wynn, Jr., Barrow-Agee Laboratories, Cairo, Illinois, who were tied, with an average of 99.976% as compared with 99.957% for last year. The certificate for second place goes to Analysts Nos. 19 and 60, E. H. Tenent, Woodson-Tenent Laboratories, Memphis, Tenn., and L. H. Hodges, Forrest City Cotton Oil Mill, Forrest City, Ark., who were tied, with an average of 99.972%, as compared with 99.953% for last year.

For some time back we have been observing the results on moisture reported by the collaborators of the Smalley Foundation Committee. There seems to be such a wide variation that we would like to call attention to it in this report. When we take an arithmetical average of the moisture on the first 10 samples (of 55 collaborators reporting moisture on the first 10 samples) we find that the points off from the mean vary from a low of 55 to a high of 617. The following table will give you some idea of where these discrepancies lie.

55	112	145	208	356
65	114	147	225	363
76	116	148	228	366
84	118	149	258	385
87	123	160	264	392
91	129	161	264	427
92	131	163	297	430
92	135	170	301	435
101	140	172	319	480
103	142	182	323	504
107	144	207	324	617

It is difficult to understand why there should be such great variation in the moisture results when the checks on nitrogen and oil are always so very close. It is true that the latter determinations are probably more accurate, but we have been wondering whether more care is taken with them because they are given consideration in figuring the standing of the collaborators whereas no attention is paid to the moisture determinations. It may be possible that for this reason all of the moisture is not driven off in many cases. We think it might be well for the incoming Smalley Foundation Committee to give consideration to the awarding of certificates for the best results in moisture to see if this will improve the results obtained.

For many years Thomas C. Law has prepared and distributed our samples at considerable inconvenience to himself. We again call attention to this as we feel that the Smalley Foundation Committee and the American Oil Chemists' Society should realize the tremendous contribution which he is making toward the success of this collaborative work.

We are again including in this report a list of the previous winners of the highest award for both Oil and Nitrogen. They are as follows:

1918-1919	G. C. Hulbert, Southern C. O. Co., Augusta, Ga.
1919-1920	G. C. Hulbert, Southern C. O. Co., Augusta, Ga.
1920-1921	C. H. Cox, Barrow-Agee Labs., Memphis, Tenn.
1921-1922	Battle Labs., Montgomery, Ala.
1922-1923	Battle Labs., Montgomery, Ala.
1923-1924	L. B. Forbes, Memphis, Tenn.
1924-1925	E. H. Tenent, International Sugar Feed Co. No. 2, Memphis, Tenn.
1925-1926	Battle Labs., Montgomery, Ala.

TABLE II.

Determination of Nitrogen.

Analyst No.	Points Off	Per Cent Efficiency
39, 53	5	99.976
19, 60	6	99.972
18	8	99.962
27	11	99.948
7, 62	12	99.944
8	13	99.940
15, 17, 59	15	99.930
25, 55, 77	16	99.926
50	20	99.906
51	21	99.902
32, 34	24	99.888
5, 70	27	99.874
24, 33	29	99.864
20, 79	30	99.859
9	32	99.850
28	33	99.845
56	35	99.836
54	36	99.831
4	39	99.817
31	40	99.813
61	42	99.803
11	44	99.793
22, 66	45	99.789
6	46	99.785
37, 65	52	99.757
16	54	99.747
3, 64	58	99.729
76	59	99.723
45	68	99.681
38	78	99.635
30	79	99.630
41	94	99.560
48	108	99.494
49	134	99.372
13	154	99.279
73	336	98.426

TABLE III.

Determination of Oil and Nitrogen.

Analyst No.	Per Cent Efficiency
53	99.957
55	99.950
39	99.949
18	99.948
27	99.941
60	99.939
19	99.921
7	99.910
59	99.905
28	99.873
25	99.872
79	99.867
17	99.861
62	99.834
50	99.830
51	99.826
70	99.804
54	99.801
9	99.798
24, 22	99.791
11	99.779
65	99.775
37	99.764
66	99.762
5	99.757
61	99.753
31	99.750
8	99.743
77	99.715
33, 30	99.711
6	99.692
20	99.674
34	99.631
45	99.573
4	99.570
3	99.554
32	99.493
38	99.450
49	99.428
76	99.309
56	99.232
73	97.767

1926-1927 W. F. Hand. Miss. State College, State College, Miss.
1927-1928 E. H. Tenent, International Sugar Feed Co., Memphis, Tenn.
1928-1929 Geo. W. Gooch Labs., Los Angeles, Calif.
1929-1930 Southwestern Labs., Dallas, Texas.
1930-1931 W. F. Hand, Miss. State College, State College, Miss.
1931-1932 J. N. Pless, Royal Stafolife Mills, Memphis, Tenn.
1932-1933 D. B. McIsaac, International Veg. Oil Co., Savannah, Ga.
1933-1934 W. F. Hand, Miss. State College, State College, Miss.
1934-1935 W. F. Hand, Miss. State College, State College, Miss.
1935-1936 N. C. Hamner, Southwestern Labs., Dallas, Texas.
1936-1937 N. C. Hamner, Southwestern Labs., Dallas, Texas.
1937-1938 W. F. Hand, Miss. State College, State College, Miss.
1938-1939 W. F. Hand, Miss. State College, State College, Miss.
1939-1940 A. G. Thompson, Jr., Southern C. O. Co., Columbia, S. C.
1940-1941 Russell Haire, Planters Mfg. Co., Clarksdale, Miss.
1941-1942 T. L. Rettger, Buckeye Cotton Oil Co., Memphis, Tenn.
1942-1943 Barrow-Agee Labs., Memphis, Tenn.
1943-1944 D. B. McIsaac, Kershaw Oil Mills, Kershaw, S. C.
1944-1945 W. W. Wynn, Jr., Barrow-Agee Labs., Cairo, Ill.

TABLE IV.

Special Table.

Analyst No.	Points Off	Per Cent Efficiency
Determination of Oil		
58	15	99.922
52	23	99.880
68	26	99.864
67	51	99.734
35	52	99.729
74	67	99.651
69	83	99.567
29	154	99.198
42	717	96.262
Determination of Nitrogen		
42	22	99.897
29, 52	34	99.841
68	40	99.813
58	42	99.803
35	43	99.799
67	45	99.789
74	49	99.771
69	79	99.630
12	132	99.382
Determination of Oil and Nitrogen		
58		99.863
52		99.861
68		99.839
35		99.764
67		99.762
74		99.711
69		99.599
29		99.520
42		98.080

M. G. Boulware
R. R. Haire
F. F. Hasbrouck
T. C. Law
R. C. Pope
P. F. Woodson
J. J. Vollertsen, *Chairman.*

Report of the Color Committee

THE Color Committee has no final work report to make at this time. Progress is, however, being made on the problem of photoelectric measurement of oil colors. Photoelectric color readings on a series of oils have been made on one instrument, and a second instrument will soon be available for further work. It is not believed that these data should be reported until comparisons on other instruments are completed. This work will be continued actively as time and the availability of equipment permit.

The Color Committee has revised A.O.C.S. Method D3-45 for the Sampling and Analysis of Crude Vegetable Oils. This section is on Color by the Lovibond-Wesson Method. The revision is in the hands of the Uniform Methods Committee.

Procter Thomson
R. T. Milner
R. C. Stillman
For the Color Committee.