# Referee Chemists and Official Methods

**WILLIAM E. LINK**, Manager, Analytical Chemistry, Research and Development Division, Ashland Chemical Co., Columbus, Ohio, USA


## ABSTRACT

The need for Referee Chemists was recognized more than 50 years ago. Currently the Examination Board of the American Oil Chemists' Society issues certificates to commercial laboratories in the name of qualified representatives who are members of the AOCS. A total of 79 chemists presently hold Referee Certificates in categories of cottonseed, soybeans, peanuts, cottonseed oil and other cup refined oils, soybean oil and other neutral oil loss oils, tallow and grease, protein concentrates, and cellulose yields. Referee Certificates have also been issued to a few chemists in Japan and Canada. The National Cottonseed Products Association, National Soybean Processors Association, etc., publish listings of their Official Chemists, who must first obtain AOCS referee certificates.

Laboratories holding certificates must use Official Methods of the AOCS wherever applicable. The AOCS *Official and Tentative Methods* is one of the leading sources of standard methods for the fat and oil industries in the world. The origin of the present edition of AOCS *Methods* is described, and the roles of the Uniform Methods Committee, various technical committees, and the editor in the development, publication, and distribution of the methods are discussed.


## REFEREE CHEMISTS

The terms "referee chemists" and "certification" mean different things to different people. Before a discussion of their roles in the activities of our Society, a differentiation is in order. Certification, which means in simple terms attesting as meeting a standard, is a volunteer process carried out by a nongovernmental organization. Licensing, on the other hand, is a procedure followed by a governmental body. In certification, standards are set by the private sector; in licensing, standards are set by the government. While the issue of licensing is becoming quite heated in the U.S., there is less controversy in respect to certification.

The American Chemical Society and its local sections do not appear to be well informed and show little interest concerning the subject of certification. Likewise, the American Institute of Chemical Engineers has no certifying program but has discussed the possibility. The American Institute of Chemists began a program in the early 1960s of certifying its members and nonmembers, and a wide range of organizations also certifies specialists in their field to attest to their competence and enhance their prestige.

The American Oil Chemists' Society was the first organization in the U.S. to certify "referee chemists," having recognized the need as early as 1909. Before tracing this development, however, it would be fitting to briefly consider the concept of certification and to examine the arguments for and against certification.

As stated by the American Chemical Society (1), certification (a) helps identify people who have special competence in their field, (b) tends to improve competence in a field, (c) enhances the prestige of certified people, (d) is national in scope and does not limit mobility, and (e) encourages participants to stay up-to-date in continuing programs.

The arguments against certification are not entirely relevant in the unique situation encountered in the AOCS but, nevertheless, some of them pertain and can be listed: (a) certification has no legal status, (b) certification is costly and time-consuming, (c) certification examinations have limited coverage and are unfair, (d) certification is superfluoous and evaluations of professional performance should provide enough information about qualifications, and (e) certified persons may be no more qualified than others.

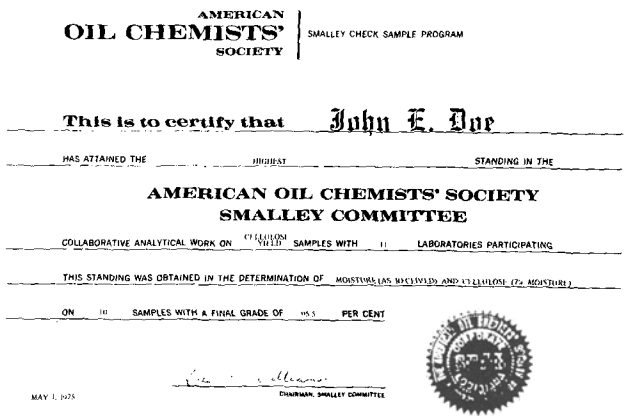
## HISTORICAL BACKGROUND

In spite of the difficulties in administering a certification program, the AOCS nevertheless was determined to find a means of protecting the buyer and seller from having their samples analyzed by laboratories whose results were not reliable. From the very beginning in 1909, the Society of Cotton Products Analysts, later to become the AOCS, was concerned with analysis. In the spring of that year, means were discussed whereby results of various laboratories could be reconciled. Thus, the Smalley Committee was formed. This was set up in about 1915 to give everyone who wished an opportunity to run analyses on the same carefully prepared sample. The original members were analytical chemists in oil mills—cottonseed crushers, to be exact. This was the original attempt to standardize methods in an area where none existed.

From a small beginning on cottonseed meal and later on cottonseed oil, the Smalley Committee's activities have increased to 16 varied check sample series of oilseeds, fats and oils, and related products. From an original dozen collaborators, there are now approximately 690 participants scattered throughout the world. The program has grown from a purely domestic to an international activity. This, however, is slightly ahead of the story.

In 1920, the Society of Cotton Products Analysts was changed to the American Oil Chemists' Society and a new class of members was designated—"Active Referee Members." These members were required to pass an examination before the Referee Examination Board, a new committee established by the AOCS Constitution. This board is presently known as the Examination Board. Its policies have changed little, except those clarifying, tightening, and strengthening the requirements for Referee Chemist. The Constitution and By-Laws of the AOCS have given the Board considerable autonomy.

It is important at this point to show the relationship between the Smalley Committee and the Examination Board. In the early years, the Board issued its own check sample series. In the early 1930s the National Cottonseed Products Association sponsored an elaborate series of check samples of seed and oil. When these were abruptly discontinued, the Examination Board again provided its own samples. Now the Smalley Committee provides all the check samples, supplies the Examination Board with the results of the testing, and makes awards based on proficiency. An example of a Smalley Award is shown in Figure 1.


AMERICAN
OIL CHEMISTS' SOCIETY | SMALLEY CHECK SAMPLE PROGRAM

This is to certify that John E. Doe

HAS ATTAINED THE ... HIGHEST ... STANDING IN THE

AMERICAN OIL CHEMISTS' SOCIETY
SMALLEY COMMITTEE

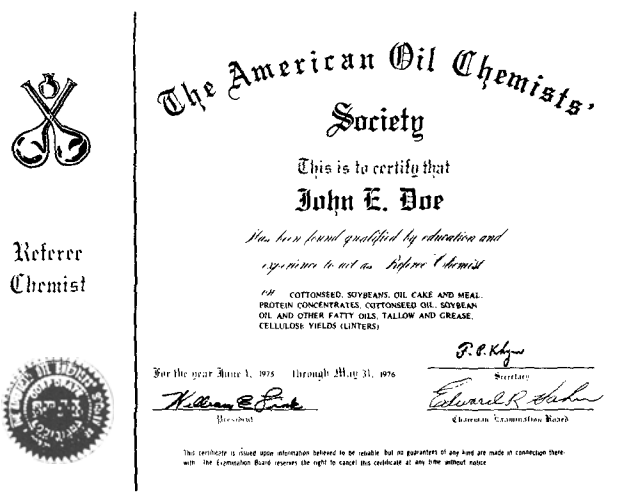
COLLABORATIVE ANALYTICAL WORK ON CT CELLULOSE YIELD SAMPLES WITH 11 LABORATORIES PARTICIPATING

THIS STANDING WAS OBTAINED IN THE DETERMINATION OF MOISTURE (AS RECEIVED) AND CT CELLULOSE (% MOISTURE)

ON 10 SAMPLES WITH A FINAL GRADE OF 99.5 PER CENT

MAY 1, 1975 ... CHAIRMAN, SMALLEY COMMITTEE

FIG. 1. AOCS Smalley Award.


The American Oil Chemists' Society

This is to certify that

John E. Doe

has been found qualified by education and experience to act as Referee Chemist

in COTTONSEED, SOYBEANS, OIL CAKE AND MEAL, PROTEIN CONCENTRATES, COTTONSEED OIL, SOYBEAN OIL AND OTHER FATTY OILS, TALLOW AND GREASE, CELLULOSE YIELDS (LINTERS)

For the year June 1, 1975 through May 31, 1976

President ... Secretary

Chairman, Examination Board

This certificate is issued upon information believed to be reliable, but no guarantees of any kind are made in connection therewith. The Examination Board reserves the right to cancel this certificate at any time without notice

Referee Chemist

FIG. 2. AOCS Referee Certificate.

This testing program is widely used by industry and commercial analysts as an indicator of how their results on varied samples agree with those of other analysts. Many firms in the U.S. require that their analysts take part in different series to know how their analysts compare with their competitors. It is vital to industry to know how their plants are doing in respect to quality control and whether their products meet national and international specifications. The Smalley Committee samples give an accurate indication of the proficiency of individuals and laboratories. The Examination Board uses these final ratings as criteria of proficiency and subsequently certifies analysts or Referee Chemists in analyses of various categories of samples of different commodities.

Currently, the Examination Board issues certificates in cottonseed, soybeans, peanuts, cottonseed oil and other cup refined oils, soybean oil and other neutral oil loss oils, tallow and grease, oilseed meals, protein concentrates, and cellulose yields. A total of 79 chemists, including a representation from Japan and Canada, presently hold Referee Certificates in one or more of these categories. Referees are certified on an annual basis as of June 1st (Fig. 2).

A number of recognized trade associations require that their chemists hold certification from the AOCS Examination Board in order to become listed as Official Chemists of such associations. Among these are the National Cottonseed Products Association and the National Soybean Processors Association. Recently the National Renderers Association began appointing their Official Chemists from the list of Referee Chemists of the AOCS. Most of the Society's Referee Chemists are Official Chemists of at least one of these trade associations, and most of the demand for certification comes from the desire for such appointment.

The present requirements for certification are similar to those adopted years ago, and variations from these to meet specific situations are made only after considerable deliberation. The goal is to have a qualified person in a qualified location.

The requirements for certification by the Examination Board are as follows:

1. Referee Certificates will be issued to a commercial laboratory in the name of qualified individuals who are active members of AOCS. The Board recommends at least two chemists be certified in each laboratory, and, if change in certification should occur during the year, the Board should be notified so that continuity of approval is maintained.
2. Each applicant shall be required to establish the analytical competency of his laboratory by presenting data on check samples sent to or caused to be sent to them by the Board. These samples shall consist of the AOCS Smalley Committee check samples and, if necessary, other samples. Application for the Smalley samples is made to the Executive Director of the American Oil Chemists' Society, 508 S. Sixth Street, Champaign, IL 61820. The Board shall determine the categories under which an applicant shall be approved. This will be based upon the declaration made in the application of the type of work the laboratory hopes to perform and the other requirements herein stated. Minimum grades of proficiency for Smalley samples shall be recommended to the Examination Board by the Smalley Committee.
3. Each laboratory shall be inspected prior to the granting of a certificate to the applicant in a manner arranged by the Board, and periodically thereafter at the discretion of the Board for purposes of evaluating equipment and personnel.
4. All laboratories must use the AOCS Official Methods wherever applicable and be so equipped as to fully comply with the demands of these methods. A list of the equipment and complete history of the applicant's professional career must be filed with the Examination Board.
5. Listing of the Official Referee Certificate holders will appear in the *AOCS Directory*. The National Cottonseed Products Association, National Soybean Processors Association, National Renderers Association, etc., publish listings of their Official Chemists. Each of these associations assumes the full responsibility of appointing its Official Chemists, but each has determined as a requirement that an Official Chemist of its association must first obtain an AOCS Referee Certificate. The AOCS Examination Board communicates with each trade association but acts only for the Society, which has the sole responsibility for referee certification.
6. Each applicant must be a trained chemist. He must have a degree in chemistry or chemical engineering from a recognized college or university or satisfactory equivalent. The Board determines the equivalent.
7. All applicants must be at least 25 years of age and must be active members in good standing for 1 year with the AOCS and be responsible for decorum in accordance with the Society's Code of Ethics.
8. Each applicant must have had at least 3 years' experience in commercial or industrial analytical chemistry in the fields of oils, fats, and waxes and their related products on which the certificate reads.
9. Each applicant must furnish at least five references vouching for his character and professional standing in his field of activities.
10. Each Referee Certificate holder must be prepared to show the Examination Board on request that the laboratory is competent to render such professional analytical services as are represented to the public.
11. All certificate holders must be in an independent

laboratory, absolutely free of financial connections with any manufacturer, and must not deal in the products on which his certificate reads, except for such charges as arise from the performance of professional services offered to the general public. This includes the renting of buildings or space or any other connections which might cause the chemist to be biased. If bias is proved on the part of said holder for reasons such as financial or personal interests in the affairs of one or more parties of the transaction, the Referee Certificate will be revoked.

12. Referee Chemists must maintain satisfactory grades on all collaborative analytical work on each series of Smalley check samples of materials covered by his certificate. In instances of failure to maintain passing grades, he must explain to the satisfaction of the Board.

## OFFICIAL METHODS

It is obvious that a certification program of Referee Chemists would not be possible without official methods, and the fourth requirement above makes it clear that the Official Methods of the AOCS be used wherever applicable and precludes the use of other procedures.

The history of the development of these methods is somewhat vague, but the evolution is more simple. Responsibility for method development and promulgation has largely been the function of certain committees within the AOCS. From 1909 to 1920 the Uniform Methods Committee, one of three outstanding committees of the founding Society of Cotton Products Analysts, was charged with the adoption of methods. Before 1917 there were no published records of these proceedings, but in that year the first notice appeared in the *Cotton Oil Press*.

Since that time, the operating functions of the Uniform Methods Committee have changed little. Initial activities consisted of preparation of standard analytical methods and cooperative testing. Distribution of samples, originally a function of the Uniform Methods Committee, was transferred to the Smalley Committee in 1922. A few years later, the Society decided that it should have its own book of methods. One committee prepared a loose-leaf book of methods, and a second committee on Revision of Methods was appointed to review and issue additions and revisions as needed. This function subsequently was assumed by the Uniform Methods Committee and presently is the responsibility of the Editor of *Official and Tentative Methods*.

The scope of *Methods* has broadened as the Society has matured, and even the appearance has changed–from a loose-leaf book to a small bound volume in 1944 and finally to the large size sheets now used. The present scope of interest includes cottonseed, flax seed, peanut, soybean, coconut, sunflower, and other seed oils of commerce, as well as fish oils and animal fats, and petroleum based detergents. Methods for industrial oils and derivatives and by-products of oil production are also important parts of *Methods*.

The editor of *Methods*, appointed by the president, has the responsibility for maintaining consistent format and editorial style and prepares revisions and additions each year, which are distributed on a subscription basis to holders of *Official and Tentative Methods*.

The format of *Methods* has not changed materially in 25 years. Each method is prefaced with a definition and scope, which are followed by sections describing the apparatus required, reagent preparation, procedure, and calculations. In recent methods and in all new methods, a section on precision is required and "notes" are permitted. The precision statement must have been derived from data obtained as a result of collaborative testing, which in turn must follow an approved experimental design. Variations of the precision statement and of the experimental design specified in AOCS Procedure M 1-59 (2) are permitted, but only after approval by the Statistical Committee. AOCS Procedure M 2-65 describes in detail the approved format for AOCS Methods (2).

*Official and Tentative Methods* contains several types of procedures. All new methods are published as "tentative" for at least a year to give opportunity for suggestions and criticisms before adoption as official. Those that have been tentative for a minimum of 1 year are raised to official status and are used for referee purposes by approved AOCS laboratories. Recommended practices are those procedures or guides published as an auxiliary to AOCS methods and are intended to assist the analyst in a choice of methods and in the interpretation of results. A recommended practice may also be an actual method which is published for information of the analyst. A recommended practice of this type, of course, carries no official connotation for referee purposes, and for identification is printed on colored paper.

The process for acceptance of methods is quite straightforward. The Uniform Methods Committee, presently consisting of eight members and a chairman appointed by the president, receives suggestions for improvement of old methods or the need for new methods. Such requests may come from any member of the Society. Development work is assigned to the appropriate committee, or a new committee may be appointed if needed. Every method which has been developed by a technical committee, subcommittee, or task group must have a two-thirds affirmative vote from that committee to recommend it for consideration to the Uniform Methods Committee, which must also approve it by the same margin. The editor then prepares it for publication as a tentative method. Although all new methods must remain "tentative" for a minimum of 1 year before adoption as "official," a tentative method that has been published for 4 years without being raised to official will be removed from *Methods*. A revision in a method must be handled in the same manner as a new method.

In practice, this system has produced high quality analytical methods suitable for referee purposes. Every effort is being made to keep these methods current and to introduce new methods as they become available but, at the same time, to retain those procedures which, although apparently obsolete, are still in use in many laboratories around the world. The Society is also willing to consider for adoption in *Methods* those procedures that have been developed by other organizations if these methods have been studied collaboratively and can be statistically validated, and provided that the usual acceptance procedures are observed.

The position of the AOCS in respect to methods and certification can be stated succinctly. The need for official methods is obvious, and the advantages of Referee Chemists (certification) are many. The AOCS is proud of the role it has played in both of these areas and is particularly gratified with the success of this system in bringing together buyer and seller in today's difficult trading arenas. The Society recognizes that this effort is voluntary and is possible only through the untiring efforts of many dedicated committee members. The president wishes to take this opportunity to invite the chemists and laboratories of other countries to make use of this unique program and to collaborate with the AOCS in the further development of uniform methods and establishment of standards so that together we can use unified procedures to facilitate international trade in this rapidly changing world.

### REFERENCES


1. Chem. and Eng. News, March 31, 1975, p. 18.
2. "Official and Tentative Methods of the American Oil Chemists' Society," Vol. I & II, 3rd Edition, Edited by W.E. Link, AOCS, Champaign, IL, 1973 (revised to 1975).