ether-soluble lead salts contained any detectable quantity of myristic acid.

The acids from the four distilled ester fractions, which were isolated and identified in each case, confirmed the deductions previously made from the mean molecular weights of the saturated acid esters.

The composition of the oil in terms of glycerides is given in Table 4.

TABLE 4—Glycerides of—

| | Per Cent |
|---|---|
| Oleic | 27.41 |
| Linoleic | 41.20 |
| Linolenic | 21.54 |
| Palmitic | 4.59 |
| Stearic | 4.10 |
| Arachidic | 0.08 |

## SUMMARY

Lumbang oil expressed from kernels of Philippine nuts in 1936 and 1921 was found to contain 8.4 and 8.3 per cent respectively of saturated acids, whereas only about one-fourth of this quantity has been reported by previous investigators.

No elaeostearic acid could be detected.

The characteristics of the oil have been determined, as well as the approximate percentages of the component fatty acids.

# THE APPLICATION OF CHEMISTRY TO THE LAW OF COMMODITY CONTROL*

By M. F. LAURO

BUREAU OF CHEMISTRY, NEW YORK PRODUCE EXCHANGE, NEW YORK, N. Y.

TO those momentarily interested in litigation, law represents simply a means for settling squabbles among men. In its largest sense, however, it is more than a mere temporary expedient. It signifies all those rules of action evolved in the course of human progress which are designed to control man's conduct in a world of infinite enterprise. In the complicated industrial society of today, human activities are so affected by the technical sciences that the specialist in any field of endeavor finds that he must narrow his sphere of action more and more as the years roll on and yet widen his background to include a greater infusion of those sciences that are closely related. This is especially true of the attorney, who finds most of his practice whittled down to a mere shadow of former years and any future business dependent on a combination of law with some other line. Hence the modern curriculum includes of necessity such separately treated departments of positive or man-made law as medical jurisprudence, aeronautical law and the law of business accounting. And in time we shall see a special branch under the designation of chemical jurisprudence, taught as a separate subject, dealing with the body of rules governing the merchandizing of commodities.

To most, this implies the administration of the pure food and drug laws of state and nation. The peculiar jurisprudence dealing with commodity control, however, is a broader conception, as it takes in the basic common law and the sales act as well. It also concerns the merchant in general, whether manufacturer, grower or dealer, buyer or seller, producer or consumer, and its subject matter is his wares; the quality and the nature of his products or article of trade.

Back of it all lies the science of chemistry. Analysis is required to determine the defects in food, drugs and the wares of commerce. A knowledge of the composition of matter, its properties and its reactions, becomes the useful handmaid in the interpertation of what law is applied here. The chemist becomes the indispensable referee, in the first instance, of quality and purity of merchandise, and the law must take cognizance of his science in deciding such issues as proper labeling, adulteration, wholesomeness and merchantability.

Under special circumstances, a knowledge of chemistry is of material help in the interpretation of what constitutes fungible goods, divisible contracts, as to when goods may be said to be put into deliverable state or appropriated to a contract, in differentiating between bailment and sale in those cases where raw materials have been delivered to another for manufacture into other forms, in drawing the distinction between sales and contracts for labor, service or material for goods not in existence, on the question of inspection and acceptance and on the question of measure of damages. Many cases can be dug out of the law books to illustrate the instances where the chemist played sometimes a minor and more often a major part in the arrival at a decision by the courts.

In the manufacture, sale and consumption of goods, some of the older remedies co-exist, on contract or in tort, along with those remedies later given the injured party by act of legislature. But the common law was never particularly interested in the ultimate consumer or the public; as a matter of fact, "caveat emptor" or "the buyer beware!" was the established principle of trade. Legislation substituted the more enlightened precept of "caveat venditor," and added considerably to the small burden of liabilities and duties imposed on the merchant by common law.

The personal property or sales act of a state define the implied warranties in any sale by description and by sample. Cases construing these sections are an excellent illustration of the injection of analytical chemistry into the subject matter of the litigation, quite often concluding the argument.

The classic example of Hawkins vs. Pemberton (51 N. Y. 198) turned upon the chemical analysis of what plaintiff had represented as "blue vitriol, sound and in good order," which the defendant found through his chemist to be mostly green vitriol, a product, stated to be "not only inferior but different." It was held that under the circumstances there had been a warranty at the auction that the article sold was blue vitriol, which had been

*Taken from a thesis, submitted for the degree of J.S.D., 1935, Brooklyn Law School.

breached, however, by the delivery of an article not corresponding to this description. In any sale by sample, it is also evident that a chemist may furnish the best proof as to whether or not, on delivery, the goods in bulk correspond to the selling sample.

Implied warranties do not run with the resale of an article; to establish liability there must be privity of contract. Hence a manufacturer or seller of food or other article of personal property is not liable to third persons. (Chysky vs. Drake Bros. (235 N. Y. 468). Members of a family, servants and guests are accordingly barred from suit in the case of defective food eaten at a meal at which all were present, though the individual who bought it may recover under the privity of contract rule.

The implied warranty of merchantability exists in a sale by sample, thus exempting such sales from the rule of caveat emptor, because of the lack of opportunity in the buyer for personal examination of the bulk of the commodity which the sample is shown to represent. The implied warranty of fitness for use exists only where the buyer makes known to the seller the particular purpose for which the goods are required AND relies on the vendor's skill or judgment. As to foodstuffs, this supersedes the common law warranty of wholesomeness (Race vs. Krum 222 N. Y. 410, where the court held that sales of food for immediate use by a retail dealer carried a warranty of fitness for human consumption). Now the law explains the exception as to foods, in construing the statute, by the presumption that the mere purchase by a customer from a retail dealer in foods of an article ordinarily used for human consumption, does by implication make known to the seller the purpose for which the article is required (Rinaldi vs. Mohican 225 N. Y. 70). If the buyer has examined the goods and should have discovered the defect, there is no warranty. It may be shown that the buyer exercised his own judgment, thus disproving reliance on the seller's skill or knowledge. This warranty extends to food served in restaurants, so far as New York law is concerned (Temple vs. Keeler, 238 N. Y. 344), although elsewhere it is different. It does not apply in the case of patented or trade-named articles. Hence the housewife would be without remedy, either if she select the goods herself from the counter or orders them by brand name.

Advertisements have been construed as express warranties, regardless of the rule of privity of contract, impressing liability on manufacturers and distributors (Curtiss Candy Co. vs. Johnson, 163 Miss. 426). For example, in Baxter vs. Ford Motor Co. (168 Wash. 456), the final purchaser of an automobile recovered against the manufacturer by virtue of his advertising of "Shatter-proof Glass."

Regardless of any warranty, recovery may always be had if negligence can be proven. The difficulty is especially great where purchase is made through intermediates. However, MacPherson vs. Buick M. Co. (217 N. Y. 382) clearly defines the liability of the manufacturer for negligence to an ultimate purchaser, predicted on his duty, independent of contract, to make a thing carefully where its nature is such "that it is reasonably certain to place life and limb in peril when negligently made and there is a knowledge that it will be used by persons other than the purchaser." (Cardozo, J.)

It is interesting to note that violations of pure food laws have been held to show negligence on the ground that such statutes are primarily designed to protect the public from the very injury sustained. Thus, in Pine Grove Poultry Farm vs. Newton By-Products Co. (248 N. Y., 293), negligence was held as a matter of law, in the sale of impure feed in violation of the state farm and markets act. It is evident that proof of such violations would lie largely in the report of the chemist's findings.

Chemistry plays a prominent part in the sale of commodities on contracts. Most of the commodity exchanges and trade associations throughout the country have their own official chemists. Where they do not, they make frequent use of the public chemist. There is scarcely any exchange of goods or transaction of any sort involving commodities which does not require a certificate of purity and of quality from the chemist. The latter often becomes the absolute judge as to grade, nature and quality, freedom from defect and impurity, adulteration, and as to whether goods delivered are up to specifications or description, etc. These are matters which must be known first before the question of proper performance of contract can be settled. The fact that out of the many thousand transactions handled in this way, a very few ever develop sufficient friction to reach the courts, is one that can be credited largely to the decisive character of the work of chemists.

With the passage of the national Food and Drugs Act and the subsequent state statutes for which it served as a pattern, much of the law engendered has felt the influence of the chemist, since it is here more than anywhere else that chemical facts are more frequently applied. Side by side with lawyer and judge, he has contributed his share in the interpretation and making of the law. Pure food legislation came about after a long crusade, colorful and interesting in the extreme, chiefly through the efforts of the chemist, Dr. Harvey Wiley. This can be stated without detracting in the least the merit of many others in that "muckraking" period who added their bit to bring about laws in the interest of the consuming public.

The Act of 1906 prohibits interstate commerce in adulterated or misbranded natural or manufactured foods, beverages, stock foods, remedies, drugs and medicines. It was construed in Weeks vs. U. S. (721 Columbia) as prohibiting neither the misbranding nor adulteration of such articles, except in the District of Columbia and the territories, but only their shipment interstate or their receipt and delivery across such state lines in original unbroken packages. In other words, there is no violation until actual shipment is made. It does not prevent the starting up of branch factories in another state in order to avoid the necessity of complying with the federal law. A merchant may evade the net weight provision as to retail packages by shipping his goods in bulk across a state line and there pack in retail boxes. The Act applies, however, even though a shipment consists of raw material to be made up into a more complex food product (U. S. vs. Two Barrels Dessicated Eggs, 185 Fed. 302), or shipment is made to another state for the specific purpose of removing impurities there (Union Dairy Co. vs. U. S. 250 Fed. 231).

The states take on where the government leaves off, so that, unlimited by a commerce clause, they can regulate the actual manufacture and sale of goods, and in many cases have made the actual impairment of food and drug the offense.

Congress has not occupied the field to the extent of excluding the states from prescribing additional standards of purity for the privilege of retail sale, even though it be made in the original packages. Obedience to the federal act does not secure a right to interstate shipment free from the reasonable regulation of a state. Moreover, the Act does not apply to cases where the article is taken from interstate package upon receipt and put into other packages for sale within a state.

The secretaries of the Treasury, of Agriculture and of Commerce were authorized by the Act to make uniform rules for the carrying out of its provisions. As to these regulations, it is said, they have the force of law. On the other hand, the decisions of the Secretary of Agriculture, except possibly in the case of canned foods under the McNary-Mapes amendmentment, are only administrative standards, whose validity becomes a question for the courts to pass upon. They are designed to express the department's attitude in the interpretation of the law and are published as a guide to the trade in its transactions, so that merchants may get in advance the benefit of this construction.

The Act establishes legislative standards only in so far as it has incorporated the definitions and the standards of the U. S. Pharmacopeia and the National Formulary. They apply, however, chiefly to drugs. Congress has legislated specifically on butter. The McNary-Mapes amendment to the Act authorizes the Secretary of Agriculture to prescribe labels for substandard canned foods, which inferentially establishes standards for all canned goods. The District Court for the Southern District of Indiana held as unconstitutional a standard established under this amendment (Morgan vs. Nolan, 3 F. Supp. 143).

Proceedings under the Act are similar to those of any federal trial. Members of the administrative staff, very often chemists, appear as witnesses and in important cases, chemists and physicians from the outside are called upon to give their opinions. The evidence to prove guilt is secured through the analysis of any suspected product, which is collected by inspectors and sent to the divisional laboratories. The offender may be cited for a hearing. If action is contemplated, the solicitor of the Dept. of Agriculture looks into the legal aspects and prepares the necessary papers for the Dept. of Justice. Here the case is referred to the district attorney who will try the case. He files the information or presents the case to the grand jury for indictment and conducts the necessary legal proceedings. Trial is had with or without a jury and judgment imposed where guilt is found. Notice of such judgment is prepared by the solicitor and published by the Food and Drug Administration for public record.

Certain classes of actions may call for seizures. The actions on which these seizures are based usually precede the issuance of the libels for the condemnation of the goods. Any interested party may intervene as claimant. The proceedings must conform "as near as may be" to admiralty practice in such cases, except for the right of jury trial. The government has the burden of proof, but as this proceeding is not of a criminal character it need not be beyond a reasonable doubt. Both sides can appeal. The condemned product may be ordered destroyed, or, under bond, reconditioned to meet the provisions of the law and so released in the discretion of the court.

If the violation is of a deliberate character, the penal section of the law may be invoked. In that case not only are steps taken to remove the offending article (deodand) from the market by seizure, but in addition the owner is prosecuted.

In the majority of cases which are the result of misunderstanding or where the damage is not great enough to warrant removing the article from commerce, the usual practice is to give the trade notice that on and after a day certain legal action will be taken unless the violation is discontinued. A public hearing may precede the notice whenever the facts seem to warrant this. In this way interested parties are given the chance to discuss matters freely and voice their opinions. Facts from departmental investigations and from outside experts help to determine the proper administrative procedure.

Imported articles call for no court action. Foreign merchants are simply required to certify before the U. S. consular agents abroad, to certain facts regarding their products within the scope of the Act and to attach the certificates to the invoices for their examination by administrative officers here. An entire shipment may be held up pending an analysis of goods if there is any indication of failure to comply with the law. The importer is informed of the result of the analysis and given an opportunity to show why his product should not be denied entry. On failure to show cause, the collector of customs refuses to permit the goods to clear through. Appeal lies to the Secretary of Agriculture. The privilege of correcting a label to permit entry is given in the case of simple misbranding. It is also customary to release slightly adulterated goods after they have been reconditioned by sorting, cleaning or denaturing, to bring them within conformity to the law. This concession is extended only to those who through no fault of theirs have received such offending shipments, but not to those importers who have abused it in the past or have repeatedly requested it.

A dealer may exempt himself from prosecution under the Act if he possesses a guaranty from his vendor, signed by him, to the effect that the goods are not misbranded or adulterated within the meaning of the Act. This may also serve as a statutory defense in certain states except in the case of those dealers who know or ought to know that the article is a violation, or who continue to sell after notice by a state commissioner that the article is adulterated or misbranded.

In contested cases under the Act, judicial action is the final resort, except in the case of imports. There the goods are simply refused entry and destroyed if the owner fails to export or destroy them himself within thirty days. Each case stands on its own factual merits.

The technical nature of the issues involved in food and drug violations presents unusually difficult problems for the courts to handle. A jury of laymen works at a distinct disadvantage. Relatively few cases reach the Supreme Court and the decisions of the lower courts are not uniform, often conflicting. A knowledge of chemistry would seem to be a strong desideratum for both bench and bar.

Despite the individual character of each case, there are many that have been decided on analogy to previous ones. In consequence there has grown up a law peculiar to this type of litigation which, though it may not always follow set rules, nevertheless has reached a stage of development where precedent and authority may be cited

to show a definite trend of judicial thought. A study of the cases involved in each phase of the pure food and drug enforcement indicate as in other branches of the law, somewhat of the same continuity of legal development, from precedent to precedent, which would justify its separate treatment as chemical jurisprudence.

Cosmetics are not within the scope of the present Act. Only a few states, Hawaii and the District of Columbia have food and drug laws sufficiently elastic to include them. The proposed new federal Act is made to apply under the broader definition of drugs. At present, however, that term is limited to medicines and preparations recognized in the pharmacopeia and the formulary, and to substances for the cure, mitigation or prevention of disease in man or other animals. Food includes all articles used for food, drink, confectionery or condiment by man or animal, whether simple, mixed or compound. The terms drug and food are not mutually exclusive.

The Act provides for the examination of specimens of food and drug in the Bureau of Chemistry of the Department of Agriculture or under its supervision, for the purpose of determining whether such articles are misbranded or adulterated. The methods of analysis are those prescribed in the pharmacopeia or by the Association of Official Agricultural Chemists. The standards for drugs are to be found in the pharmacopeia and formulary, while the standards and definitions for food products are contained in the service and regulatory announcements of the department, most of which have been collected into one pamphlet as a guide for the officials of the department in enforcing the Act (S.R.A., F. D. No. 2. Rev. 4 Aug. 1933).

Misbranding and adulteration are the two topics with which the Act deals and which we shall discuss in their legal aspect. In the ordinary sense of the word, a label is a slip of paper attached to an article of manufacture for the purpose of describing it, or for specifying the quality, etc., or the name of the maker. Under the Act and its amendments, the label includes any legend, design or pictorial device on the container itself, circulars, pamphlets and the like packed with it, printed matter on the outer carton of the package and any such to which reference is made either on the label attached to the package or on the package itself. Hence the definition is quite inclusive but fails to cover advertising apart from the package, such as radio broadcasting in which most of the misrepresentation is done nowadays. An invoice is not a label.

The term misbranding applies to a label which is false and misleading as to the composition of the article and as to its place of manufacture or production. An article is deemed misbranded if it is an imitation of, or offered for, sale under the name of another article, if its contents have been substituted wholly or in part with another, if the label itself fails to state the presence of any of ten specified drugs (morphine, opium, cocaine, chloroform, etc.), if it purports to be a foreign product when in truth it is not, if it contains claims regarding curative or therapeutic effects which are false and misleading, and if it omits conspicuous marks of weight, measure or numerical count. A product plainly labeled as a compound, imitation or blend is no violation. Similarly if it is sold under its own distinctive name, provided it contains no deleterious ingredients and does not imitate or assume the name of another artcle.

The courts will consult trade papers, market reports, newspapers and even dictionaries to construe the term misbranding under the Act, regarding the generally understood signification of the label to persons of ordinary intelligence, familiar with the product and understanding the English language (U. S. vs. 75 Boxes Alleged Pepper 198 Fed. 935). It is immaterial that the label uses a term correctly characterizing the product to people in that line, unless through custom such a term has become so widespread as to negate the possibility of deception. Curiously enough, it is held that no commercial practice can legally establish a novel system of measures.

The requirement of a statement of quantity on packages permits reasonable variations. This does not make the provision unconstitutional as setting up too indefinite a standard in a criminal statute (U. S. vs. Shreveport Grain & El. Co., 287 U. S. 77). There can be no misstatement of the nature or the identity of an article (U. S. vs. 95 Barrels Vinegar, 265 U. S. 438), nor any implication of the presence of ingredients actually absent (Newton Tea & Spice Co. vs. U. S., 288 Fed. 475). Geographical names can be used only when such articles are produced at the place indicated, unless so generic through constant use as to mean type or class rather than place of production, as was the case with the Rocky Ford melon. A proprietary name is allowed where it has attained a secondary significance though destitute of any ingredients suggested by the original meaning (U. S. vs. Coca Cola Co., 241 U. S. 265). This is an important exception to the general rule that giving a proprietary product a name suggestive of absent ingredients is not to use its own distinctive name, but rather the name of a different compound and hence deceptive (U. S. vs. 150 Cases Fruit Puddine, 211 Fed. 360). Strength, quality, grade or purity are decided generally by chemical analysis, on the basis of which the courts may decide whether or not a product conforms to the representations of the label.

The Sherley Amendment was passed to take care of the decision in U. S. vs. Johnson (221 U. S. 488, 31 Sup. Ct. 627, 1911), which held that the term "misbranded" applied only to false statements as to the identity or quality of food and drug, but not to declarations concerning their therapeutic value, though false and misleading. The law now applies to this type of misrepresentation but the government must prove both falsity and fraud, which makes it a very difficult problem. The intent to deceive may be inferred from circumstances. The representation is not false if there is any difference in rival schools of medical thought. In this connection, the courts will take judicial notice of medical progress, so that what would pass as a remedy in one generation might fail in the next (Aycock vs. O'Brien, 28 F. (2d) 506, C.C.A. 9th, 1928, and U. S. vs. Tuberclecide Co., 252 Fed. 938).

The government must prove each case of misbranding, even though successful. But a decision for the defendant at once bars any further proceeding against his article so long as he keeps the same formula and label (Geo. H. Lee vs. U. S., 41 F. (2d) 460-462, C.C.A. 9th, 1930).

Adulteration has been defined by Bouvier as the act of corrupting or debasing, of mixing something impure or spurious with something pure or genuine, or an inferior article with a superior one of the same kind. The act gives it a two-

fold effect: economic and hygienic. The first involves the substitution of a cheaper though perhaps just as wholesome a substance, the removal of a valuable ingredient, the addition of something affecting strength or quality or the concealment of damage or inferiority by coloring, coating or powdering. The second considers the question of injury to the public health. Such is the case of filthy, decomposed or putrid animal or vegetable matter, or of added poisonous or harmful ingredients or of the product of a diseased animal or one that has died other than by slaughter. In the first class of cases, the consumer's health need not be concerned.

A drug is deemed adulterated if it fails to conform to the specifications of the U. S. Pharmacopeia and the National Formulary, unless a deviation from standard is declared on the label. Certain substances are banned from use in confectionery such as minerals, narcotics, poisonous colors or flavors, etc. A mere chemical trace is sufficient to condemn the product. If the normal strength of an article is reduced or diluted or if an ingredient normally present is found to be absent, adulteration exists. In the case of food products prepared for shipment by the external application of some preserving agent, containing harmful substances, which can however be removed mechanically or by macerating with water, as for example sprayed fruits and vegetables, the provision of the Act regarding added poison, etc., applies only when such products are ready for consumption.

Food need not be harmful at the time of seizure. It is enough that it can be proved to become so within a reasonable time. Nor does the government have to prove it must affect public health; it is adulterated if it may injure anybody. Human intervention likewise is unnecessary. Whether a food is naturally putrid or becomes so by accident, the Act still applies.

For accurate ascertainment of misbranding and adulteration, there must be suitable standards for comparison. No analyst can pass intelligently on samples collected in suspected cases of violations without a knowledge of the true composition of the products they purport to be. Hence the scientific staff of the Food and Drug Administration is constantly engaged in investigation and analysis, and their results in specific cases will indicate when prosecution lies, and become in the ensuing litigation the vital evidence for conviction. The chemist is therefore a prime factor in the establishment of the necessary standards, in the interpretation of merchantability, wholesomeness, misbranding and adulteration, without which the courts cannot proceed to render a just decision.

# COMPARISON OF TWO METHODS FOR THE DETERMINATION OF CONJUGATED DOUBLE BONDS

By K. A. PELIKAN, Ph. D., and J. D. von MIKUSCH, Ph. D.

WOBURN DEGREASING COMPANY OF N. J.,
CHEMICAL DIVISION, HARRISON, N. J.

EARLY in 1936 H. P. Kaufmann and J. Baltes[1] published a laboratory method to determine the number of conjugated double bonds in oils and fatty acids which they expressed in equivalents of iodine and called the "Diene Value."

> The weighed sample is dissolved in acetone and a known excess of maleic anhydride is added. This solution, contained in a sealed tube, is kept in an oven at 100° C. for 20 hours. After cooling, the solution is poured into water and an emulsion forms, which breaks after several hours. Finally, the maleic acid in the water solution is titrated with N/10 alkali after separating it from the oily layer by filtration.

Later, a similar method was suggested by B. A. Ellis and R. A. Jones,[2] requiring considerably less time and which they claim is "more on practical lines."

> In their directions toluene is used as solvent and the solution is refluxed for 3 hours or—after adding a small amount of iodine as catalyst—for 1 hour. After hydrolizing, ether is added and the excess maleic acid washed out in a separatory funnel for titration. A larger sample and normal alkali solution is used in this method.

While both groups of investigators have obtained approximately the same value of 70 for tung oil, and the theoretical value of 87 for β-elaeostearine, K. and B. have also tested their method successfully with anthracene and Δ9,11-linolic acid. Among the samples analyzed by E. and J. was one of "medicinal castor oil" for which they found the Maleic Value of 10.5.

Though E. and J. suggest the name "Maleic Value" for the new constant rather than "Diene Value," as preferred by K. and B., both values are calculated in the same manner in terms of iodine and should be identical.

As the Ellis method requires much less time it seemed advisable to compare the results of the two methods and if they should disagree to ascertain which one represents the amount of conjugated double bonds more correctly. The statement by E. and J. that: "This method (Kaufmann method) is not well adapted for general application, and the results recorded would seem to be subject to variations of considerable magnitude," calls for correction in as much as we had used this method for a number of determinations during the last year and could not complain of any considerable variations. In fact, we usually checked our results within a few tenths of a point. Though the long reaction time, requiring the leaving of the samples in the oven over night, was felt to be a handicap we never objected to the use of small quantities of a few tenths of a gram which is of the same magnitude as that used for iodine numbers and other determinations. Thus we can see no advantage in the use of samples of 3 or more grams in the Ellis method. The use of normal alkali as opposed to the more dilute solution needed for the Kaufmann method was also of no advantage in our case as standardized N/6 alcoholic KOH is used in our laboratory for acid number

[1]Fette und Seifen 43, 6-7, 93 (1936).
[2]Analyst 61, 812-6 (1936).