International

IUPAC unit elects Firestone

Former AOCS President David Firestone has been elected to succeed Prof. C. Paquot of France as president of the Commission on Oils, Fats and Derivatives of the International Union for Pure and Applied Chemistry (IUPAC).

Dr. Paquot, also an AOCS member, will serve through the meeting to be held Aug. 25-Sept. 2, 1981 in Leuven, Belgium. Dr. Firestone was elected to a two-year term beginning in 1981. Other officers will be Prof. Maurice Naudet of France, vice-president (to succeed Dr. Firestone as president), and Dr. A. Hautfenne of Belgium, secretary.

The 1980 meeting was held Sept. 2-4 in Paris. The 1981 meeting will coincide with the 31st meeting of the full IUPAC commission, whose meetings are held every two years.

The following report on the oils and fats' working groups (WG) on analytical methods was provided by Dr. Firestone.

TECHNICAL REPORTS

Total oxidized fatty acids by TLC (WG 2)

It was observed that the method using colorimetric detection of oxidation products was unsatisfactory as well as time-consuming. Dr. Pokorny recommended that study of the method be discontinued. The TLC method with quantitation by photodensitometry has already been accepted as a standard method of the Commission (see Method 2.503, Standard Methods for Analysis of Oils, Fats and Derivatives, 6th Edition, 1st Supplement [1979], Pergamon Press, NY). Dr. Johnson (Australia) recommended that the work group remain in operation to consider alternate methods for oxidized acids. Dr. Pokorny observed that liquid column chromatography should be investigated; Dr. Naudet suggested the use of HPLC; and Dr. Firestone briefly discussed Arthur Waltking's current work on methodology for analysis of oxidized fats using HPLC with refractive index and infrared detection. Dr. Paquot concluded that the work of WG 2 could be considered completed. Additional study in individual countries could lead to reactivation of WG 2 if future developments mandated reactivation.

Tocopherols in oils, fats and margarines (WG 3)

Examination of the AOAC and EEC methods for tocopherols (see 4 February 1980 minutes of the Commission) indicated no systematic difference between the methods. It was noted that gas chromatography (GC) was more reproducible than colorimetry. With the EEC method, GC was not satisfactory for analysis of tocopherols in olive oil. It was decided to prepare a text of the methodology in two parts: (a) preparative steps including TLC separation and recovery; and (b) determination of the tocopherols by colorimetry, and alternately by GC. Dr. Pokorny observed that oxidation products of the tocopherols also should be determined since oxidation can affect the ratio of tocopherols present in various oils. Dr. Johnson suggested the use of HPLC for tocopherol determinations. Several members also noted the current use of HPLC for tocopherol determination. Dr. Firestone noted a projected collaborative study by H. Slover (USA) of a GC method for tocopherols and sterols. Professor Paquot pointed out that non-HPLC as well as HPLC methodology was required to serve the needs of analysts in various countries.

Chlorinated pesticides in oils, fats and wool-wax (WG 4)

Dr. Zwerenz (Austria) observed that results of collaborative study by eight laboratories of methodology for wool wax was disappointing. He proposed that additional work include analysis of wool-wax containing 10 ppm levels of organohalogen pesticides, and that study be restricted to one method.

Polyunsaturated fatty acids (PUFA) (WG 5)

Dr. Levis distributed the text of the PUFA method. Dr. Beare-Rogers supported the position for a method specific for linoleic acid. Dr. Levin noted the use of the enzymatic method plus GC to determine linoleic acid specifically. The discussion continued with a review of the status of capillary column GC for specific determination of linoleic acid. Dr. Wolff said that ring tests were needed to determine the capability of capillary column GC for routine analysis under standardized conditions. Dr. Pocklington noted that conventional GC equipment was unsatisfactory for capillary column GC. Dr. Paquot said that one of the members should consider drafting a proposal for study of capillary column GC techniques, for discussion next year.

Heated fats (WG 7)

Dr. Wessels stated that the results of collaborative study of the Sen Gupta and Guhr column chromatographic method for "polar components" in frying fats was successful. He pointed out, however, that a small amount (up to 2%) of highly polar material was retained on the silica gel chromatographic column. He also said that standardization of the silica gel was not completely worked out, although the TLC step in the method was suitable for determining whether adequate separation of altered and unaltered triglycerides was attained on the chromatographic column. It was agreed that the method should be approved with determination of oxidized (altered) fat by difference (weight of sample minus weight of nonpolar material) and specification of "Silica Gel 60, E. Merck, or equivalent" as the column chromatographic adsorbent.

Emulsifiers in oils and fats (WG 8)

Dr. Bruschweiler presented a general discussion of methodology for separation and analysis of emulsifiers and distributed copies of a proposed method for determination of emulsifiers. The methodology involves separation of emulsifiers from fat by column chromatography, hydrolysis in alcoholic KOH solution, silylation of ester components and GC analysis of the silyl derivatives. Dr. Bruschweiler intends to conduct a collaborative study of the proposed method during the coming year.

Plastic monomers (WG 13)

Dr. Levin said that he reviewed available literature and could not find any suitable methods for further study. It was decided that additional search be conducted for acceptable methodology to determine, e.g., vinyl chloride and styrene monomer.

Analysis of glycerine (WG 16)

Mr. Moller said that five methods were ready for finalizing and publication.

Erucic acid (WG 18)

Dr. Wessels reviewed the results of collaborative study of a silver nitrate TLC/GC method (see 4 February 1980, minutes of the Commission, pages A-41–A-47) for determination of erucic acid in the presence of other docosenoic acid isomers (see 30 June 1980 Work Report, pages A-33–A-37). Satisfactory results were obtained with a sample (mixture of hydrogenated fish oil, rapeseed oil and sunflower oil) containing 14% erucic acid. It was noted that overlap of 20:4 and 20:5 with 22:1 can occur with GC packed columns. It was recommended that additional collaborative study be carried out with samples containing ca. 5% erucic acid.

Polycyclic aromatic hydrocarbons (WG 3/78)

Dr. Firestone reviewed available methodology and said that a suitable method would be selected during the coming year for investigation and collaborative study.

Solid content of fats by NMR (WG 2/78)

A discussion was carried out on the so-called "general procedure" for solid content involving continuous wave (indirect) or pulse (direct) NMR vs a rapid procedure described by Drs. Hendrikse (Netherlands). Dr. Hendrikse pointed out that he has developed a special method for cocoa butter and related fats (pulsed NMR) which requires no special pretreatment. He said that if tempering was conducted at the slip point, then less than 10% of solids (more than 90% liquid) is obtained. If the sample is then cooled to a low temperature for tempering, the solids go over to the stable form, but the liquid will, for the most part, not be converted to the solid, stable form. Dr. Paquot remarked that all three procedures (the two lengthy procedures of Naudet and Hendrikse's rapid procedure) should be published, noting the range of application of each method.

Erythrodiol in grapeseed oil (WG 1/79)

Dr. Gracian Tous will prepare a text of a procedure useful for determination of erythrodiol in olive oil, olive residue oil and grapeseed oil. It was pointed out that virgin olive oil unsaponifiables contain 2-5% erythrodiol, whereas olive residue oil unsaponifiables contain 15-20% erythrodiol. The method in question involves isolation of unsaponifiable matter, fractionation by TLC, acetylation of the dihydroxy triterpene alcohol fraction and GC of the acetylated derivatives. With betulin as internal standard, erythrodiol can be determined directly. A collaborative study of the method is planned this year.

Total sterols (WG 2/79)

Three methods were proposed for determination of total sterols including an enzymatic procedure (Dr. Karleskind) and a GC method (Dr. Pocklington). Dr. Pocklington discussed the results of a comparison study of the GC and enzymatic methods. Good results (quantitative recoveries) were obtained upon analysis of cholesterol standard solutions by the enzymatic procedure. However, poor reproducibility and unsatisfactory recoveries were obtained when the enzymatic procedure was applied to oil and fat samples. Dr. Wolff noted that the IUPAC method for sterols (Method 2.403) requires revision to give total sterol content (note: IUPAC Method 2.402 describes the determination of total sterols by their digitonides).

Solvent residues in oils and fats (WG 3/79)

Dr. Vos referred to methodology for determination of mineral oil residues proposed by Dr. Hendrikse. This method involves TLC on silica gel plates with hexane as developing solvent. Saturated hydrocarbons give R_f values of ca. 0.7. The TLC method gave satisfactory results in the hands of several members of the work group, although the method is at best semiquantitative. Dr. Firestone pointed out that the AOCS and AOAC have already developed and approved a quantitative column chromatographic method for saturated hydrocarbons (AOAC Method 281124-28.126; AOCS Method Ca 6c-65). Dr. Paquot remarked that the AOCS-AOAC method would have to undergo additional study by analysts in various countries using reagents available in these countries in order to validate the method as an international procedure. Dr. Williams pointed out that he had reported a method for detecting fuel oil contamination in 1938 (*Analyst* [1938] 63:84-93) which involved use of acetic anhydride to isolate hydrocarbons. Methods for hydrocarbons will undergo further study. Methodology for volatile solvent residue will be considered later. Dr. Vos requested that methods for residual solvents be sent to him for evaluation prior to the next meeting of the Commission.

Additional methodology

Dr. Pocklington suggested study of GC methodology for determination of triglycerides. Triglyceride composition is useful for identification of oils such as palm oil which may be fractionated to yield products whose fatty acid composition is not much different from the crude oil. Dr. Wessels suggested silver nitrate-TLC fractionation prior to GC analysis. Dr. Paquot suggested that a text be prepared for evaluation at the next meeting.

Dr. Pokorny suggested study of the TBA test, which is useful for analysis of oxidized oils. Dr. Johnson pointed out that the TBA test may be influenced by the presence of trace amounts of iron. It was suggested that the TBA test might be useful for analysis of butter. Dr. Paquot instructed Dr. Pokorny to prepare a text of the method for review next year. ☐

Brazil: Drive more, lose weight

This article was prepared by Dr. Roberto F. Kohlmann in Sao Paulo, Brazil. Dr. Kohlmann is a frequent contributor to JAOCS.

A few none-too-serious remarks about different ways to change our diet

Brazil relies heavily on petroleum imports – at present 80-85% of its needs. Although, until recently, the demand could be met – needless to say, at sharply increasing prices – the country is searching for ways to become less dependent on imports and reduce its vulnerability to sudden supply shortages or cutoffs, as happened during the Iraqi-Iran war.

How to replace petroleum? Use biomass!

Besides the obvious pressure to explore for more petroleum on land and offshore (so far mostly dry holes), the alternative option for local fuel supply is biomass, a renewable source which is now being exported. In Brazil, fortunately, electrical energy is plentiful at present, with 90% produced by hydroelectric generation, and with further expansions underway (Itaipu dam). There also is poor-quality coal available. However, the total fuel substitution of imported petroleum by biomass is hardly feasible and is still quite expensive at present. This should be adopted only in case of extreme necessity, once the only alternative is local fuel at *any* cost!

How to save gasoline? With alcohol

The first subsidized fuel substitution started with the introduction of ethanol into gasoline, about 10 years ago. Today 20% of anhydrous alcohol is mixed into all distributed gasoline. In addition, about 50% of all new cars are sold for operating with pure hydrated alcohol, which means that in 1981 about 500,000 new vehicles with enlarged fuel tanks, burning alcohol, will be sold and put on the roads.

Incidentally, this produces an annoying pollution. The intensive smell of acroleine/alcohol is perceptible already in the city of Sao Paulo, mostly in winter, on windstill days with thermal inversion. But to speak about this sort of pollution is taboo – the hangover comes later. A similar dilemma was faced by agriculture: should we die by insecticides or famine?

Let us return to the more positive outlook.

Alcohol is produced from sugar cane. Alternatively, the cassava root is being tested presently in an experimental plant as raw material (25 million tons of cassava roots are harvested yearly). The starch breakdown into poly- and disaccharides will be solved eventually by the use of microwave heating.

The sales price of gasoline (Americans would call it gasohol) is now a discouraging 2.80 US$/gallon, whereas the subsidized cost of ethanol is 60% of the gas price. In spite of 10-20% lower mileage for ethanol, there is still an interesting cost-saving, favoring the use and abuse of alcohol. Yes, indeed, you guessed it (we don't drink it. . .); people convert gasoline-operated cars into alcohol cars, through unauthorized mechanics, at half the price of US $480 charged by shops officially approved for converting, e.g., a VW beetle. Others add still more hydrated alcohol into the 20/80% gasoline cars, thereby spoiling the engines (carburator corrosion), or, even worse, the gas station owners let some more hydrated alcohol into the gasoline tanks, just "by mistake." The separated water hopefully remains at the bottom.

Anyway, this tremendous success of ethanol may result in a severe shortage of alcohol in the near future. Of course, there always remains the alternative of reducing the 20/80 mixture to 10/90 or 100% gas in order to supply the 100% alcohol fleet already on the road, from Beetles to Ford LTDs.

How to save diesel fuel? With vegetable oil!

Here we face a hairy problem. Public and cargo transportation moves on heavily subsidized diesel oil (against heavily penalized gasoline), which is being sold at present for about US $1 per gallon and certainly cannot be replaced by ethanol alone. What about soybean oil or peanut oil or any other?

Tractors have been operated on soybean oil quite successfully for months. Two buses were tested for nearly one year in Porto Alegre, running on an ethanol-castor oil mixture (something like brake-fluid) at incredibly high cost. Volkswagen is test-operating four cars with diesel engines using vegetable oil. With the right additive, the carbon buildup on pistons might be solved. At present, crude degummed soybean oil is quoted at roughly US $1.90 per gallon. If we eliminate the subsidy on diesel oil, soya oil might compete as fuel. Brazil's soybean crop of 15 million tons yields around 2.7 million tons of oil, of which local consumption will be about 1.2 million tons in 1981, leaving us still with 1.5 million tons of fuel substitute! But, as any change will take time, there is no immediate danger of the international trading market going crazy too soon. Nevertheless, there is a faint possibility that a new factor might be added to the commodity price structure, that is, the cost of petroleum and the break-even of its derivatives against vegetable oils. After all, the consequences for the world market remain unpredictable if, by necessity, part of the world production of vegetable oil (less than 50 million tons) has to be burned in engines by some food-exporting countries which are poor in petrol. Will our diets change?

Our new diet: fewer calories – more wheels!

Grossly oversimplified, one could imagine Brazil in an emergency situation, which by and large has already developed, sacrificing calories in order to keep vehicles moving.

The food faddists would be happy: less sugar, less fat.

The nutritionists would be triumphant: drive more, eat less and reduce your weight.

The police would acknowledge: moved by alcohol – only the car, not the driver.

The economists would not need any more credibility (it's lost anyway) because Brazil's negative trade balance would no longer be so badly affected by expensive petroleum imports, only partly set off by vegetable oil exports (let's not figure it out!)

The futurologists would be right: Brazil will surprise you! ☐

OTAI to hold symposium

The following report from India was provided by JAOCS International Correspondent K.D. Krishnan in New Delhi, India.

The Oil Technologists Association of India's Southern Zone organization will hold a symposium on Feb. 14, 1981, aimed at finding ways to make oilseed processing more efficient and economically attractive.

The symposium will be held at the regional research laboratory.

India's requirements for fats and oils are rising faster than domestic oilseed production. The symposium will explore whether oilseed growing could be made more profitable with more oilseed processing facilities in the nation. Among topics discussed will be the existing and potential capabilities in India to design and build machinery to modernize oil mills and oil processing facilities. Economic use of by-products also will be considered, possibly as substitutes for products currently derived from petrochemicals.

The OTAI Central Zone held a seminar on Nov. 29, 1980, in Kanpur, on the use of fats and oils for surface coatings, edible oils and vanaspati. The Northern Zone organized a one-day workshop for Nov. 2, 1980, on the reclassification of edible oil and fats under India's Prevention of Food Adulteration (PFA) Rules.

The OTAI Eastern Zone is participating in research work on dewaxing of rice bran oil, which is being conducted in the department of applied Chemistry at Calcutta University. Lecture topics at the 1980 Eastern Zone meetings included "Application of Gas Chromatography in the Analysis of Fats and Oils," "Environment Pollution and Treatment of Effluents," "Processing of Rapeseed Oil in Canada," and "Processing of Palm Oil."

A residential refresher course on "Specialized Processing of Oils and Fats" was held Dec. 7-13, 1980, at YMCA International House. A one-day seminar was held Dec. 13 in Bombay on developments and difficulties in establishment of red oil palm plantations and processing of the palm fruit to obtain oil. ☐

Malaysia opens commodity exchange

The following report was provided by JAOCS International Correspondent R.N. Muthurajah of the Palm Oil Research Institute in Kuala Lumpur.

The Kuala Lumpur Commodity Exchange (KLCE) opened for business on Oct. 23, 1980, providing futures trading in crude palm oil. Later the exchange hopes to provide trading in other area commodities, including tin and natural rubber.

Malaysian observers say the exchange will permit more effective hedging in palm oil futures than has been possible through foreign exchanges where soya oil and other vegetable oils were of prime concern.

Prices for crude palm oil during the summer of 1980 were relatively low, partially because of lack of interest in European markets for crude palm. ☐