

Irradiation testing at W.E.J. Laboratory

Food preservation is one of the longest-standing objectives of food science and treatment with energy-rich radiation is now widely used. Shortly after the discovery of x-rays, the germicidal effects of irradiation were documented and in the 1950s, intensive research was carried out. At the end of the 1950s, the first commercial applications of food irradiation took place.

The radiation sources must fulfil two criteria:

- 1) radioactivity must not be generated in the product;
- 2) the radiation has to be powerful enough to affect the whole product.

Only two sources fulfil these criteria:

- electron beam;
- the more common gamma radiation, which results from the nuclear disintegration of cobalt-60 or caesium-137.

The treatment may be used for different purposes, for example:

- prevention of germination and sprouting of potatoes, onions and garlic;
- disinfection by killing or sterilising insects which infest grains, dried fruit, vegetables or nuts;
- retardation of the ripening and ageing of fruit and vegetables;
- prolongation of the shelf-life of food and prevention of food-borne diseases by reducing the number of viable micro-organisms in meat, poultry and seafood;
- reduction of the incidence of micro-organisms in spices and herbs.

In practice, the use of this technique is rather limited, even though it is authorised in many countries.

The treatment of ionising radiation of a specific food item may only be authorised if the following criteria are satisfied:

- a) there is a reasonable technological need;
- b) no health hazard is presented;
- c) it benefits the consumer;
- d) it is not used as a substitute for hygiene and health practices or for good manufacturing or agricultural practice.



EU Member States may also maintain restrictions or bans on irradiated foods until the completed EU-wide list of products authorised for irradiation is in force.

In the USA, any food that is irradiated as such or contains irradiated food ingredients must be labelled with a symbol and the term "irradiated". The

term "cold pasteurised" can also be used. Since 11 September 2001, the use of irradiation treatment increased due to the fear of anthrax contamination and other biological threats.

At the end of 2002, Eurofins-W.E.J. had established a new laboratory section for irradiation testing in food, dietary supplements and food additives according to the EN-methods (13751^a, 1788^b, 13784^c, 1784^d, 1785^e, prEN 13708^f).

The investment so far includes photon stimulated luminescence^a (PSL) and thermoluminescence^b (TL), as well as DNA-comet assay^c. Furthermore, the laboratory is now able to perform the analysis for the identification of hydrocarbons^d and alkylcyclobutanones^e, compounds that result from irradiation treatment of fatty products. As these chemical compounds are inferred to be carcinogenic, the demand for their detection is increasing. The electron spin resonance^f (ESR) system which W.E.J. plans to purchase in the near future will enable it to check packaging materials for irradiation as well and cover the whole spectrum of European irradiation testing methods. These EU methods are also used in official laboratories and therefore enhance the credibility of W.E.J.'s laboratory services.

Worldwide, about 200.000 tons of food are irradiated, of which the biggest proportion is accounted for by spices. The number of foods to be irradiated is increasing. A study in the UK showed that 42% of all dietary food supplements have been irradiated. Only eight Member States have a monitoring system for irradiated products ●

Silke Bruns

Silke.Bruns@WEJ.de

Dr. Sebastian Kastrup

Sebastian.Kastrup@WEJ.de

The programme of the 7th International Symposium on Food Authenticity and Safety (October 15-17, Nantes) is enclosed.

More information : www.eurofins-fasis.com or phone. +33 (0) 2 51 83 21 12

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Product Emission Testing - Value for Industry and Consumer

Most people spend 90% of their time indoors. Therefore, it is essential to design and provide good indoor air quality and a healthy working environment. Poor indoor air quality may cause health problems such as headaches, abnormal tiredness, malaise, irritation of mucous membranes in nose and throat, eye irritation, and skin problems.

Products such as paints and lacquers, floorings and adhesives, textiles and cupboards liberate chemicals, particularly organic vapours. This impairs the quality of indoor air by chemical contamination and by generating bad odours. It is important to perform emission tests under controlled laboratory conditions to understand fully the effects of the emissions on indoor air quality.

EU directive and labelling systems

EU directive 89/109/EEC on construction of buildings claims that hazardous gases and particles should be avoided in indoor air by using low-emission products. Consequently, many countries have established legal or voluntary systems for emission control of formaldehyde and other hazardous substances in furniture, carpets, floorings, adhesives, etc. Similar initiatives have been taken in the USA, in Japan, and in other countries.

Such labels are designed to help consumers buying low-emission products and are important selling tools for manufacturers. An overview can be downloaded from the Internet at www.eurofins.dk. Some examples include:

- EU flower - Europe
- Nordic Swan - Scandinavia
- Blue Angel - Germany
- Umweltzeichen - Austria
- EMICODE for flooring installation products, Europe
- GuT for carpets, Europe



- M1 emission classification - Finland
- Indoor Climate Label - Denmark, Norway
- CRI Green Label for carpets, adhesives and cleaners, USA
- AgBB-construction products under EU directive (hygienic requirements), Germany
- Natureplus, Europe

Eurofins can help manufacturers with testing and application for most of these labels. This includes the potential for saving resources by using one laboratory test result for several of these labels.

Product Testing

Eurofins runs one of the largest private laboratories in Europe for testing of products for their impact on man and the environment, as regards chemical hazards and other related components. The Centre for Product Emissions Testing located in

Denmark has customers in 14 European countries, in the USA and in Japan. It acts as a consulting partner to several industries and authorities. Manufacturers use Eurofins for documentation of compliance, and for their R&D programmes. Building companies use the Eurofins' services for investigation of emissions from products before they are incorporated into a new construction and authorities and consumer organisations here find experts for investigating market samples.

Eurofins tests and services include:

- testing of chemical emissions from construction products, industrial products, and consumer products (sophisticated chamber tests and more simple testing procedures);
- testing of odour characteristics and odour thresholds of substances and products, and gas chromatography with sensory detection;
- testing of migration of chemical substances from e.g. plastic and rubber into media such as food-stuffs, baby saliva, and skin fat;
- design, acquisition, and management of research projects on these subjects;
- consultation and support to clients on the above areas and related fields;
- contributions to relevant developments in task forces and standardisation committees.

Eurofins is known for its custom made test programmes and optimisation of the information/costs ratios. Knowing that industries may draw essential conclusions from the test results, the laboratory guarantees high quality and reliability of the tests - and comprehensive consultation on how to deal with the results ●

Reinhard Oppl
ro@eurofins.dk

Olive oil sensory testing



History

Over many years the olive oil market has experienced much negative publicity. One of the first olive oil scandals occurred in 1981, when industrial denatured rapeseed oil was sold as edible oil to Spanish consumers. 25,000 people became ill, of whom 300 died.

Further problems arose in 1988 when high concentrations of the cleaning agent perchlorethylene (PER) were found in olive oil.

More recently there have been positive laboratory results for organic residues such as benzene, dioxins and PAHs.

Implementation of more extensive quality control

Currently, the quality of the olive oil - which depends on the origin of the oil as well as on the processing procedures used - is in the public eye. The EU-Regulation for olive oil consists of 10 articles and 17 appendices regulating limit values for undesirable ingredients including halogenated solvents and organoleptic compounds. Thus far, the quality of the oils has been measured by different chemical (peroxide value or quantity of free fatty acids) and sensory methods. One of the most frequently requested parameters in the Eurofins laboratory is sensory testing of olive oil in accordance with EG 1683/92.

Demand for sensory testing in Eurofins' Hamburg laboratory W.E.J.

The demand for sensory testing of oils and fats in the laboratory was found to increase by 80% in 2002 as compared with 2001. Since 1998, the samples received for sensory testing have in general increased more than fivefold. The clients comprise wholesalers, traders and raw material suppliers. The analyses for fatty acid profiles, for classification in accordance with EU-regulation as well for organic residues have also increased demands for oils and fats matrices. Capacity for sensory testing is limited at present, but investment in this area is being considered for the future.

Olive oil panels

Mr. Lothar Börs, who has worked for more than seven years in olive oil analysis at W.E.J. is also a member of the German olive oil panel (DOP = Deutsches Olivenöl Panel) which provides the Eurofins laboratory with expert knowledge of sensory testing. In 2001, after three years of preparatory work, DOP finally realised its aim of being accredited by the IOOC (International Olive Oil Council).

Moreover, the German Bundesanstalt für Getreide, Kartoffel-und Fettforschung in Münster is also working on the establishment of a second panel that expects to be accredited by the IOOC in the future. Members of the panel working group include so far three experts from the W.E.J. laboratory ●

Lothar Börs
Lothar.Boers@WEJ.de

Pleased to meet you! – Meat to please you?

A popular turn of phrase among butchers - but is our meat everything it seems to be?

The meat trade is an international business. In finished products such as convenience foods or mixed meats it is often difficult to identify the meat species present.

Why is it necessary to identify the meat species in these products?

Firstly, some ethnic groups are not allowed to eat certain types of meat. For example, pork is not permitted in Kosher and Halal foods. Furthermore, allergies are on the increase, and some people have allergic reactions to meats and other animal products. For these groups it is essential to provide correct information on the label to allow the consumer to make an informed choice. Last but not least, there are premium meats which, once processed, cannot be distinguished from lesser quality meats.

Which technologies are being used for the detection of meat species present?

The methods used largely depend on the type of analysis required. There are two main approaches: DNA-based methods such as specific Polymerase Chain Reaction (PCR) and Restriction Fragment Length Polymorphism (RFLP), and antibody-based techniques such as Enzyme Linked Immuno Sorbent Assay (ELISA). DNA techniques make use of the unique DNA sequence of each animal species while antibody-based techniques recognize the structure of a protein specific to the species. Here are some case studies:

Case A:

A producer buys a meat mix which is described as diced venison for a salad. A premium price is paid for this meat. The producer asks if the product consists exclusively of venison or also contains other (cheaper) meats, such as beef. In this case, a technique called RFLP is used to identify all types of meat present in the product.

Case B:

A consumer complains about a skin rash that developed after he had eaten a turkey and mayonnaise sandwich. The consumer knows that he is allergic to pork and suspects that traces of pork may be present in the sandwich filler. The retailer submits the product for specific PCR analysis to detect even traces of specific meat(s), in this case pork.

Case C:

The producer buys in a meat mix product where a minimum of 30% beef is guaranteed. Here, ELISA is used to determine the approximate percentage of the beef proteins present in the product.

Whichever technique is applied: DNA or antibody-based, it is crucial that whoever is performing the analysis has experience of the matrices analysed. For example, DNA assays are prone to cross-contamination while antibodies may cross-react with a similar protein. The accredited Hamburg-based laboratory Wiertz-Eggert-Jörissen, member of the Eurofins Scientific group, has extensive experience in PCR-based and ELISA-based assays. The individual steps of the analytical procedure are carried out in separate rooms to ensure that the risk of cross-contamination is minimised. To avoid erroneous results, appropriate controls are always used as part of the Quality Control and Quality Assurance procedures.

Successful participation in international proficiency testing schemes provides proof of the competence in this field.

However, continuous development to extend the portfolio of assays is needed, including new species tests and real-time PCR-based quantification. Here, the Eurofins Scientific Analytics laboratory in Nantes, France, is involved in two European projects - DNAIQ and MOLSPECID - dealing not only with meat but also fish speciation and quantification ●

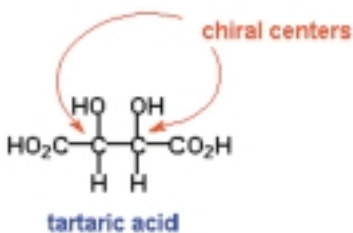
Bert Pöpping

BertPopping@Eurofins.com

Isotopic analysis of tartaric acid to check its natural origin

Tartaric acid was discovered many years ago as its potassium salt precipitated from wine. It was first isolated by Scheele in 1769, and its chiral properties were studied by Biot and Pasteur in the 19th century. The structure of the tartaric acid shows that it has two chiral centres resulting in four possible three dimensional arrangements of the functional groups involved and four different "tartaric acid" products (see below).

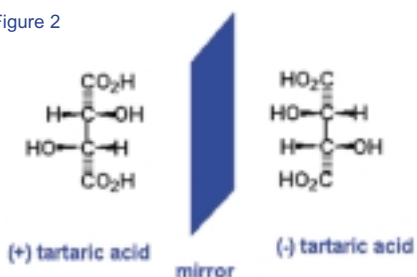
Figure 1



the two isomers of tartaric acid shown in Figure 2 are the optically active forms.

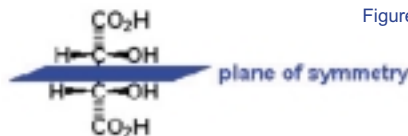
L(+)-Tartaric acid is the form that occurs naturally (especially in grapes).

Figure 2



- the racemic acid that Pasteur studied was a 1:1 mixture of these two enantiomers (DL-tartaric acid).
- meso-tartaric acid (Figure 3) is optically inactive because it has a plane of symmetry.

Figure 3

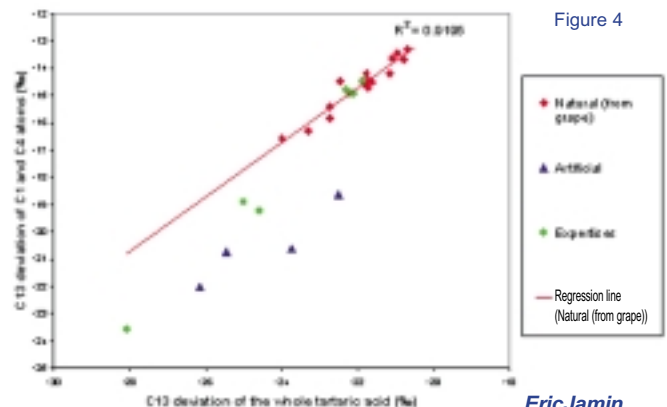


The different chemical forms of tartaric acid and its derivatives (salts, esters) are widely used as additives in the food and pharmaceutical industries. Although most are produced from "tartar", a by-product of the wine industry, currently synthetic petroleum by-products are produced on an industrial scale, especially in China. This is also the case for L-(+) tartaric acid. Given the increasing consumer demand for natural products, the authentication of the natural source of a product is becoming more and more important. In wine, the use of tartaric acid is authorised in accordance with the International Wine Codex and European legislation (EC regulation 1493/1999). Recently, the European Commission officially restricted the use of tartaric acid to that of

agricultural source only in order to preserve the "natural" status of wine (EC regulation 2244/2002).

Our laboratory has investigated the possibility of differentiating between tartaric acids of both petro-chemical and plant origin using isotopic techniques. This was successfully achieved using a global and positional ¹³C-IRMS (Carbon 13 Isotope Ratio Mass Spectrometry) analysis, after selective degradation of the tartaric molecule. A preparative HPLC procedure was developed and validated in order to isolate pure tartaric acid from wines and grape juices, making it possible to detect the addition of exogenous tartaric acid of non-agricultural origin to these products ●

Figure 4



EricJamin

EricJamin@Eurofins.com

Control, management and use of food safety data and information: a strategic tool for decision making since the recent crisis?

The answer is no longer in doubt. But the huge volume of information makes it a very difficult task.

The OJ of the European Union publishes on average 58 pages per day! Even if the European Commission announced its intention to reduce the body of texts by 25%, and in particular those related to food safety¹, the treatment of the information requires huge resources.

It is unlikely that food manufacturers will be satisfied with simply fulfilling the requirements specific to a given finished product. Expertise in various areas is necessary to manage concerns related to emergent new hazards or "exotics" which often come in the form of contaminants or residues.

The trade associations and the various technical institutes have never been as active in providing technical support as they are today. This increased demand for their services bears witness to the need of manufacturers for permanent support in the design and implementation of effective policies addressing preventive food safety management. In this area one indispensable tool is information. The "anticipated" (almost preventative) control of all food-stuff components, through the provision of associated information, becomes crucial. This concern applies equally to raw materials, various ingredients, packaging, the environment and technology.

However, and contrary to generally held opinion on the subject, an effective monitoring system does not generate any new information.

It gives the professionals global solutions to facilitate the monitoring of food safety procedures. One of its principal benefits is the easy access to infor-

mation which, due to its volume and storage in various locations, would otherwise be difficult to process.

In October 2002, the consultancy department of Eurofins in France launched Vigial[®], an adaptation of its own monitoring system. Vigial[®] is an online food safety information system organized by food sectors. It integrates the three key elements of a complete information monitoring system:

- recalls and withdrawals of products in Europe, USA and parts of Asia;
- news of food safety initiatives involving government and industry professionals;
- European regulation and its implementation in local policy.

These elements are supplemented by parliamentary questions and the memoranda of the Administrations.

The daily update of this website is guaranteed thanks to the use of up to 150 information sources. These include food safety agencies, various national and European bodies, Internet sites, professional, press and others dedicated to food safety. Information is organised and supported in a very user-friendly manner. Those who are expected to use the system include general and operations management teams, quality directors, the food safety and technology departments of retailers, catering companies and manufacturers.

The user can access the required information according to the following criteria:

- the nature of the documents (policy requirements, alerts, news);
- the danger or hazard in question (chemical, microbiological, or others);
- key word (via an integrated search engine).

The main advantage for the users of Vigial[®] is 'one-stop' access to all the organised information.

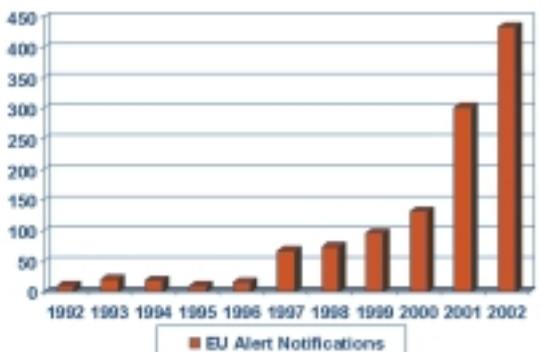
Initially, Vigial[®] will be launched in French only, although it should become available in English within a few months ●

Fayçal Bellatif

FaycalBellatif@eurofins.com

¹ source "Les Marchés" February 18, 2003

² You can visit Vigial[®] at www.vigial.com



Source: EU Rapid Alert System for Food and Feed

News in brief...



7th European Biotech Crossroads
"Biotech-Nantes 2003"

September 25-26, 2003, Cité des Congrès
Conference Centre, Nantes, France

The 7th European Biotechnology Crossroads – "Biotech-Nantes 2003" which is one of the major annual events of the sector, will assemble 4000 professionals from all over the world in September 2003. This event will enable the participants to meet the key players of the biotech industry and to give a boost to the development of new projects via seminars, a business partnering conference and an exhibition.

Eurofins will be represented at Crossroads, with presentation of two scientific seminars, one by Dr. Gilles Martin, the C.E.O. of the Eurofins Group and the other by Dr. Andreas Pardigol, Molecular Biology Business Unit Manager of our Nantes laboratory. "Biotech-Nantes 2003" will also be the occasion at which Eurofins will inaugurate its new premises in Nantes.

www.biotech-nantes.com,
Phone: +33(0) 2 40 25 27 20



Eurofins Scientific is organising the 7th Food
Authenticity and Safety International
Symposium (FASIS)

October 15, 16 and 17, 2003 - Nantes, France

Topics discussed will include state of the art analytical methods, their implementation, application and interpretation including: allergens, farm to fork traceability, protection of brand and origin denomination, checking of raw materials and authenticating consumer products. The quality control aspects will be considered in each case, including the latest regulatory issues and risk management tools.

All topics will be dealt with in conference style presentations and round table discussions, with French and English as official working languages.

www.eurofins-fasis.com,
Phone: +33(0) 2 51 83 21 12

Eurofins Scientific CZ :
Milan Hajek
E-mail : MilanHajek@eurofins.com

Eurofins Scientific France :
François Vigneau
E-mail : FrancoVigneau@eurofins.com

Eurofins Scientific US :
Lars Reimann
E-mail : LarsReimann@eurofins.com

Eurofins Scientific Denmark :
Allan Steen
E-mail : as@miljo-kemi.com

Eurofins Scientific Netherlands :
Mercedes Prinsen
E-mail : m.prinsen@analytico.com

Eurofins Scientific Germany :
Silke Bruns
E-mail : Silke.Bruns@wej.de

Eurofins Scientific UK :
Stewart Hollington
E-mail : StewartHollington@eurofins.com

Newsletter editorial team:
M. Lees, F. Vigneau,
S. Noster-Vallée, M. Champion
M. L. Martin, G. Fuchs, L. Reimann,
Design and creation:
Patrycja Blazejewska - Michel Fournier

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