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Plastic Package Chromatographic Analysis Lab Document: Functions and Services of Labthink Lab Chromatographic Analysis Lab

Abstract: this article presents a detailed introduction to the method and necessity of residual test of complex package. At the same time, it provides the functions and services of Labthink Chromatographic Analysis Lab.
Key Words: solvent residue, lab, gas chromatography, test

The security of polymer materials applied in food package has always been one disputable issue. The previous disputable subject always focused on whether polymer materials will produce harmful free monomers in the process of application. However, the accidents of residue excess in recent years happened in an endless stream, which made the polymer package safety attract wide attention. With the compulsory 3C authentication, solvent residue test of polymer materials has become essential.

1.Background Information of Test

As one common packing material with excellent properties of various polymer materials, complex materials can efficiently prolong quality guarantee period of products. Solvent residues generally arise from processing process of printing ink, solvent, and manufacture; and may be influenced by the quality of printing ink, drying speed of diluted solvent, machine performance, environment as well as the structure of package. At present, domestic packing and color printing industries mainly adopt organic printing ink, and use high temperature drying to eliminate organic solvent. However, the unequal volatilizing speeds of solvents, such as methylbenzene, butanone and ethyl ester, result in unequal quantity of solvent residue. When the residue exceeds certain amount, the pollution to inner content happens and further brings hazard to the health of consumers. Solvent residue of the complex packages is usually tested after printing according to international documents. Total quantity of solvent residue in food package should not exceed 10mg/m^2 with benzene type residue not exceeding 3mg/m^2. Generally, the main solvent residues within package are methylbenzene, dimethylbenzene butanone, isopropanol, butyl acetate and ethyl acetate, which will vary with specific material and printing ink. To flexible package manufacturers, factors causing excess of solvent residue are various. For example, improper material, nonstandard process, outdated equipment and inadequate testing in each production link. In addition, it can also be caused by improper drying temperature of drying tunnel, inadequate speed of input drying air, non-uniformity of additives and unreasonable production speed, etc. In fact, the tests of solvent residue on raw materials and finished products are essential. Through adjusting raw materials and processing according to field test results, flexible package manufacturers can improve their product quality,

2. Gas Chromatographic Instrument

Solvent residues in complex packages can be tested with professional gas chromatographic instrument; micro quantity solvent residue in materials can be conveniently separated with its quantity analyzed by detector. Since specified matter possesses fix reaction rate to another matter, standard chromatogram map can be drawn referring to standard matter for purposes of carrying out quantitative analysis of test objects. Test method of gas chromatography is already a very mature technology. It is widely used in various fields, including purity test of medicines, farm chemicals, chemicals, air quality, oil elements and impurity analysis. As to solvent residue test of

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complex package, since organic solvents used in material manufacture, complexion and printing are limited in kinds, common gas chromatographic instrument can satisfy the test demand, which can lower operation difficulty and cost of instruments at the same time.

Figure 1 is the standard chromatogram map obtained with Labthink GC-7800 gas chromatographic instrument. It can test common solvent residue such as ketone, esters, alcohols and benzol during the process of flexible package manufacture. This instrument is specially designed for flexible package enterprises. With special gas chromatography station(software), it can not only directly test the name of various solvent residue in complex package, but can also directly display the quantity （mg/m^2）of corresponding residue, which can facilitate operators making data analysis with reference to test standard . In addition, it can test the purity of solvent being used. Labthink GC-7800 gas chromatographic instrument can complete test within 13 minutes without program heating up. This is because the heating up will cause deviation of base line and in turn results in analysis error. In principle, unless there is test demand on separation of multi-ingredients, process heating up should be avoided as much as possible. The whole test process is mainly divided into the following: warm-up, specimen preparation, drying, sampling, filling into chromatographic instrument as well as obtaining test results (please refer to figure 2).

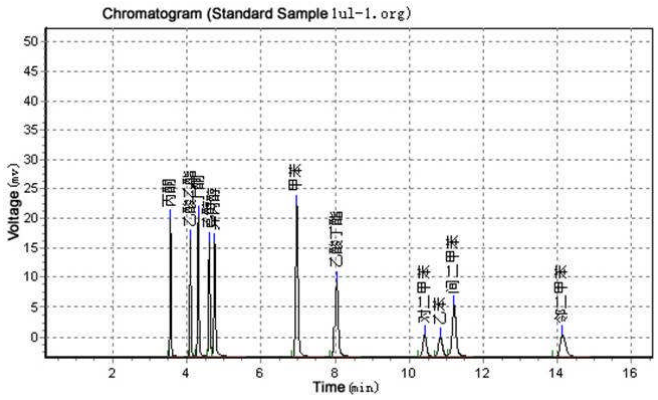

Figure 1. Standard Chromatogram Map

- Acetone
- Ethyl acetate
- Butanone
- Grain alcohol
- Isopropyl alcohol
- Toluene
- Butyl acetate
- P-xylene
- Ethyl benzene

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- M-xylene
- O-xylene

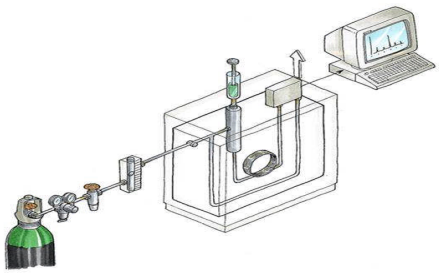

Figure 2. Illustrate Diagram of Solvent Residue Test

3. Labthink Chromatographic Analysis Lab

Labthink expanded its labs in 2005, and established Labthink Chromatographic Analysis Lab (figure 3). Equipped with several advanced gas chromatographic instruments and full set of ancillary instruments, this lab devotes to the study of aroma separation, solvent residue analysis of complex package, etc. It can provide services for establishing analysis method, data testing, and staff training on solvent residue controlling of package materials. Labthink GC-6890 and GC-7800 Special Gas Chromatographic Instruments for solvent residue test of complex package can provide test for commission service to customers. It can also perform multi-lab data comparison. In the future, this lab will also carry out thorough and careful research of global advanced research subjects on permeation principle of organic gases through polymer, selective controlling and testing.

Figure 3. Chromatographic Analysis Lab

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4 Prospects

At present, the development and application of unbenzoled printing ink, water based printing ink, and various environment-friendly adhesives has brought a bright prospect in thoroughly solving solvent residue problems of complex package. However, issues about the price and replacement of existing instruments at present have limited its wide application. Therefore, to meet the solvent residue standard of complex package, it is essential to change present manufacturing process and to strengthen test mechanicals.