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Functions and Services of Labthink Lab——Chromatographic Analysis Lab

Abstract：This article presents a detail introduction to the method and necessity of residue test of complex package. At the same time, it provides the functions and service items of Labthink chromatographic Analysis Lab.
Keywords：solvent residue, lab, gas chromatography, and test

The security of polymer materials applied in food package has always been one disputable issue. The past disputable subjects always focus on whether polymer materials will produce harmful free monomers in the process of application. However, the accident of residue supercriterion happened in an endless stream, which made the safety of polymer packing boxes attract wide attention. As the 3C authentication is strengthened, residue test of polymer materials becomes essential.

1. Background Information of Test

Being one common packing material with excellent properties of various polymer materials combining in one, complex materials can efficiently prolong quality guarantee period of products. Solvent residues generally comes from printing ink, solvent, and manufacture process, which may be influenced by the property of printing ink, drying speed of diluted solvent, property, environment of instrument 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 speed of solvents such as methylbenzene, butanone and ethyl ester results in unequal quantity of solvent residue. When the residue exceeds certain amount, the pollution to inner content appears and further brings hazard to the health of consumers. Solvent residue 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 superstandard of solvent residue are many. For example, improper material, nonstandard process, outdated equipment, inadequate tests in each production link. In addition, it can also cause by improper drying temperature of drying tunnel, inadequate speed of input drying air, non-uniformity of additives, unreasonable production speed and etc. In fact, the test of solvent residue to raw materials and to finished products is essential. Through adjusting raw materials and process of production according to field test results, flexible package manufacturers can improve their product quality,

2. Gas Chromatographic Instrument

Solvent residue of complex package should be tested with 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 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).

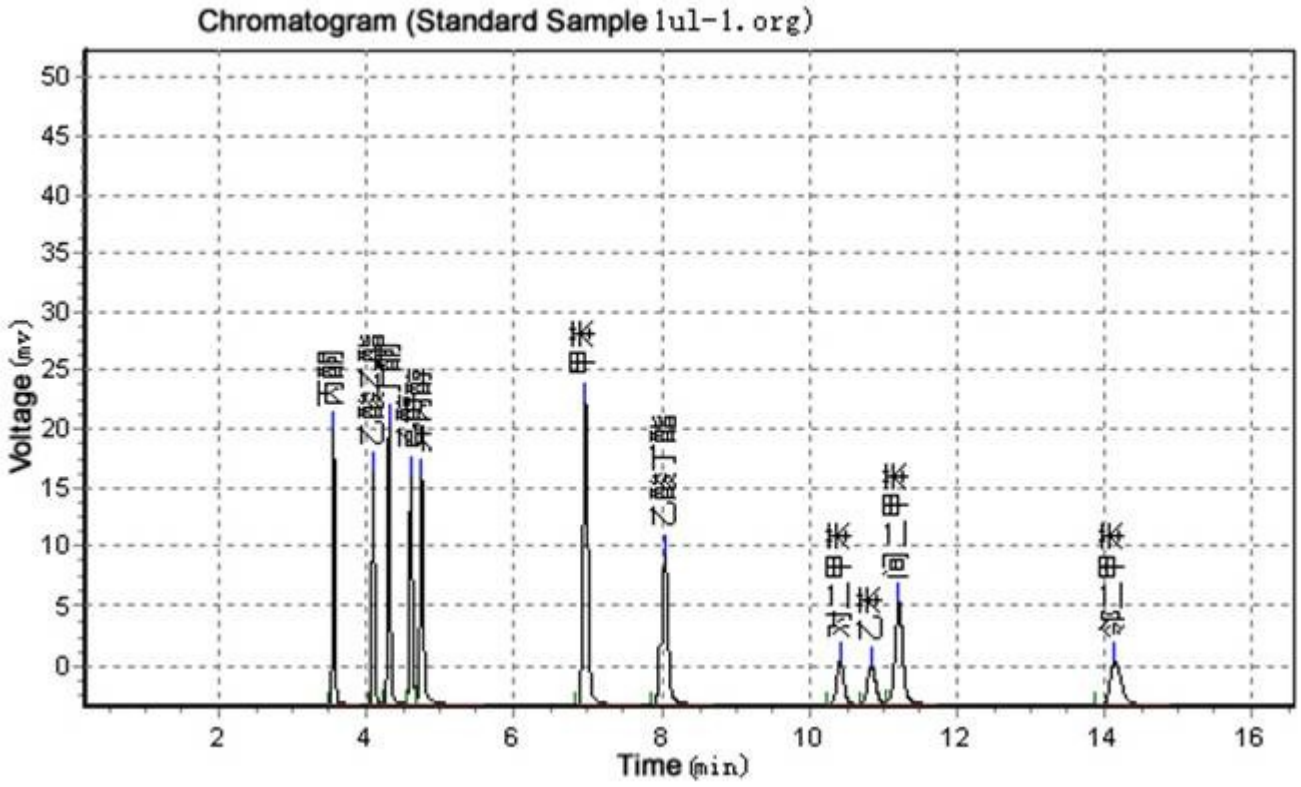

Figure 1. Standard Chromatogram Map

- Acetone
- Ethyl acetate

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

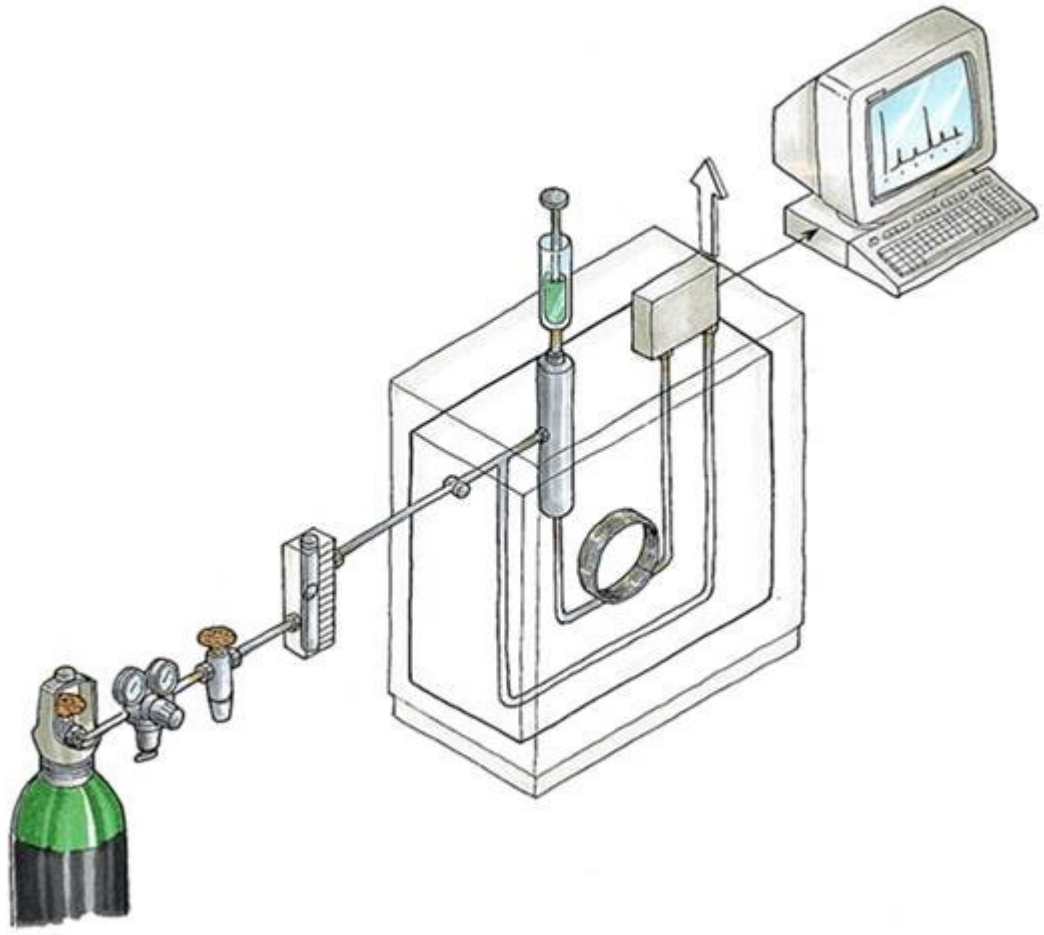

Figure 2. Illustrate Diagram of Solvent Residue Test

3. Labthink Chromatographic Analysis Lab

Labthink expanded its lab in 2005 and established chromatographic analysis lab (figure 3). Equipped with several advanced gas chromatographic instruments and full set of accessory instruments, this lab mainly devoted to the study of aroma separation, solvent residue analysis of complex package. It can provide services of establishing

analysis method, data test, and staff training on solvent residue controlling of package materials. Labthink GC-6890 and GC-7800 special gas chromatographic instrument for solvent residue test of complex package can provide test for commission service to customers. It can also perform data comparison of several labs. In the future, this lab will also carry out thorough and careful research of global advanced research subjects on permeation principle of organic gases in polymer, on selective controlling and test.

Figure 3. Chromatographic Analysis Lab

4. Prospects

At present, the development and application of unbenzoled printing oil, aquosity-printing oil, and various environmentally sound adhesives gave a bright prospect in thoroughly solving solvent residue problems of complex package. However, issues about the price and instrument replacing at present have limited its wide application. Therefore, to meet the solvent residue standard of complex package, it is essential to change present manufacture process and to strength test mechanicals.