

Data Comparison of Permeability Testing between Labthink and Thailand Lab

Abstract: this article presents a detailed data comparison of sensor method oxygen permeability testing between Labthink and Thailand Package Center.

Key word: sensor, oxygen permeability instrument, and comparison.

On June 6, 2005, representatives of Jinan Languang Mechanical & Electrical center accepted the invitation of Thai Packaging Center for visitation. Representatives of both sides exchanged information about package testing theory and technology development. They reached agreements concerning issues of data comparison and commutative data testing. After the visitation, the two sides complete a data comparison. The following is a brief introduction about the comparison and other work being carried out at present.

Data comparison this time is carried out in view of the stability and data comparability of oxygen permeability testing instruments and water vapor permeability testing instrument using equal pressure method.

During the data comparison, both Labthink and Thailand Package center have used sensor method oxygen permeability testers in the oxygen permeability of materials. TOY-C1 package/film oxygen permeability tester of Labthink, possessing dual function of film and package oxygen permeability testing, is based on the electrochemical principle and meets the requirements of standard ASTM F1307, ASTM D3985 and so on. The instrument adopted by Thailand side is of the same kind, but purchased from an American manufacturer.

Since temperature of testing environment can exert obvious influence on testing results (detailed information can refer to the article *Influence of Temperature Fluctuation on Material Permeability* updated on February 21, 2005 in Languang Lab Forum), the two sides unified the condition of testing environment before oxygen permeability testing of the specimens, that is, testing is performed under 23 °C, 0 % RH. However, total unification cannot be guaranteed.

All the tested specimens are offered by Thailand Package Center. All of them, being divided into colors of PEDIGREE, FA THAI BRAND, and SEMINIS, are well printed complex film used for the packing of food, flavoring agent and so on.

Measured data of Labthink are listed as below in table 1:

Table 1. Measured Data of Labthink

Specimen	PEDIGREE	FA THAI BRAND	SEMINIS
OTR measured data	543.091	0.31	102.94

cm ³ /(m ² ·d)	557.527	0.36	99.11
	543.683		100.42
	561.779		
OTR (mean value) cm ³ /(m ² ·d)	551.520	0.34	100.82
S	9.553	0.04	1.95
CV%	1.7	10.6	1.9

From the result we can see that test result of Labthink features good stability. Especially during the testing of low permeability specimen with big oxygen transmission rate(O₂TR), data fluctuation is less than 2%. But for FA THAI BRAND specimen with small O₂TR, data fluctuation is relatively big. This may caused by the following three reasons: first, if testing accuracy of oxygen sensor is limited, there may be data fluctuation during the testing of high permeability specimen. Secondly, calculation of data fluctuation may make CV changes in sevenfold even for the same standard error. For example, if S of testing result is 0.04, CV will be 11.8% for FA THAI BRAND specimen ,0.04% for SEMINIS specimen and only 0.007% for PEDIGREE specimen. Thirdly, when material with high permeability is tested, testing result is apt to be influenced because the general influence of various factors including instrument structure is bigger than that on the testing of medium and small permeability specimen.

Comparison data offered by Thailand are listed in table 2:

Table 2. Data Comparison

Specimen and unit		TPC data	Labthink data
PEDIGREE	OTR cm ³ /(m ² ·d)	830	543.863
FA THAI BRAND		0.10	0.36
SEMINIS		124	100.42

Note: TPC Thailand package center

Both sides show great interests to such a comparison result. On the one hand, the data of each specimen has certain comparability in the data group. On the other hand, the number of labs participating data comparison is relatively small and

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tested specimens are limited in number. What is more, the data range of testing result is relatively wide, further data comparison is still necessary.

The Data comparison is completed in July. Labthink has sent out compared specimens to Thailand. We believe results of data comparison will come out in the next two months.

Data comparison has always been one of the cooperative projects between Labthink and Thailand. Although data comparison being participated by only two labs has a big limit, it is still useful as guidance for further performance. At present, the influence and using number of sensor method oxygen permeability are gradually increasing. TOY-C1 package/film oxygen permeability tester developed by Labthink has become one of the highlights in the market.