

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.

Keywords: Thailand packaging center , labthink , oxygen transmission rate , otr , permeability

On June 6, 2005, representatives of Labthink Instruments Co, Ltd. accepted the invitation of Thai Packaging Center and visited Thailand. 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 visit, two sides completed a data comparison. The following is a brief introduction about the comparison and other work that has been carrying out at present.

Data comparison this time is carried out focusing on the stability and data comparability of oxygen permeability testing instruments and water vapor permeability testing instruments using equal pressure method. Owing to the developing influences and market expansion of sensor method oxygen permeability tester, this article mainly deals with data comparison of bilateral sensor method oxygen permeability testers.

During the data comparison, both Labthink and Thailand Package center 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 fluctuation 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 Labthink Lab Forum), the two sides unified the conditions of testing environment before oxygen permeability testing of the specimens, that is, testing is performed under 23°C, 0 % RH. However, complete unification cannot be guaranteed.

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

Labthink data are listed as below in table 1:

Table 1. Labthink Data

Specimen	PEDIGREE	FA THAI BRAND	SEMINIS
OTR measured data cm ³ /(m ² · d)	543.091	0.31	102.94
	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 results we can see that test results of Labthink are with good stability. Especially during the testing of mediate and high permeability specimens 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 be caused by the following three reasons: first, if testing precision of oxygen sensor is limited, there may be data fluctuation during the testing of high barrier property specimen. Secondly, calculation of data fluctuation may make CV changes many times for the same standard error. For example, if testing result S 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 barrier property is tested, testing results are 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 barrier property specimen. And therefore, easy to fluctuate.

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 in such 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 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 was completed in July. Labthink has sent out the second lot of comparison specimens to Thailand. Labthink estimates 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 Package Center. Although data comparison of only two labs is with big limitation, it is still of certain reference value. At present, the influence and the amount 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.