



# Soxtec™

## Supporting nutritional analysis at Japan Food Research Laboratories

*Quality control of analytical procedures is a core principle for the renowned Japan Food Research Laboratories (JFRL) especially when performing complex nutritional analysis. Mr Takahito Nakasato, Manager of the Nutritional Analysis Section, JFRL, explains their operational approach for 'In Focus' including a presentation of JFRL's comparative study of Soxtec™ versus traditional Soxhlet analysis.*

At Japan Food Research Laboratories we support health and safety through impartial analysis of food and many other products. The integrity of the analytical procedures is therefore a central pillar of our business. We operate under a strict quality principle based on the following three statements:

- We analyse impartially and independently
- We analyse accurately in time
- We are always involved in the promotion of our techniques to assure quality

### Controlling the complete food and feed analysis cycle

When it comes to analyzing food and feed for nutritional components we are often faced with challenges such as the difficulty in obtaining representative samples and the wide variation in density of components

such as fat and protein, from 1% to 100%. Quality control procedures are required, not just in terms of checking data, but also with respect to organization, facilities, daily operations, machinery, handling of chemical reagents and training of laboratory personnel. Not least, an overall commitment to delivering results of the highest quality in a timely manner is vital to support ongoing business.

Automated analysis can play an important role in fulfilling our goals, for example in simplifying and accelerating Soxhlet analysis of fat – a method that can be problematic due to the long extraction time and safety concerns regarding the use and collection of flammable organic solvent. At JFRL we use both the traditional Soxhlet method and Soxtec™ side by side.

	Soxhlet	Soxtec™
Extraction time	8 ~ 16hrs	About 1.5hrs
Safety	Poor	Built-in
Extraction condition	Repeated elution with cold solvent	Boiling and rinsing extraction
Solvent collection function	Unavailable	Available

*Table 1. The differences between Soxhlet and Soxtec™ methods*



Materials	Soxhlet		Soxtec™			
			Boiling time ~ 20 min		Boiling time ~ 30 min	
	Mean (g/100g)	CV (%)	Mean (g/100g)	CV (%)	Mean (g/100g)	CV (%)
Potato chips	28.36	0.5	28.05	0.5	27.99	0.3
Cup noodles	17.46	0.3	17.38	0.6	17.34	0.4
Mayonnaise	73.52	0.4	73.31	0.9	72.99	0.3

Table 2: Results of Soxhlet and Soxtec™ methods. The conditions of Soxtec™ are 20 and 30 minutes boiling time and 60 minutes rinsing time

And of course, we demand that the automated solution must be comparable to the traditional method. With this in mind, we have conducted our own comparative study, the results of which are presented here.

### Comparison between Soxhlet method and automatic quick extraction method with Soxtec™ 2050

The FOSS Soxtec 2050 is designed for automatic quick extraction as a replacement for the Soxhlet method. Table 1 shows the differences between the Soxhlet and Soxtec methods.

In this study, we examined the Soxtec by comparing the test results with the Soxhlet method.

## 1. Materials and Methods

### 1) Materials

We examined cup noodle, potato chips and mayonnaise because the fat content in these products is high and the Soxhlet method is suitable for them.

### 2) Methods

**Soxhlet method:** We measured test materials according to Standard tables of food composition in Japan, 5th Revised and enlarged edition, Analysis Manual.

**Soxtec:** We measured test materials with Soxtec 2050 from FOSS. We examined two conditions of 20 and 30 minutes boiling time at 60 minutes rinsing time. In addition, we examined three conditions of 30, 40 and 60 minutes rinsing time at 60 minutes boiling time.

## 2. Results

The results are shown in Tables 2 and 3.

When the conditions of Soxtec are 20 and 30 minutes boiling time and 60 minutes rinsing time, the two methods do not differ significantly at  $P = 0.05$  by t-test.

When the conditions of Soxtec are 30, 40 and 60 minutes rinsing time at 60 minutes boiling time, the two methods do not differ significantly except for potato chips. In this case, there are significant differences between the Soxtec and Soxhlet method when the conditions of Soxtec are 30, 40 minutes rinsing time and 60 minutes boiling time, but the two methods do not differ significantly when the conditions of Soxtec are 60 minutes rinsing time.

Therefore, we conclude that the best analysis condition with Soxtec for these samples is 60 minutes of rinsing time and 20 minutes or 30 minutes of boiling time.

## About the Japan Food Research Laboratories

Japan Food Research Laboratories cover not only food and feed products but also medicines, cosmetics, medical devices, household chemical products and the environment. Japan Food Research Laboratories answer the diversified needs for health and safety of societies, industries and consumers.

Since 1957, Japan Food Research Laboratories have been the leading testing laboratories in Japan. The organization's mission is to make a contribution to society through our analytical activities. It has devoted its energies to answering promptly with accurate data that is maintained impartially as a disinterested party while fulfilling obligations of secrecy.

by Mr. Takahito Nakasato, Manager of the Nutritional Analysis Section, Japan Food Research Laboratories

Materials	Soxhlet		Soxtec™					
			Rinsing time 30 min		Rinsing time 40 min		Rinsing time 60 min	
	Mean (g/100g)	CV (%)	Mean (g/100g)	CV (%)	Mean (g/100g)	CV (%)	Mean (g/100g)	CV (%)
Potato chips	28,36	0,5	28,00	0,3	27,73	0,9	28,20	0,4
Cup noodles	17,46	0,3	17,32	0,4	17,30	0,4	17,49	0,7
Mayonnaise	73,46	0,4	73,01	0,5	73,38	1,7	73,30	0,2

Table 3: Results of Soxhlet and Soxtec™ methods. The conditions of Soxtec™ are 30, 40 and 60 minutes rinsing time and 20 minutes boiling time