

Test Report No. PAL08-54203-1e/sac

Altenberge, 21.11.2008

Test of glassware

- Sample Entry: 24.07.2008
19.09.2008 (re-test material)
- Client: Lock & Lock, Seoul
- Order: 24.07.2008
23.09.2008 (re-test material)
- Sample-No. 08-059988-01: 3 glass bowls (small, medium, big) with plastic lid and silicone seal
- Sample-No. 08-078436-01: re-test material:
4 glass bowls with plastic lid and silicone seal
- Material: --
- Sample description: glassware

Tested Samples:

1. complete sample
2. glass material of the bowls
3. plastic material of the lids
4. silicone material of the seals
5. re-test: complete sample
6. re-test: silicone seals

Methods of Analysis:

- Global Migration: ASU, B 80.30-1 bis 3 (mod.)
- Metal Release (lead, cadmium): ASU B 80.03 mod.
- Sensory Assessment: ASU L 00.90-7 (mod.) und DIN 10955
- Polycyclic Aromatic Hydrocarbons (PAH): DIN 38414 S23
- Volatile Organic Components: Bundesgesetzblatt 46 (2003), S. 362 ff.
- Extractable Components: Bundesgesetzblatt 46 (2003), S. 362 ff.
- Peroxid-Residues: Bundesgesetzblatt 46 (2003), S. 362 ff.

Lock & Lock/PAL08-54203 -1e/sac

Page 1 of 7

Results:**1. Global Migration (iso-Octan: 2 d, 22 °C, other simulants: 10 d, 40 °C)**

Simulant	Unit	Sample 3	Limit Value^[1]
Acetic Acid 3% (w/w)	mg/kg	< 4	60
iso-Octan	mg/kg	< 4	60
Ethanol 95% vol.	mg/kg	3.2	60

^[1] according to Commission Directive 2002/72/EC**2. Metal Release (24 h, 22 °C, Acetic Acid 4% (w/w))**

	Unit	Sample 2	Limit Value^[1]
Release of lead	mg/l	< 0.01	4.0
Release of cadmium	mg/l	< 0.01	0.3

^[1] according to DIN 51032

3. Polycyclic aromatic hydrocarbons (PAH)

Parameter	Unit	Sample 3
Naphthalin	mg/kg	< 0.1
Acenaphthylen	mg/kg	< 0.1
Acenaphthen	mg/kg	< 0.1
Fluoren	mg/kg	< 0.1
Phenanthren	mg/kg	< 0.1
Anthracen	mg/kg	< 0.1
Fluoranthen	mg/kg	< 0.1
Pyren	mg/kg	< 0.1
Benzo[a]anthracen	mg/kg	< 0.1
Chrysen	mg/kg	< 0.1
Benzo[b]fluoranthen	mg/kg	< 0.1
Benzo[k]fluoranthen	mg/kg	< 0.1
Benzo[a]pyren	mg/kg	< 0.1
Dibenz[ah]anthracen	mg/kg	< 0.1
Benzo[ghi]perylen	mg/kg	< 0.1
Indeno[123-cd]pyren	mg/kg	< 0.1
Sum of detected PAH	mg/kg	-/-

4. Sensory Assessment

Triangle Test, 6 Probanden, Mineral Water, 10 d, 40 °C

	Sample 1	
	Intensity	Significance
Deterioration of smell	0.5	--
Deterioration of taste	3.0	--

	Sample 5 (re-test)	
	Intensity	Significance
Deterioration of smell	0.0	--
Deterioration of taste	0.0	--

0 = not detectable
 1 = slightly detectable
 2 = weak
 3 = strong
 4 = heavy

5. Volatile Organic Components (at 100 °C, 1 h)

Parameter	Unit	Sample 4	Sample 6 (re-test)	Limit Value ^[2]
Volatile Organic Components	g/100 g	< 0.1	< 0.1	0.5

^[2] according to recommendation No. XV "Silicone" of the Federal Institute for Risk Assessment

6. Extractable Components

10d at 40 °C

Parameter	Unit	Sample 4	Sample 6 (re-test)	Limit Value ^[2]
Acetic Acid 3% (w/w)	g/100 g	0.08	0.05	0.5
Ethanol 10% vol.	g/100 g	0.04	0.05	0.5

^[2] according to recommendation No. XV "Silicone" of the Federal Institute for Risk Assessment

7. Residues of peroxides

Parameter	Unit	Sample 5	Sample 6	Limit Value ^[2]
Peroxide Residues	g/100 g	< 0.001*	< 0.001*	must not be detected

^[2] according to recommendation No. XV "Silicone" of the Federal Institute for Risk Assessment

*) = Limit of detection

Assessment:

The tested glassware set is intended to be brought into contact with foodstuffs. Therefore it is a food contact article according to article 2 paragraph 6 no. 1 of the German Lebensmittel-, Bedarfsgegenstände- und Futtermittelgesetzbuch (LFGB) and according to article 1 paragraph 2 of the Regulation (EC) No. 1935/2004. The tested samples have to comply with these legislations and with Commission Directive 2002/72/EC relating to plastic materials and articles intended to come into contact with foodstuffs.

According to article 31 paragraph 1 LFGB it is forbidden to use or to bring to market materials or articles in terms of article 2 paragraph 6 no. 1 as food contact materials or articles, which do not comply with the requirements of production laid down in article 3 paragraph 1 of the Regulation (EC) No. 1935/2004.

Article 3 paragraph 1 of the Regulation (EC) No. 1935/2004 claims that food contact materials and articles shall be manufactured in compliance with good manufacturing practice so that, under normal or foreseeable conditions of use, they do not transfer their constituents to food in quantities which could:

- a) endanger human health or
- b) bring about an unacceptable change in the composition of the food or
- c) bring about a deterioration in the organoleptic characteristics thereof.

According to article 2 of Commission Directive 2002/72/EC, plastic materials and articles shall not transfer their constituents to foodstuffs in quantities exceeding 10 milligrams per square decimetre of surface area of material or article (mg/dm²) (overall migration limit). However, this limit shall be 60 milligrams of the constituents released per kilogram of foodstuff (mg/kg) in the following cases:

- a) articles which are containers or are comparable to containers or which can be filled, with a capacity of not less than 500 millilitres (ml) and not more than 10 litres (l);
- b) articles which can be filled and for which it is impracticable to estimate the surface area in contact with foodstuffs;
- c) caps, gaskets, stoppers or similar devices for sealing.

With regards to manner and extent of the examinations, these limit values were not exceeded by the plastic material of the lids.

According to DIN 51032 food contact articles made of glass that can be filled shall not release more than 0.3 mg cadmium and not more than 4.0 mg lead per litre of food simulant. With regards to manner and extent of the examinations neither lead nor cadmium release was detectable from the glass material.

Furthermore it was tested if a food simulant is deteriorated in its organoleptic characteristics. If the intensity of deterioration is assessed with an average value of 3 or higher, an undesired deterioration in the organoleptic characteristics of foodstuffs could not be excluded (compare Bundesgesundheitsblatt 30 (1987), page 368 et seqq.).

With regards to manner and extent the 6 skilled probands detected deterioration of smell and flavour. The probands described the deteriorations as “like plastic”, “like rubber”, “aromatic” and “organic”.

Due to the average assessments of intensity, an undesired deterioration of the organoleptic characteristics of foodstuffs, that normally could be expected to be brought into contact with the product, can therefore not be excluded.

However, the client sent improved material of the silicone seals for sensory re-testing. With regards to manner and extent of the re-test, the sensory characteristics of the samples comply with the above respective requirements.

Legal requirements for the amount of PAH in food contact materials and articles do not exist at present. Therefore the following “Recommended guidance levels”, which were laid down in a experts’ discussion on 02.08.2005 in Berlin, are chosen for assessment:

- Materials and articles which are intended to come into contact with the human skin for 30 seconds at maximum should contain less than 20 mg/kg Benzo[a]pyrene and less than 200 mg/kg PAH (sum of 16 compounds with regards to EPA) in total.
- Materials and articles which are intended to come into contact with the human skin for more than 30 seconds should contain less than 1 mg/kg Benzo[a]pyrene and less than 10 mg/kg PAH in total.

With regards to manner and extent of the examinations, polycyclic aromatic hydrocarbons (PAH) were not detected in the samples.

The Recommendations on plastics intended to come into contact with food of the Federal Institute for risk assessment (BfR) contain additional requirements for materials and articles made of plastics.

According to recommendation No. XV “Silicones“ (dated of 01.06.2007) silicone elastomers must not release more than 0.5 % volatile organic and no more than 0.5 % extractable components. The finished products must not test positively for peroxides.

With regards to manner and extent of the examinations performed, the present samples do not emit extractable components and volatile organic components above the limit of 0.5 g/100 g of the silicone elastomer. Peroxide residues were not detectable.

Summary:

With regards to manner and extent of the examination, the tested glassware set complies with the current legal requirements of EU directive 2002/72/EG, the DIN 51032 on metal release from food contact articles, the BfR recommendation on silicone elastomers and the experts' recommendation on PAH.

Taking into account the results of the sensory re-test, too, the product is therefore assessed as marketable.

This report was issued electronically and is valid without signature.

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(food chemist)