Risk Analysis of Food Packaging Materials in Dubai

By

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Dubai Central Laboratory

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Food and Environment Section Activities

The F&E Section is conducting the following tasks:

1. Physical, chemical and microbiological analysis of food since 1975.
2. Analysis of environmental samples since 1988.
3. Revision, updating and development of food National standards
4. Conducting surveys, research and offering consultations to private sector as well as government agencies.
5. Training services

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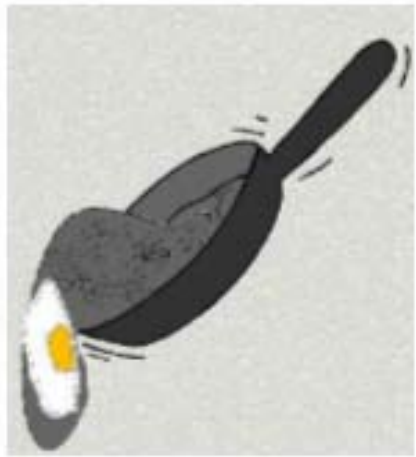
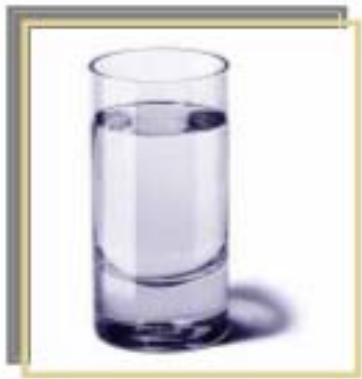
What is 'food contact material'?



It is any material coming into contact with food during, pre-transportation, processing, manufacturing, packaging, storing and transportation.



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What is “food Packaging Material”?

Food packaging materials (What we keep our food in) which are the most important, and the most obvious, examples of ‘Food Contact Materials’.

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Examples of 'Food Packaging Materials'.

Plastic

Paper

Glass

Metal

function's of Food Packaging Material

1 - Protect the sensory and other quality characteristics of the food.

2 - Protect the product against dehydration.

3 - Protect the food against microbial and other contamination.

4 - Not to add to the food any substances which may influence the quality of the food.

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Risk Analysis of Food Packaging Materials

Risk analysis as a general definition:

It is a science – based process used to evaluate risks

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Risk Assessment – Food Packaging

The **Risk Assessment** shown that components **migration** is the **potential adverse health effects** on human.

This migration could be from the material components, as well as additives used in the composition of the final food packaging material or article.

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1- Hazard Identification

Chemicals **used in making food contact materials such as:**

- **Monomers & starting substances**
- **Solvents**
- **Antioxidants**
- **Plasticisers**
- **Dyes & pigments**

DM used internationally established list of chemicals

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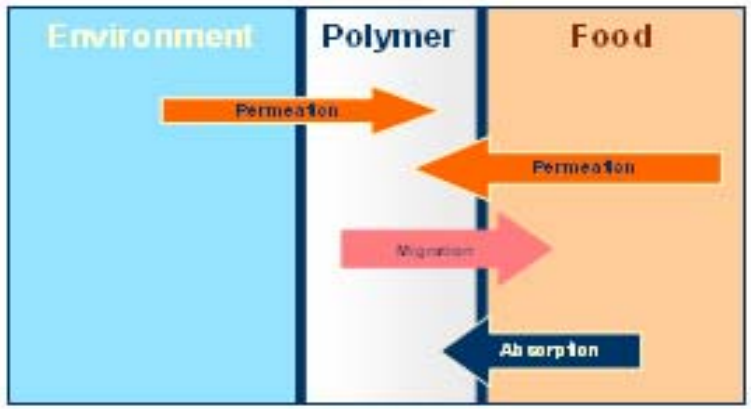
2- Hazard Characterization

It is the MIGRATION OF CHEMICALS used in making food packaging materials

There is ***No Absolute Chemical ZERO***.
Since no material is completely inert, so the issue becomes:

(a) What chemical (s) migrate?

(b) How much migrates?



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Types of Migration from Packaging Materials to Food

According to Regulations

Two Types Of Migrations

Overall Migration (OM)

Is the total amount of all substances transferred into the foodstuff from packaging

Specific Migration (SML)

Relates to the migration of identified, individual compounds, which usually have *toxicological* properties

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	What chemical migrates?	How much migrates?
Ref. No	CAS No.	Name	Restrictions and/or specifications (expressed as mg/kg of food or food simulant)[71]
(1)	(2)	(3)	(4)
10030	000514-10-3	Abietic acid	
10060	000075-07-0	Acetaldehyde	SML(T) = 6 (2)
10090	000064-19-7	Acetic acid	
10120	000108-05-4	Acetic acid, vinyl ester	SML = 12
10150	000108-24-7	Acetic anhydride	
10210	000074-86-2	Acetylene	
10599/90A	061788-89-4	Acids, fatty, unsaturated (C18), dimers, distilled	SML(T) = 0.05 (27)
10599/91	061788-89-4	Acids, fatty, unsaturated (C18), dimers, non distilled	SML(T) = 0.05 (27)
10599/92A	068783-41-5	Acids, fatty, unsaturated (C18), dimers, hydrogenated, distilled	SML(T) = 0.05 (27)
10599/93	068783-41-5	Acids, fatty, unsaturated (C18), dimers, hydrogenated, non distilled	SML(T) = 0.05 (27)

Now food contact materials must comply with national and international regulations and to ensure this compliance testing of food packaging material is required

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3- Exposure Assessment:

From the preliminary local market study, survey and Gathered information, we found the Plastic packaging materials Represents about 70% of usage, including:

- **Bottled Water.** ⟸
- **Milk and Milk Products .**
- **Vegetable oils.**
- **Juice and drinks.**
- **Soft drinks.**
- **Sauces and ketchups.**

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Plastic Material Surveys and work

Places

- **Bottled water factories**
- food manufacturers Milk, **Juice and Soft drinks)**
- **Super markets (300 Samples)**
- **Groceries (medium and small)**
- **Food packaging processors**

Check Points

- Labeling compliance, Plastic Type (code plus availability of food grade and certificate)
- Awareness
- Suitability of the usage
- Storage

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Examples of Plastic Materials Codes

Symbol	Type of plastic	Common uses
1 PET	**PET** (Polyethylene Terephthalate)	**Soft drink and water bottles**, salad domes, biscuit trays, salad dressing and peanut butter containers
2 PE-HD	**PE-HD** (High Density Polyethylene)	**Milk bottles**, **ice cream containers**, **juice bottles**, milk crates
3 PVC	**PVC-U** (Unplasticised Polyvinyl Chloride)	Cosmetic containers, electrical conduit, plumbing pipes and fittings, blister packs, wall cladding, roof sheeting, bottles, garden hose, shoe soles, cable sheathing, blood bags and tubing, watch straps
4 PE-LD	**PE-LD** (Low density Polyethylene)	Plastic food wrap, garbage bags, **squeeze bottles**
5 PP	**PP** (Polypropylene)	Dip bottles and **ice cream tubs**, **potato chip bags**, straws, **microwave dishes**, **kettles**
6 PS	**PS** (Polystyrene)	**Foamed polystyrene hot drink cups**, **hamburger takeaway clamshells**, **foamed meat trays**, protective packaging for fragile items
7 OTHER	**Any thing else**	Car parts, appliance parts, computers, electronics, water cooler bottles, packaging **PC: Polycarbonate 5 gallons water bottles**

Food Grade Symbol

Case Study (1) : Bottled water survey

The survey aimed to:

- Protection of consumer from exposure to undesirable substances in water, which may migrate from water packaging.
- Support and assist legislation on materials used in water packaging.
- Help the locals water bottling industry and trade to get harmonized with the National and International Food and water Quality and Safety Laws.

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Case Study (1) : Bottled water survey

Survey covered:

- 18 water bottlers in Dubai
- 35 brands (5 gallon water bottles)
- 59 brands (Small water bottles, 5 liters and less)

Checked Points:

- Plastic material type and identification.
- Labeling (Plastic Code, Food Grade).
- Availability of food grade certificates from original polymer manufacturer.
- Manufacturing process steps.
- Staff awareness (Food packaging Materials)

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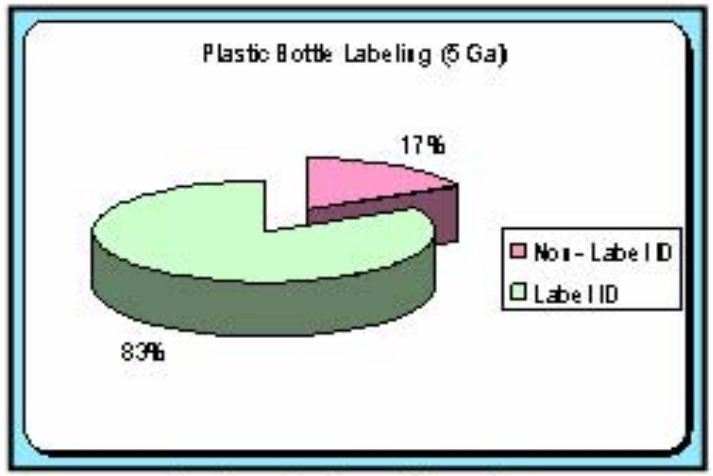
5 Gallon Bottled Drinking Water

No. of Factories	PC Polycarbonate (7 OTHER)	PET Polyethylene Terephthalate (1 PET)
35	32 (91%)	3 (9%)

Material Identifications



Label Identification

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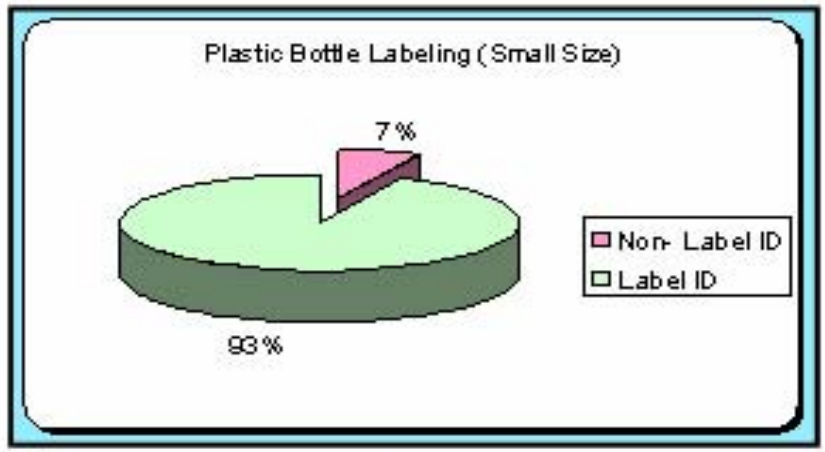
Small Bottles Drinking Water:

No. of Samples	PET Polyethylene Terephthalate
59	59 (100 %)

Material Identifications



Label Identification

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4- Risk characterization - case study (1)

5 Gallons Bottled Drinking Water 91% was polycarbonate

Plastic Type	Monomer	SML
PC	BPA	Not exceed 0.6 mg/kg

RE-USE OF BOTTLE

Factors affecting migration rate:

- Temperature/Time (during cleaning process)
- Chemicals used in disinfection process (e.g. Ozone, chlorine)
- Cleaning agents (detergents)
- Improper treatment (e.g, Organic Solvents

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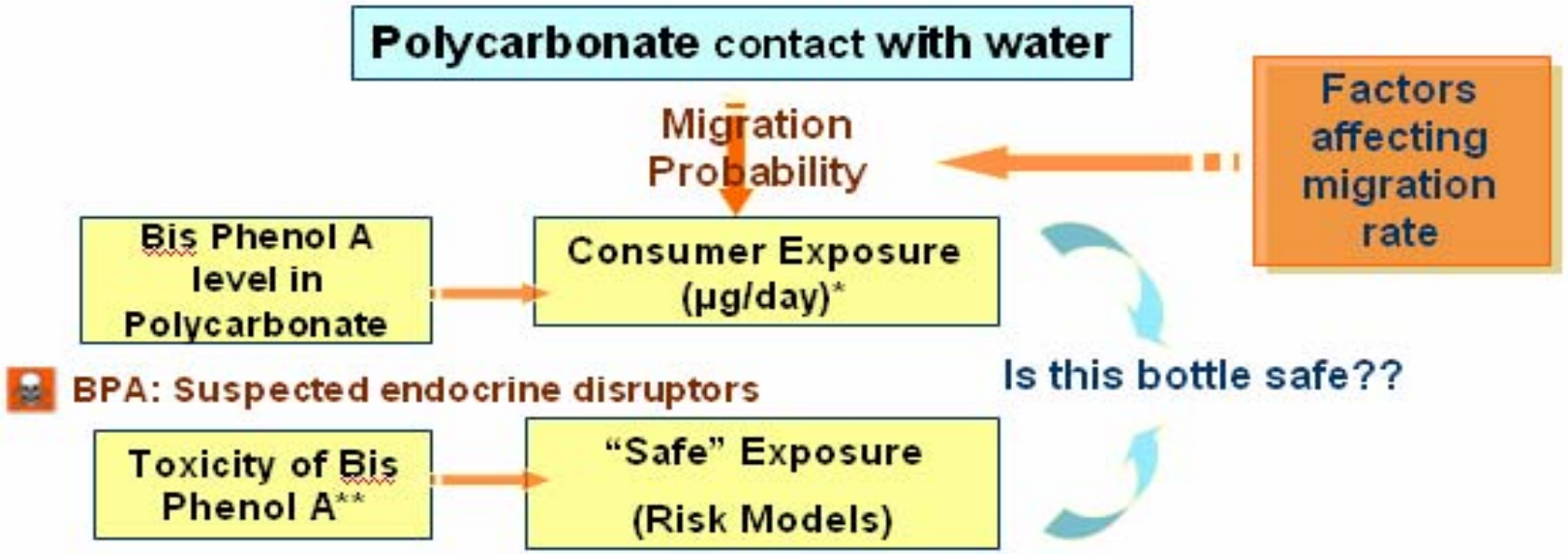
Safety Assessment of BPA in PC



*: Worse-case exposure to monomers

**: Chronic effects (Health effects)

Conclusion:

Bringing together all the information from Survey results, International food contact Materials guidelines & analytical Studies data of Qualitative *Risk Assessment on Polycarbonate 5 gallons* drinking water we could see that the Risk is LOW & could be minimized by:

1- Use of correctly Specified PC (Food grade)

2- Use of Compatible Chemicals and disinfectants/temperature.

3- Controlling of Re-Use process (number of returns of the bottles).

4- Use of other alternative Plastic Materials e.g. PET

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Case Study (2): Disposable Plastic Cups used in serving hot drinks

The study aimed to:

- **Protect the consumers from health risk and exposure to undesirable material, which could be caused by using some plastic cups in serving hot drinks.**

- **Assist manufacturers and food establishments who are making or using disposable plastic cups in the selection of suitable cups based on the use.**

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4- Risk characterization - case study (2)

- Deformation in shape of some plastic cups used in serving hot drinks
- Hot drinks measured temperature was 96° C
- Lab tests (Infrared Finger Print) shown plastic material was Polystyrene (PS), rigid
- **According to physical properties of rigid PS** the maximum serving temperature is 85° C,

The cups were not Technically Suitable to be used with hot drinks

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Effect of Hot tea on rigid PS disposable plastic cups

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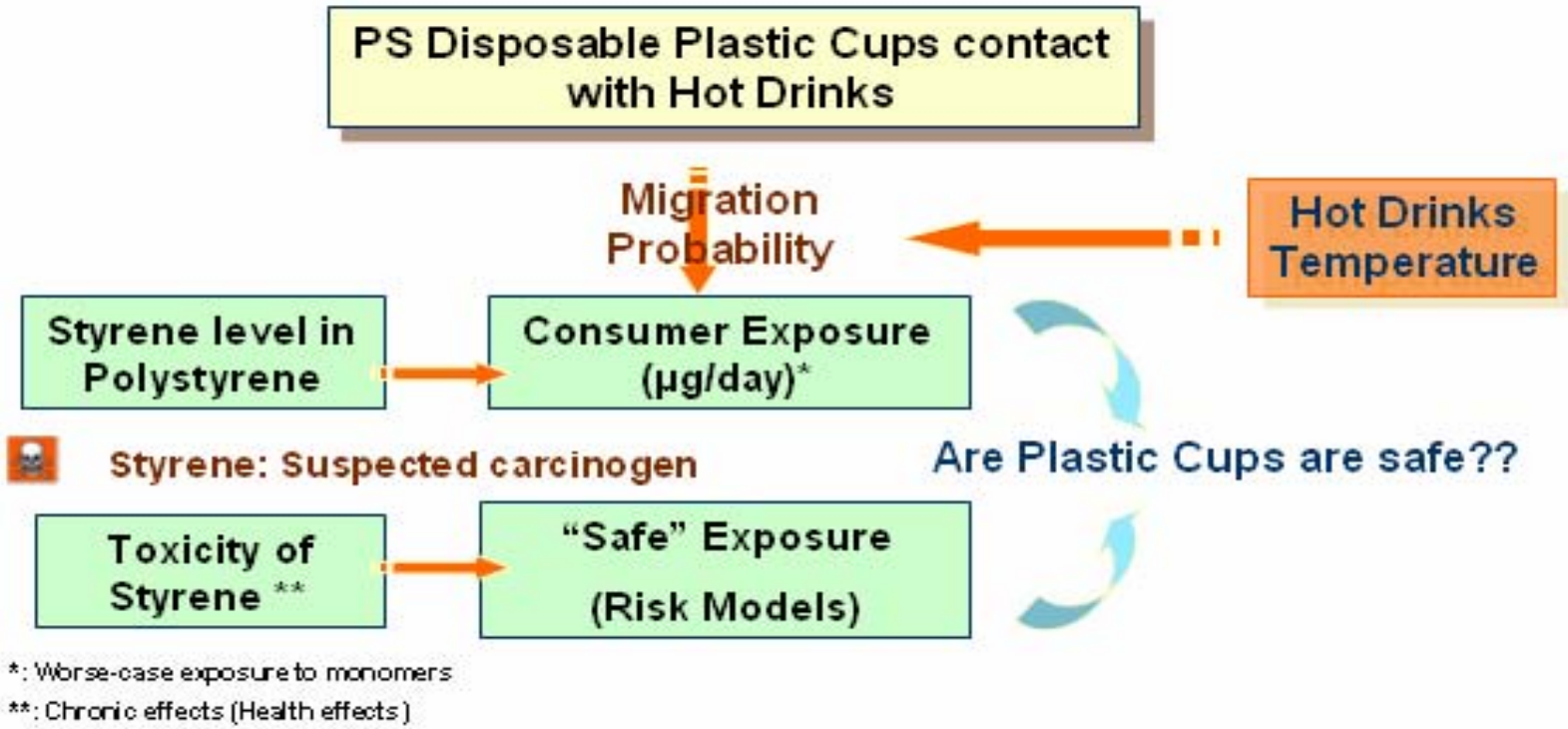
Safety Assessment of Styrene in Polystyrene



*: Worse-case exposure to monomers

**: Chronic effects (Health effects)

Conclusion:

The overall Risk Characterization of Disposable Plastic Cups used in serving hot beverages, based on the study results was MEDIUM.

We MINIMIZE the Risk to VERY LOW by:

1- DM circular no. PROHIBITING the use of unsuitable plastic cups made from rigid polystyrene in serving hot beverages

2- Guide the consumers to use alternative cups compatible with hot beverages.

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Examples of Alternative Cups could be used With Hot Beverages.

6

PS (Code 6)

(Paper)

5

PP (Code 5)

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Case Study (3): Melamine Tableware

The survey aimed to:

- Compliance of Melamine tableware to current UAE standard.
- Protection of consumer from exposure to a prohibited material urea formaldehyde

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4- Risk characterization - case study (3)

Urea Formaldehyde drawback is the potential risk arising from releasing of carcinogenic material "formaldehyde" to our food.

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Identification Melamine (finger Print)

FTIR Spectrometer

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Risk Management – Food Packaging

Based on risk assessment studies and Food Safety strategy in Dubai, considering:

- **Economic Situation.**
- **Consumers and Food consumption.**
- **Local Food producers and retails.**
- **Food Packaging industry.**
- **Imported Food and trade.**
- **Availability of international standards and laws.**
- **Expertise.**
- **Development in Dubai.**

The Risk Managers Decide:

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- **Issuing necessary guidelines and circulars controlling the use of specific food contact materials (e.g. Plastic cups)**

DM Circular

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بلدية دبي

Ref.

التاريخ: 2006/04/03

Prohibiting the use of plastic cups in serving hot beverages	استخدام أكواب البلاستيك في تقديم المشروبات الساخنة
To All Food Establishments	إلى جميع المؤسسات الغذائية :
To protect the public interest, and according to what was presented before the Food Safety Committee, and due to the health risks which could be caused by using some plastic cups in serving hot beverages, the following has been decided:-	نظراً لما تقتضيه المصلحة العامة ، وطبقاً لما عرض على لجنة سلامة الأغذية ، ولخطورة المشاكل الصحية التي قد تنتج جراء استخدام بعض أكواب البلاستيك في تقديم المشروبات الساخنة فقد تقرر ما يلي:-
1- Prohibiting the use of plastic cups which are made of Rigid Polystyrene in serving hot tea, coffee, and other hot beverages.	١- منع استخدام أكواب البلاستيك المصنوعة من مادة البولي ستيرين الصلب (Rigid Polystyrene) في تقديم الشاي ، القهوة أو المشروبات الساخنة الأخرى .
2- Other alternative cups may be used such as: - Cups made of foam polystyrene (Code # 6) - Paper cups suitable for serving hot beverages - Other cups which could withstand a temperature of more than 100C	٢- يمكن استخدام أكواب بديلة مثل : - أكواب من الـ (Foam) المصنوع من مادة البولي ستيرين الرغوي (الرمز رقم ٦) - أكواب ورقية مناسبة لتقديم المشروبات الساخنة . - أكواب أخرى تتحمل درجة حرارة 100 مئوية فما فوق .
3- The working temperature range and the code indicating the plastic type used should be mentioned on the bottom of the cups.	٣- يجب ذكر المدى الحراري للاستخدام ، إضافة إلى الرمز الذي يبين نوع البلاستيك المستخدم ، وذلك على أسفل الكوب.
4- A grace period of **ONE month** from the date of issuance is granted to implement this decision.	٤- تمنح مهلة **شهر واحد** للتطبيق من تاريخ إصدار هذا الأمر
Thank you for your cooperation This for your information and to act accordingly.	هذا للعلم والعمل بموجبه . نشكر لكم تعاونكم معنا .

مديرة إدارة الصحة العامة
ورئيس قسم رقابة الأغذية

E-mail : info@dm.gov.ae • Web site : http://www.dm.gov.ae

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- **Disposable Plastic cups registration according to usage (Hot or cold) 2006**

Registration Requirements

إجراءات منح شهادة تسجيل للأكواب البلاستيكية

1- DM directive requirements. (Copy attached)
2- Chemical name of the material.
3- Typical composition (if any additives, master batches, etc)
4- Plastic Code given against FTIR spectral identification
5- Raw material country of origin certified certificate.
6- Physical properties (Thermal, serving temperature, melting, softening, mechanical, wall thickness, weight, etc).
7- Recent Certificate from the raw material manufacturer stating
8- The material is virgin and not recyclable.
9- Chemical properties (Chemical compatibility, resistant, etc).
10- Description of the manufacturing process (include raw material manufacturing process).
11- Description of the intended use of the article.
12- Statement that the cups are manufactured according to the Good Manufacturing Practices and from a (virgin, highly pure, non-recycled, and food grade material).
13- Lab test certificate (Overall migration and Specific Migration from accredited laboratory)

Note:
- All the submitted documents should accompanied with the original for comparison

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Serving Hot Beverages.

Registration Certificate

Reg. Ref: Date:

Plastic Cups Registration
In accordance with DM circular No. 812-02-02-1-7591

Ref: Disposable Drinking Cups intended for Serving Hot Beverages.

Registration Details:

Company Name	Sihmi Paper & Plastics Products Co. LLC
Address	Mussafah Industrial Area – Abu Dhabi – U.A.E P.O. Box 46766
Product (s)	Disposable plastic cups, Single use only
Commercial Product Name	SHUAA GROUP (Shown on the cups bottom)
Material Type	Polypropylene, (PP - Shown on the cups bottom)
Plastic Code	5 (Shown on the cups bottom)
Color	**White**, with no silk print
Cups Volume (s)	7 oz
Thermal Suitability Labeling	**HOT DRINKS** (Shown on the cups bottom)
Other description (s)	TEL: 02-5554780 (Shown on the cups bottom)

After reviewing and inspecting the product documents specifications, certificates and laboratory identifications of the cups material.
We hereby confirm that the submitted Sihmi Plastic Polypropylene disposable cups (**7 oz, White**) under brand name "SHUAA" are meet Dubai Municipality Health Requirements Guideline, and could be used for serving Hot and Cold beverages.

PP Cups 8 Oz

This registration is limited to the above-mentioned product and not applicable to any other products.

The registration is voided if any modification might be added to the registered product.

Dubai Municipality Food Control Inspectors shall carry out random inspection of food establishments and, in case of violations, appropriate action shall be taken in accordance with DM Circular.

Best regards,

Amina Ahmed Mohammed
Head of Food and Environment lab Section

Cc: Food Control Section

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3

- **Starting preparing necessary DM regulations covering food contact and food packaging materials**

Dm Regulation
General Guidelines

"Materials and Articles must be manufactured in compliance with Good Manufacturing Practice (GMP) That is to say in such a way that under normal conditions of use, they do not transfer their constituents into foodstuffs in quantities which could:

Endanger human health

- Bring about an unacceptable change in the composition of the foodstuffs or a deterioration in the organoleptic characteristics thereof."

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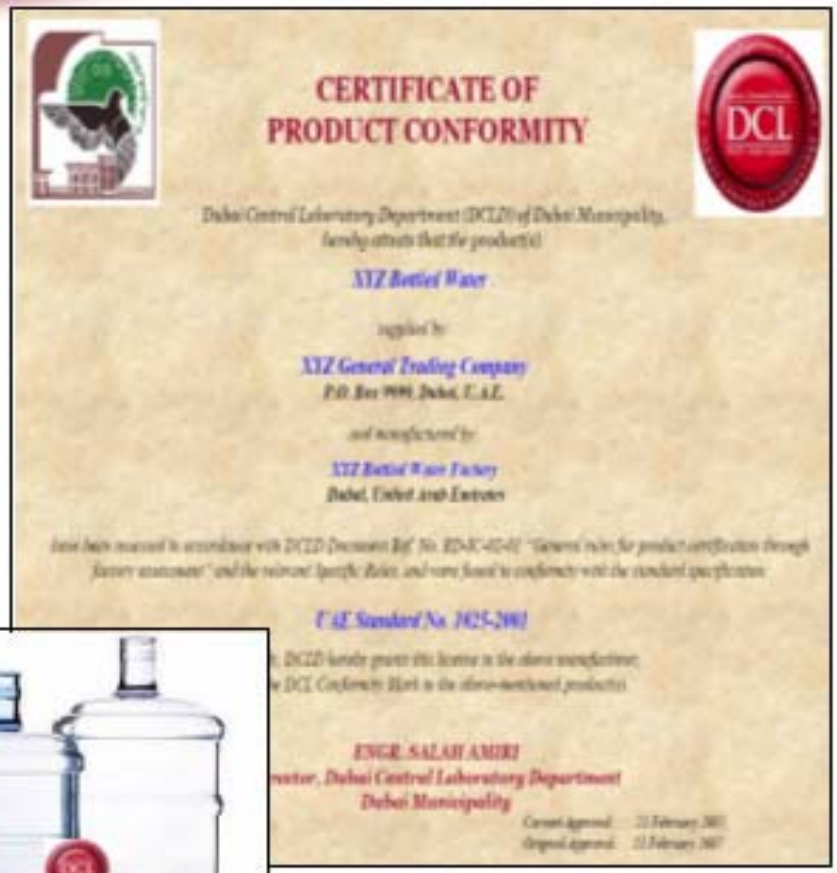
- **Starting water factories product certifications according to the DM specific rules (2nd Q Y 2007)**

Product
Certification



CERTIFICATE OF
PRODUCT CONFORMITY

Dubai Central Laboratory Department (DCLD) of Dubai Municipality,
hereby attests that the product(s)

XYZ Bottled Water

supplied by

XYZ General Trading Company
P.O. Box 9999, Dubai, U.A.E.

and manufactured by

XYZ Bottled Water Factory
Dubai, United Arab Emirates

have been assessed in accordance with DCLD Document Ref. No. RDAC-02-01 "General rules for product certification through factory assessment" and the relevant Specific Rules, and were found in conformity with the standard specification

UAE Standard No. 1025:2001

DCLD hereby grants this license to the above manufacturer,
the DCL Conformity Mark to the above-mentioned product(s)

ENGR. SALAH AMIRI
Director, Dubai Central Laboratory Department
Dubai Municipality

Current approval: 21 February 2007
Original approval: 21 February 2007

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- **Start Food Packaging Materials Registration 3rd Q Y 2007**

Risk Communication – Food Packaging

Food Packaging materials Chain of Care (*Those affected by Risk and decisions*):

STAKEHOLDERS

- **Converters** (Who turn the raw material into packaging for food use)
- **Vendors of the Materials** (Retailers, Suppliers)
- **Food Producers** (Users of materials)
- **Food retailers** (Groceries , Stores)
- **Regulatory authorities and coordinators** (ESMA, GSM)
- **Consumers** (End user)

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Open information exchange with stakeholders to establish a risk communication:

- **Meetings with food producers & Plastic Food Packing Materials.**
- **Workshops to exchange and discuss topics related to food packing materials specifications and risk exposure.**
- **Factories visit to discuss practically difficulties in this area.**

- **Sharing information and results with other municipalities in the country, through National Food Safety Committee, GSM as well as other concerned bodies.**
- **Sharing technical information with international laboratories who are doing food contact and packaging materials test.**
- **Making collaboration with regulatory organizations to get updated with recent positive list, food contact notifications, directives,**

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- **Organized consumers awareness press and media (TV and Radio programs, press notes), circulars to food establishments**
- **Giving awareness lectures to schools students.**

Finally!

- Food packaging material will not cause harm (affect our food safety) and quality if used correctly based on its intended use.

- Risk managers can determine if any special measures are needed to control food packaging materials (selection, suitability, safety)

Thank You