

# PACKAGING DIVISION

Edward Food Research & Analysis Centre Limited





**efrac**  
Edward Food Research & Analysis Centre Limited



# USFDA INSPECTED FACILITY



Developing a new Product that needs new environmentally friendly packaging or changing the packaging design and need a laboratory for extractable or container closure testing. EFRAC, a highly admired ISO/IEC 17025:2017 accredited Laboratory extends packaging studies, research, testing, experimentation, developments, certifications and studies.

We are highly equipped with different highly sophisticated, precise & robotic instruments for packaging material testing & analysis.

## **SALIENT FEATURES :**

- USFDA Inspected Lab
- National Reference Lab by FSSAI (NRL)
- Wide Scope coverage for PT programs with multiple Analyte - Matrix combinations
- 40,000 Sq.ft. of World-Class Analytical Facility
- 11 Regulatory Accreditations & 3 International Recognitions
- Quickest Turn Around Time (TAT) in the industry
- 21 CFR Coupled Instrumentation for Data Integrity & Security
- LIMS Platform with Barcoding & Digital Encryption Features
- Machines with Auto-samplers, Robotic Controls & DQ, IQ, OQ, PQ Qualification

# PACKAGING

Packing is the art and science which involves preparing the articles for transport, storage, display and use so that they should retain their therapeutic effectiveness from the time of their packaging till they are consumed.

Edward Food Research & analysis centre Ltd. ensure that the quality of plastic packaging materials for drinking water, pharmaceutical as per different National & International standards.

As per the regulations it is necessary for the producer to ensure the optimum quality of the packaging materials under which foodstuff, medicine, beverages to be packed.





# APPROVALS & ACCREDITATIONS





## OUR PRESENCE

The ideal container or package should protect the contents from the environmental hazards like light, Temperature, Moisture, Atmospheric gases, Particles, Microorganisms, also from mechanical hazards like Vibration, Compression, Shock, Puncture, Abrasion.

The material of the package should be inert in nature that means not to react with the product to be packed or not to leach any material from it.

We are happy to serve our services to the following sectors

- 1 Producer of Package Drinking water
- 2 Beverage manufacturers
- 3 Food processing industries
- 4 Bureau of Indian Standards
- 5 Pharmaceutical Industries
- 6 Producer of Packaging Materials
- 7 Exporters

# OUR SERVICES



# PHARMACEUTICAL PACKAGING PRODUCTS

The safety and efficacy of any pharmaceutical product is inextricably linked to its packaging. Containers or container closures that do not meet the physical, chemical, or biological specifications of the major compendia will compromise the quality of the drug product itself. Our container testing services can help to ensure the quality and protection of drug products.

Regulatory agencies require extractable and leachable testing to identify any risks of product adulteration.

EFRAC performs testing on virtually all container types requiring evaluation, including plastic bottles, glass vials, stoppers and raw plastic (resin pellets, sheets, etc.).

The packaging system used to deliver pharmaceuticals to patients is a crucial part of product development. Containers must be capable of retaining the therapeutic efficacy of a drug product from the time of packaging through to administration. Containers that do not meet the specifications of the major compendia can compromise the safety and effectiveness of the drug product.

We provide professional testing services for containers, container closures and pharmaceutical packaging on a broad range of polymer containers to several pharmacopeia methods, including USP, EP, BP, IP and JP methods.

We also offer Atomic Absorption Spectrometry with hydride generation to support full EP monograph requirements, as well as extractable and leachable the potential for chemicals to migrate from the container closure into the product and demonstrate that your package meets the required specifications.

Our pharmaceutical container and packaging testing services are supported by state-of-the-art laboratory equipment, including a fully-validated autoclave



## PARAMETERS

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Identification • Material • Heavy Metals ( Total & Leachable) • Non Volatile Residue • Transparency • Controlled Extraction Studies • Extractable and leachable (different stimulant) heavy metals like Al, Pd, As, Cd, Co, Cr, Hg, Zn, Ni, Ti, V, Zr, Sb, Ge, Ba, Mn etc • Total Terephthaloyl Moieties, and Ethylene Glycol of extractant • Acidity/ Alkalinity of extractant • Absorbance of extractant • TOC of extractant • Colorant Extraction • Residual pigments & colorants • Residual additives • Global Migration , Specific migration • Ink adhesion test • Product Resistance • Tensile Strength, Tensile elongation & Tensile index • Dart Impact Resistance • Odour/ Thickness/ width of film • Bursting strength • Oxygen Transmission rate (OTR) • Water Vapour Transmission rate (WVTR) • Non volatile residue & residue on ignition • Buffering capacity of extractant

## INSTRUMENTS

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FTIR • DSC • GC MS/ MS • GC FID • LC MS • ICP MS & ICP OES • Ion Chromatogram • Karl Fischer auto titrator • Transparency Tester • Drop Tester • Hot Air Oven • Vibration Leakage Tester • Humidity Controller • Analytical Balance • Vernier Caliper • Digital Screw gauge • Auto Clave • OTR & WTVTR apparatus

## STANDARDS/REGULATIONS

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U.S. Pharmacopoeia National Formulary (USP-NF) • Indian Pharmacopoeia (IP) • European Pharmacopoeia (EP) • British Pharmacopoeia (BP) • Japanese Pharmacopoeia (JP) • International Organization for Standardization (ISO) • Indian Standards (BIS) • American Society for Testing and Materials (ASTM)



# FOOD GRADE PLASTIC USED FOR FOOD & BEVERAGE

Nowadays plastic is widely used in food packaging, storage transportation, process and so on. The quality of the plastic material is a key element to retain the quality of foods; however, anything will be leached from packaging materials that definitely alter the flavor, taste and quality of the food stuff.

Although plastic is made from hydrocarbons derived from petroleum or natural gas but the processes involved vary and affect the purity level of the finished product. Any plastic that comes into contact with something humans will consume including beverages and food is held to a much higher standard than other forms of plastic.

Different additives are used in the process of plastic production process to alter the chemical properties of the plastic, softening, flexibility, elasticity, malleability, processibility, stability, anti-oxidant and light-stability and so on. Out of these additives some have low molecular weight which may be migrated in to the food stuff and made toxic properties for human consumption.

In order to ensure the quality and safety of food contacted plastics, most nations have established lists of “allowed” and “non-allowed” substances along with their limits. Based on the toxicology data and risk assessment, European Regulation EU No 10/2011 specifies the allowed substances in plastic food package along with the specific migration limits (SML), (13.15). The equivalent law to EU No 10/2011 in China is GB9685 (16).

Edward Food Research and Analysis Centre Limited is a of state-of-the-art Laboratory with a robotic, automated high end instruments offering laboratory tests, assessments, evaluations of food-contact packaging and related materials, we ensure the packaging materials comply with all the necessary global regulations to bring the products to market both quickly and safely.

Edward Food Research & Analysis Centre Limited provides expert insight and comprehensive solutions for food packaging, including: Packaging Migration testing, Packaging Migration & Food Contact Testing, Specific Migration, Sensory Analysis, Color Migration, Overall product safety analysis, Bisphenol A, B and so on.



## PARAMETERS

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### Paper, Paperboard & Corrugated Fibre Board Boxes

Thickness • Bursting strength, Bursting factor & Burst index • Tensile strength, Tensile elongation & Tensile index • Tear index, Tear strength & Tear factor • GSM • Thickness • Substances or Rim weight • Bulk • Moisture Content • pH value • Ash • Breaking Length • Folding endurance • Water penetration & water absorbency • Gloss • Opacity • Oil absorbency • Fibre composition • Shape, Size & dimension • Compression strength • Inclined impact test • Drop test • Stack load test • Leachable Heavy metals

### Plastics & Allied Materials (PVC, PET, PBT, HDPE)

Thickness • Heat seal strength • Melt flow index • Tensile strength / Breaking load • Elongation at break • Dart impact test • Oxygen transmission rate (OTR) test • Water vapour transmission rate (WVTR) test • Vibration leakage test • Water potability test • Stack load test • Drop test • Ink adhesion test • Leak proofness test (by air pressure) • Hydrostatic pressure test • Brimful capacity • Closure leakage test • Material • Shape & dimension • Residual additives • Overall Migration • Specific migration (Metal & non-metal) • Residual monomers • Transparency

## INSTRUMENTS

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FTIR • DSC • GC MS/ MS • GC FID • ICP MS & ICP OES • Transparency Tester • Drop Tester • Hot Air Oven • Vibration Leakage Tester • Humidity Controller • Analytical Balance • Vernier Calliper • Digital Screw gauge • OTR & WTVTR apparatus

## STANDARDS/REGULATIONS

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International Organization for Standardization (ISO) • Indian Standards (BIS) • American Society for Testing and Materials (ASTM) • European Union Methods (EU) • German institute for standardization (DIN)



# KRAFT PAPER

Over the years, paper has been made from a variety of materials including hemp, cotton, sugar cane, and straw. Today paper is mostly made from cellulose fiber derived from wood. Kraft paper is a very high-strength packaging paper, made from unbleached or bleached sulfate pulp or equivalent fibers. Sometimes, semi chemical pulp is also used in production. Due to its high strength and moisture resistance, kraftliner is used as an outer and intermediate ply, especially in corrugated board. Kraft paper is suitable for the production of paper bags, for example, due to its strength. Kraft tissue paper is mainly used as a wrapping paper for protecting fragile goods and those with sensitive surfaces. Packing paper is wound ultra tightly under pressure onto paperboard, metal or tube cores. It is generally transported/shipped unpackaged and merely strapped at the ends with steel strapping, although relatively thin grades of paper of 110 - 150 g/m<sup>2</sup> are sometimes packaged.

Some common uses of Kraft paper are;

- As a plastic hazard free paper in paper sacks for cement, food, chemicals, consumer goods, flour bags etc.
- Electrical insulation in large oil-filled transformer.
- Paper grocery bags, multiwall sacks, envelopes and other packaging.
- An inexpensive material for lining particle boards.
- The base paper for sandpaper, flower bouquets.
- Transporting goods national & international places by cargoes.

As paper is mainly made from vegetable fibers, it is hygroscopic and has a tendency to swell. Improper storage or care of the cargo may result in dimensional changes, distortion and reduced strength (tearing). Paper rolls are very sensitive to mechanical influences such as pressure, impact and friction. The risk of damage is greatest during cargo handling.

So the quality of the kraft paper need to be examined before it's used for specific packing purpose, otherwise the purpose of packaging may not be solved



## PARAMETERS

Polychlorinated biphenyls (PCBs) • Pentachlorophenol (PCP) • Thickness • Bursting strength, Bursting factor & Burst index • Tensile strength, Tensile elongation & Tensile index • Tear index, Tear strength & Tear factor • GSM • Thickness • Substances or Rim weight • Bulk • Moisture Content • pH value • Ash • Breaking Length • Folding endurance • Water penetration & water absorbency • Gloss • Opacity • Oil absorbency • Fibre composition • Shape, Size & dimension • Compression strength • Inclined impact test • Drop test • Stack load test • Leachable Heavy metals(Cd, Cr-VI, Pb, Hg etc) • Cobb value • Alkalinity • Sulfate • Chloride



# POLYETHYLENE TEREPHTHALATE (PET) & FLEXIBLE POUCHES FOR PACKING OF REFINED EDIBLE OILS

To prevent or retard chemical deteriorations of fats and oils, and for easy handling, transportation and to ensure that the product reaches the ultimate consumer in safe condition and to satisfy legal requirements for their sale, the packaging material should maintain chemical quality, purity, colour, flavour and other required attributes. Therefore, the material should be a barrier to water vapour, oxygen, and odour, and should be grease resistant and fulfill the following requirements. Packaging material should be a barrier to volatile and taint proof towards prints, inks, solvent used for inks, and adhesive, etc. It should have good impact resistance to prevent loss or contamination due to breakage or leakage of the package. It also have good stiffness, tensile strength, tear resistance and heat seal strength to work well on automatic Form Fill-Seal machines (for flexible films). It should be non-toxic and be compatible with the product and be tamper proof. It should be economical, easily available, printable and disposable.

The following forms are commonly used:

- Rigid Containers: Metal/Glass/ Plastic
- Semi-rigid Packages
- Flexible Pouches

So the quality of the packaging materials (HDPE/ LDPE/ PET) should be optimum as per the national & International regulation.



## PARAMETERS

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Thickness • Vibration leakage • Storage test • Overall migration • Stack load test • Drop impact • Dart impact resistance • Water vapor transmission rate (WVTR) and oxygen transmission rate (OTR) • Ink adhesion test • Product resistance of printed pouches



## **POLYSTYRENE, POLYETHYLENE, POLYPROPYLENE AND ITS COPOLYMERS, POLYALKYLENE TEREPHTHALATES) POLYCARBONATE RESINS, ETHYLENE/ACRYLIC ACID & COPOLYMERS, NYLON-6, ETHYLENE METH ACRYLIC ACID & COPOLYMERS, ETHYLENE VINYL ACETATE & COPOLYMERS, FOR PACKAGING**

Nowadays different types of polymers are used in food packaging. FSSAI has created separate packaging regulations as it recognizes the importance of packaging in the food sector and its impact on food safety. Any material which comes in direct contact with food or likely to come in contact with food used for packaging, preparation, storing, wrapping, transportation and sale or service of food shall be of food grade quality. Packaging materials shall be suitable for the type of product, the conditions provided for storage and the equipment for filling, sealing and packaging of food as well as transportation conditions. Packaging materials shall be able to withstand mechanical, chemical or thermal stresses encountered during normal transportation. In case of flexible or semi-rigid containers, an overwrap packaging may be necessary. Food products shall be packed in clean, hygienic and tamper-proof package or container. The sealing material shall be compatible with the product and the containers as well as the closure systems used for the containers. Printing inks for use on food packages shall conform to IS: 15495, it should be ensured that Printed surface of packaging material shall not come into direct contact with food products. In case of multilayer packaging, the layer which comes in direct contact with food or layers likely to come in contact with food shall meet the requirements of packaging materials specified in Schedule I, II and III of these regulations. The materials listed in Schedule I, II and III of these regulations shall be compatible with their intended use as a packaging material so as not to alter the quality and safety of the food product.

Besides, general and specific requirement with respect to packaging materials, the regulations also prescribe overall migration and specific migration limits of contaminants for plastic packaging materials. The regulations specify the suggestive list of packaging materials for different food product categories. As per these regulations, the packaging materials used for packing or storing the food products shall conform to the Indian Standards provided in the schedules.

Edward Food Research and Analysis Centre Limited offering laboratory tests, assessments, evaluations of food-contact packaging as per the requirement of FSSAI and provide complete solution to the customers



## PARAMETERS

Overall Migration Test • Colour Migration Test • Lead (Pb) • Arsenic (As) • Mercury (Hg) • Cadmium (Cd) • Zinc (Zn) • Selenium (Se) • Barium (Ba) • Chromium (Cr) • Antimony (Sb) • Total Aromatic Amine • Thickness • Heat seal strength • Melt flow index • Tensile strength / Breaking load • Elongation at break • Dart impact test • Oxygen transmission rate (OTR) test • Water vapour transmission rate (WVTR) test • Vibration leakage test • Water potability test • Stack load test • Ink adhesion test • Leak proofness test (by air pressure) • Brimful capacity • Closure leakage test • Material • Shape & dimension • Residual additives

## INSTRUMENTS

FTIR • DSC • GC MS/ MS • GC FID • ICP MS & ICP OES • Transparency Tester • Drop Tester • Hot Air Oven • Vibration Leakage Tester • Humidity Controller • Analytical Balance • Vernier Calliper • Digital Screw gauge • OTR & WTVTR apparatus

## STANDARDS/REGULATIONS

International Organization for Standardization (ISO) • Indian Standards (BIS) • American Society for Testing and Materials (ASTM) • European Union Methods (EU) • German institute for standardization (DIN)



# PACKAGE DRINKING WATER BOTTLE & POUCH

As per the regulation of BIS it is mandatory for all the industries who produce package Drinking Water and/or Natural Mineral Water should maintain the quality of the Containers as per IS 15410:2003 & IS 15609 : 2005 specification.

It was found in different research studies that sometimes the packaging material leached different toxic elements into the water which are easily dissolved into the high polar water. This toxic elements have direct adverse effects on human health most of them are carcinogenic in nature. To regulate the quality of packaging materials different National & International organization provides the guideline like in India; FSSI, BIS, in USA; FDA, In Europe; EN, In Germany ; DIN.

Edward Food Research is a leading provider of services to the aqua industry by offering unrivaled experience in container testing. With our pan India reach and extensive network of laboratories, we can ensure the quality of the packaging materials as per the National & International Standards.

We have world class dedicated facilities including ICP-MS, ICP-OES, GC MS/MS, FTIR, DSC for our Packaging Material Testing Laboratories.

We not only NABL & BIS approved Laboratory for Container testing; rather we are the REFERAL Laboratories from FSSI. We are proud that our container testing division is USFDA inspected Lab.

We have a dedicated team of Scientist, Chemical Engineers & Mechanical Engineers to ensure the quality of containers safe for packaging of Drinking water or Natural Mineral water. Because of this, reliable quality control and safety testing are of paramount importance to every supplier, manufacturer, and distributor of water containers.

EFRAC ensures that the packaging Materials meet the quality and safety standards of the destination market. Our fully accredited test reports ensure compliance with a number of regulatory requirements, including: BIS, FSSAI, EN, USFDA and so on.



## PARAMETERS

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Material (PE / PVC/ PET/ PBT/ Polypropylene/Polycarbonated/ Polystyrene) • Design, Shape & Dimensions • Manufacture, Workmanship, Finish & Appearances • Brimful capacity & Nominal capacity • Environmental Stress-Crack Resistance • Transparency • Leakage Test (Vibration Leakage) • Drop Test • Overall Migration/ Global Migration/Specific Migration • Water Potability • Stack Load test • Ink adhesion test • Product Resistance • Tensile Strength • Dart Impact Resistance • Odour/ Thickness/ width of film • Product resistance of printed pouches

## INSTRUMENTS

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FTIR • DSC • Gas Chromatography • ICP MS/ICP OES/ AAS • Transparency Tester • Drop Tester • Hot Air Oven • Vibration Leakage Tester • Humidity Controller • Analytical Balance • Vernier Caliper • Digital Screw gauge

## STANDARDS/REGULATIONS

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IS 15410 • IS 2798 • IS 4905 • IS 8747 • IS 9845 • IS 10142 • IS 10146 • IS 10151 • IS 10910 • IS 12252 • IS 14971 • IS 15609 • IS 2508 • IS 14500



# EXTRACTABLE & LEACHATES

The use of plastic for packaging are increasing rapidly all over the world because they are light weighted, can be molded into any shape, non-corrosive in nature, variety of colors etc. The primary function of packaging is to protect the food from external environment, maintaining hygienic conditions, conserving its purity, quality and safety. Almost one-fifth of the net revenue of the plastic industry is from food packaging industry. The main issue associated with packaging is food packaging material (FPMs) interaction because FPMs have the potential to release and successive transfer of components into the packaged content. In this way, FPMs contaminate the stored commodity with the risk of toxic health hazard for the consumer. The substance migrating from FPMs can be subdivided into two category and these are intentionally added substances (IAS) and Non-intentionally added substances (NIAS). IAS are derived directly from the FPMs i.e., they are identical to the FPM such as metals, plastic monomers, antioxidants, etc. NIAS are those compounds which have not been added intentionally to the FPM during the preparation of the FPM or it might have been added to that portion of FPM, which may not come in contact with the food. Examples of IAS include plastic monomers such as vinyl chloride (from PVC), caprolactum (from polyamide), metals (from stabilizer) and bisphenol-A and phthalate (from plasticizer) etc. Examples of NIAS include formation of acetaldehyde and formaldehyde as thermal degradation products from polyethylene terephthalate and formation of 2,4-ditertbutylphenol(2,4 DTB) and 2,6-ditertbutyl-p-benzoquinone(2,6- DTBQ) as oxidation products from Irgafos 1010 and Irgafos 168, or both antioxidants etc.

Migration of toxic chemicals from food packaging polymer into the food constitutes a category of pollutants that cannot be neglected. These pollutants contaminate the food with the risk of toxic health hazard for the consumer. Therefore, the guidelines for the suitable use of plastic for food packaging application have been formulated all over the world. To safeguard the health of a consumer against potential hazard of substances that migrate into the food, the European Union (EU), U.S.A (U.S. Pharmacopoeia 1995, British Pharmacopeia 1998, EU 2004, EU 2008, EU 2011) and many other countries including India have provided the standards. In India, Bureau of Indian Standards (BIS), provide the national standards.

So Leachate & Extractable analysis in the form of Specific migration is mandatory for the packaging materials which are directly used in Pharmaceuticals, Food & Beverage & Foodstuff packing.



## PARAMETERS

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Aluminium • Barium • Cobalt • Copper • Iron • Lithium • Manganese • Zinc • Acetaldehyde • Ethyleneglycol • Diethyleneglyco  
• Formaldehyde • isophthalic acid dichloride • isophthalic acid • terephthalic acid dichloride • phthalic acid • Vinyl Chloride  
• Phthalates • Bisphenol A

## INSTRUMENTS

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Gas Chromatography FID/MS • ICP MS/ICP OES/ AAS

## STANDARDS/REGULATIONS

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International Organization for Standardization (ISO) • Indian Standards (BIS) • American Society for Testing and Materials (ASTM)  
• European Union Methods (EU) • German institute for standardization (DIN)





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