environment * energy * health * safety

INX

Doing our part for a sustainable future

INX Green Team Sustainability
Frequently Asked Questions on Printing Inks

Q1: How has the ink industry contributed to the environmentally responsible disposal of the final printed products?

A1: The ink industry has reformulated all inks to exclude the known toxic metals: lead, cadmium, mercury and hexavalent chromium.

Q2: How does the ink affect the biodegradability of printed materials?

A2: While there is some evidence that vegetable oils themselves are more biodegradable than petroleum oils, no difference in biodegradability of a printed substrate would be anticipated. Biodegradability of printed matter is a function of the biodegradability of the substrate, not of the dry ink film.

Q3: What happens to the printing ink during the recycling process?

A3: The deinking plant utilizes office wastepaper and other paper waste streams as feed stock to recycle paper by removing the ink and other contaminates to produce a clean, bright, market pulp which will be sold to producers of printing and writing grades of paper.

Rejects from the process collected in the deinking process rejects collection tank are dewatered and pressed by a belt filter press in the deinking plant. Polymer will be added to the sludge prior to the sludge press to enhance the dewatering of the sludge. Pressed sludge is collected in a bunker and loaded on a truck for landfill disposal.

The press filtrate is collected and the pH is adjusted and sent to the primary clarifier for wastewater treatment. On its way, polymer is again added to aid in reducing biological oxygen demand (BOD) and total suspended solids (TSS) in the clarifier. This is also a normal practice found in most deinking mills for effluent enhancement.

In the case of decorated aluminum cans, at the aluminum manufacturing plant the cans are remelted along with all ink and coatings that were applied. The melted material is at the same time mixed with virgin aluminum and cast into new ingots. By adding recycled aluminum scrap to the virgin mixture, fewer raw materials are mined from the earth, less time and fuel are used in shipping the material, and less energy is used in processing. Aluminum cans are endlessly and 100% recyclable.

Q4: What happens to the ink once it is removed from the paper?

A4: Ink and stickies (sticky materials like glue residue and adhesives), are trapped in the froth produced during the flotation deinking process. This material is collected, and much of its water is removed and reused at the paper mill. The remaining material, which is still 30%-50% water, also contains very small fibers which have washed out of the pulp during the deinking process. This material can be burned to make energy, composted, or land filled. It can also be used to make concrete and gravel for roads. The disposal method depends upon the material's final content. In a typical deinking plant, every 100,000 dry lbs. of recovered paper placed in the pulper will result in as much as 35,000 dry lbs. of ink, stickies and small fibers.

Q5: Are different types of ink more readily removed from the printed substrates?

A5: NAPIM (National Association of Printing Ink Manufacturers) has no experimental data on the de-inkable characteristics of soya ink versus other paste inks. A review of typical formulations suggests, however, that there would be little or no difference in de-inkable properties between soya or other vegetable oil inks and petroleum based inks.

Q6: Is the De-inking sludge from soya based inks less hazardous than the de-inking sludge from other types of inks?

A6: NAPIM has no experimental data on de-inking sludges. However, since the pigments in soya inks are identical to pigments used in other types of inks and since the vehicle, resins, driers and additives are either identical to, or similar to petroleum based ink, there is no reason to expect that the sludges resulting from the de-inking of soya inks would be less hazardous than other de-inking sludges.

Q7: Are your inks biodegradable?

A7: INX has reviewed the ASTM test methods D 6868-03 and D 6400-04, regarding the specifications for compostable plastics. Our investigation of our product lines reveals that our products have not been tested under the criteria described in these ASTM methods, so we cannot say that we have products that meet these test method requirements.

We would like to take a moment to observe that these ASTM methods appear to be written for the plastic itself, not the printed matter on the plastic. A short lab study shows that ink applied at 100% coverage over a sheet of plastic makes up 0.6% total weight per square inch on a 13 thousandths thickness styrene. In ASTM D 6400-04, Section 6.2 *Disintegration During Composting*, it notes that satisfactory disintegration occurs if after controlled composting, less than 10% of the original dry weight remains after sieving. With the weight of the ink making up so little of the typical total weight of a printed piece, it may not even be a consideration in the testing.

We at INX are not aware of any product on the market that would have been tested under these ASTM methods regarding the specification for compostable plastics. If you have any questions, please feel free to call.

Q8: Are your printing inks biodegradable or compostable?

A8: Biodegradability and compostability for inks and coatings are complex subjects. There is little scientifically based lifecycle analysis research in these areas. But we have seen testing which indicates that mass of ink present on most packaging is so small that it does not interfere with substrates that do biodegrade or compost.

Wal-Mart has exempted inks, coatings and adhesives from their scorecard activity at this time. Again Wal-Mart recognizes these materials make up a very small portion of the mass of the entire package. Ink will represent less than one percent of the total mass of many packages. It makes little sense to expend significant effort and resources to make changes to a material that will have a minimal overall impact on the biodegradability/compostability of the packaging.

In addition, inks are the visible part of the package the consumer sees. Inks have significant impact on the final performance and esthetics of the package. The recycle content on paper can be changed and the consumer will likely no notice the change. A brand product must be very careful in making a packaging change. If a change is perceived, the consumer may wrongly believe that the product has also been changed. For all of these reasons inks may be a high risk change, and are well down the list of items that will changed based solely on sustainability.

Q9: How Do Printing Inks Fit Into Your Sustainability Program?

A9: There are many different types of printing inks (i.e. sheetfed, web, liquid, energy curable, metal decorating, and coatings). The decision to choose an ink, and its specific performance characteristics, typically is made based on the printer's need to balance performance, cost and environmental compliance. Often the choice comes down to performance. To meet the performance requirements a printer may have a very limited choice of ink systems. So choosing an ink often comes down to the selection of an ink that meets the performance requirements on the press, and its product-end-use needs as an ink printed finished good.

All printing inks are made up of four classes of raw materials; pigments, resins, solvents, and additives. The pigment is the color portion of the formula. Pigments are solid particles. The resins are also solid, and resins bind the pigments to the substrate and provide many of the end-use properties that are required as an ink printed finished good. The solvent reduces the ink to a liquid form, allowing the ink to

be printed by the various selected printing process. Additives are a wide range of raw materials which modify the physical properties of the ink to improve its use on the printing press.

Most of all of these four classes of raw materials are petroleum based products. These are highly refined and processed specialty chemical materials which deliver very unique properties to the various printing ink formulations.

There are some ink raw materials which do come from renewable resource feed stocks. There has been a long tradition of use of renewable raw materials in inks. There are a wide range of current renewable raw material components that are used in various printing inks formulations which includes: vegetable oils and esters, alkyd/rosin esters, cellulose esters/nitrocellulose, fatty acid amides, epoxy soy bean oil, vegetable waxes, and bio-ethanol. But remember the use of renewable raw materials in various printing inks is influenced by technical considerations, customer requirements and pricing.

Ink companies are continuing to practice environmental stewardship on a global bases, fostering technical and regulatory groups to work to produce ink, coatings, pigments, fountain solutions and other products that are environmentally friendly.

Ink manufacturers today are experimenting with many types of new vehicles and other non-petroleum products to produce the next generation ink systems that will continue to offer environmentally friendly "green" inks.

Q10: Do We Know an Ink's Carbon Footprint?

A10: To date there has been no joint PIA/GATF/NAPIM activity on this question. However from rough estimates the Carbon Footprint for an ink may vary between 100-200 grams of CO_2/kg ink produced. Based on the studies of the UK Carbon Trust on the carbon footprint of a specific crisps package a further estimate determines the ink contribution to be in the order of less than one percent, which for the time being would be an assumption to be generalized also for other applications*.

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Q11: What is the contribution of the printing ink to the overall carbon footprint of the printing process?

A11: Ink contributes 0.5% of the overall carbon footprint of the printing process where other components contributions are paper, 76% of the total carbon footprint; machine usage, 12.5%; transport, 6%; and plates 5%; in a calculation done by Manroland based on the total carbon life cycle including CO_2 emissions from the production of the actual manufacture of equipment and materials. (from Ink World, July 2008 article "Energy Efficiency, Sustainability are key topics at drupa 2008")

Q12: Can Corrugated Cardboard be Recycled?

A12: Cardboard is reportedly the largest single source of recovered paper, comprising 54% of all paper recovered for recycling in the U.S. (*U.S. EPA*, 2000). If reducing the amount of cardboard used for packaging is not feasible (source reduction), then it should be recycled or composted. Corrugated cardboard which is made from strong, good quality wood fiber including un-waxed cardboard boxes and brown paper bags can be easily recycled. Paperboard cartons such as cereal boxes, waxed cardboard used for packaging fresh vegetables and other non-corrugated boxes cannot be recycled as cardboard but may be recycled with mixed paper products. Waxed corrugated cardboard can be reused. *The American Forest and Paper Association* has a complete listing of locations that will accept waxed corrugated boxes. This list can be found on their website at http://www.aafandpa.org, or call them at (800) 878-8878. Waxed cardboard can also be composted or pelletized for use as fuel in industrial boilers. Cardboard usage is widespread and contributes significantly to the waste stream disposed in landfills, even though cardboard is universally marketable, profitable, and easily recycled.

Corrugated Cardboard Wax Alternatives

Traditionally, some corrugated containers have been treated with wax coatings to provide moisture and vapor protection for safely transporting products requiring it (such as broccoli, usually packed in ice). Wax coatings cannot be recycled because they do not dissolve in water, so they create problems in the repulping process. The industry has worked diligently to develop recyclable alternatives, many of which are now becoming commercially available.

The corrugated industry developed a new recyclability standard that allows these alternatives to be tested, proven and certified recyclable if they pass the required protocol. Certified materials should be marked with one of these symbols:

or


When you see either of these symbols, you know that the container bearing it can be successfully recycled.

Q13: How do I Recycle Coated Corrugated?

A13: If it has been treated with plastic extrusions or laminates, wax coatings, etc., it cannot be recycled (unless it is marked with either of the recyclable certification symbols shown below, which indicate the coating has been tested and proven recyclable). These can be included in general paper waste for recycling or reused


http://www.corrugated.org/Recycling/RecyclingProgram.aspx

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Q14: Do printing inks use renewable resources?

A14: Offset printing inks use several renewable resources. Soy oil, Linseed oil, Tung oil, and Chinawood oil are all renewable plant derived materials. Rosin resins used in the ink vehicle are derived from pine trees and other species of conifers. It should be noted that not all resins used in inks are derived from renewable resources. Hydrocarbon resins are derived from petroleum. The amount of renewable versus hydrocarbon resins in an ink will vary depending on the specific ink properties and formulation goals. The pigments in inks are made from petroleum based resources due to end customer requirements for light fastness.

Q15: Does INX have a take-back program for containers?

A15: INX does take back and reuse our largest size containers – totes, which hold between 2000-3000 lbs of ink. Liquid, Sheetfed, and Heatset inks can be purchased in totes. All plastic and metal containers used by INX are recyclable but we rely on our customers to recycle these containers. INX also sells Heatset ink in bulk, using tanker trucks to deliver ink directly to our customer's tanks. The minimum order size needs to offset the delivery cost for bulk deliveries.