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CHEMISTRY OF KINDERJOY: AN OVERVIEW ON PLAYTIME NOW COMES WITH SURPRISES

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ABSTRACT

Kinder Joy is a revolutionary idea that is a delight for children. By combining chocolate, a surprise and a toy, a fun and entertaining world for children was created, while at the same time, delivering parents a reassuring and emotional experience. This unique treat for children comes in a well-designed portion size of delicious milk and cocoa cream with wheat germ and two crunchy wafer balls filled with cocoa cream. The packaging of Kinder Joy ensures air-tight protection, maximum hygiene and practical consumption, thanks to the little spoon contained inside. The toys and gadgets featured with Kinder Joy not only stimulate imagination and creativity but also accompany and aid in a child's cognitive, emotional and relational development. All Kinder Joy toys are designed and developed with safety in mind, rigorously observing international regulations as well as extra safety criteria voluntarily adopted by the Ferrero Group. This unique product creates affectionate moments for parents and children to share, generating joy and discovery every time. Kinder Joy - mother's trust, child's joy!

KEYWORDS: Kindergarten, wax, Styrofoam.

Overview

The word **Kinderjoy** comes from **Kinder**-garten which reflects on young babies (both boy and girl) where children below the age of compulsory education play and learn; a nursery school and KinderJoy gives happiness (Joy) to the children by its lucrative outer look and yummy inner look.

Figure-1: Kinder-Boy & Kinder-Girl

Circulating warning claims that children's chocolate treat, Kinder Joy contains a wax coating that can cause cancer. It further claims that Styrofoam containers also have a wax coating.

The claims in the warning are misleading and inaccurate. Many chocolate products do actually contain paraffin wax to give them a shiny finish and help them remain solid at room temperature. However, there is no evidence that this wax additive causes cancer. Wax has been used as an additive to various foods for decades and is considered non-toxic and the claim that polystyrene containers have a wax coating is false. The warning is similar to another false warning that claims that instant noodles have a wax coating. KINDER JOY contains wax coating which is also used in Styrofoam containers. That is why Kinder Joy don't stick to each other when eating it. Our body needs up to two days to clean the wax.

Make sure you stop eating Kinder Joy. This wax can cause CANCER.[1]

Ingredients

Sugar, Edible Vegetable Oils, Fats, Skimmed Cow Milk Powder (19.5%), Toasted Wheat Germ, Low Fat Cocoa Powder (4%), Wheat Starch, Powdered Barley Malt Extract, Emulsifier (Lecithin – INS 322), Whey Protein, Raising Agent (INS 500ii, INS 503ii), Salt.
Allergens: Contains Milk, Gluten, Soy

Detailed Analysis

According to a warning that circulates via social media, you should stop eating the chocolate treat Kinder Joy because it contains a wax coating that can cause cancer. The message claims that the wax coating is designed to stop the treats sticking together when you eat them. The message warns that your body can take up to two days to get rid of the accumulated wax and that this accumulation can lead to cancer. It further claims that the same cancer causing wax coating is used in Styrofoam containers. However, the claims in the message are misleading and inaccurate.

Waxes are a class of chemical compounds that are malleable near ambient temperatures. These are esters of long chain fatty acids with long chain fatty alcohols where $(CH_2)_n$ and n is a big number. They are also a type of lipid. Characteristically, they melt above 45°C (113°F) to give a low viscosity liquid. Waxes are insoluble in water but soluble in organic, nonpolar solvents. All waxes are organic compounds, both synthetically and naturally occurring.

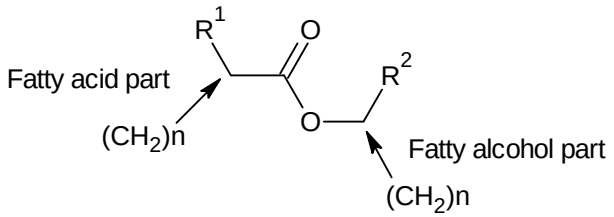

Figure-2: Wax skeleton

Waxes are organic compounds that characteristically consist of long alkyl chains. Natural waxes may contain esters of carboxylic acids and long chain alcohols or mixtures of substituted hydrocarbons, such as long chain fatty acids and primary alcohols. Synthetic waxes are long-chain hydrocarbons lacking functional groups.

Plant and animal waxes: Waxes are synthesized by many plants and animals. Those of animal origin typically consist of wax esters derived from a variety of carboxylic acids and fatty alcohols. In waxes of plant origin characteristic mixtures of unesterified hydrocarbons may predominate over esters. The composition depends not only on species, but also on geographic location of the organism. Because they are mixtures, naturally produced waxes are softer and melt at lower temperatures than the pure components.[2]

Animal waxes: The most commonly known animal wax is beeswax, but other insects secrete waxes. A major component of the beeswax used in constructing honeycombs is the ester myricyl palmitate which is an ester of triacontanol and palmitic acid. Its melting point is 62-65°C. Spermaceti occurs in large amounts in the head oil of the sperm whale. One of its main constituents is cetyl palmitate, another ester of a fatty acid and a fatty alcohol. Lanolin is a wax obtained from wool, consisting of esters of sterols.

Plant waxes: Plants secrete waxes into and on the surface of their cuticles as a way to control evaporation, wet ability and hydration. The epicuticular waxes of plants are mixtures of substituted long-chain aliphatic hydrocarbons, containing alkanes, alkyl esters, fatty acids, primary and secondary alcohols, diols, ketones, aldehydes. From the commercial perspective, the most important plant wax is Carnauba wax, a hard wax obtained from the Brazilian palm *Copernicia prunifera*. Containing the ester myricyl cerotate, it has many applications, such as confectionery and other food coatings, car and furniture polish, floss coating, surfboard wax, and other uses. Other more specialized vegetable waxes include candelilla wax and ouricury wax.

Petroleum derived waxes: Although many natural waxes contain esters, paraffin waxes are hydrocarbons, mixtures of alkanes usually in a homologous series of chain lengths. These materials represent a significant fraction of petroleum. They are refined by vacuum distillation. Paraffin waxes are mixtures of saturated n- and iso- alkanes, naphthenes, and alkyl- and naphthene-substituted aromatic compounds. The degree of branching has an important influence on the properties. Millions of tons of paraffin waxes are produced annually. They are used in foods (such as chewing gum and cheese wrapping), in candles and cosmetics, as non-stick and waterproofing coatings and in polishes.

Montan wax: Montan wax is a fossilized wax extracted from coal and lignite. It is very hard, reflecting the high concentration of saturated fatty acids and alcohols. Although dark brown and smelly, they can be purified and bleached to give commercially useful products.

Polyethylene and related derivatives: Some waxes are obtained by cracking polyethylene at 400°C. The products have the formula $(CH_2)_nH_2$, where n ranges between about 50 and 100. As of 1995, about 200 million kilograms/y were consumed. Waxes are mainly consumed industrially as components of complex formulations, often for coatings. The main use of polyethylene and polypropylene waxes is in the formulation of colourants for plastics. Waxes confer matting effects and wear resistance to paints. Polyethylene waxes are incorporated into inks in the form of dispersions to decrease friction. They are

employed as release agents. They are also used as slip agents, e.g. in furniture, and corrosion resistance.

Candles: Waxes and hard fats such as tallow are used to make candles, used for lighting and decoration.
Wax products: Waxes are used as finishes and coatings for wood products. Beeswax is frequently used as a lubricant on drawer slides where wood to wood contact occurs.

Other uses: Sealing wax was used to close important documents in the Middle Ages. Wax tablets were used as writing surfaces. There were different types of wax in the Middle Ages, namely four kinds of wax (Ragusan, Montenegro, Byzantine, and Bulgarian), "ordinary" waxes from Spain, Poland, and Riga, unrefined waxes and colored waxes (red, white, and green). Waxes are used to make wax paper, impregnating and coating paper and card to waterproof it or make it resistant to staining, or to modify its surface properties. Waxes are also used in shoe polishes, wood polishes, and automotive polishes, as mold release agents in mold making, as a coating for many cheeses, and to waterproof leather and fabric. Wax has been used since antiquity as a temporary, removable model in lost-wax casting of gold, silver and other materials.

Wax with colorful pigments added has been used as a medium in encaustic painting, and is used today in the manufacture of crayons and colored pencils. Carbon paper, used for making duplicate typewritten documents was coated with carbon black suspended in wax, typically montan wax, but has largely been superseded by photocopiers and computer printers. In another context, lipstick and mascara are blends of various fats and waxes colored with pigments, and both beeswax and lanolin are used in other cosmetics. Ski wax is used in skiing and snowboarding. Also, the sports of surfing and skateboarding often use wax to enhance the performance.

Some waxes are considered food-safe and are used to coat wooden cutting boards and other items that come into contact with food. Beeswax or coloured synthetic wax is used to decorate Easter eggs in the Ukraine, Poland, and the Czech Republic. Paraffin wax is used in making chocolate covered bon-bons. Wax is also used in wax bullets, which are used as simulation aids.[3]

Animal waxes
Beeswax - produced by honey bees, Chinese wax - produced by the scale insect *Ceroplastes ceriferus*, Lanolin (wool wax) - from the sebaceous glands of sheep, Shellac wax - from the lac insect *Kerria lacca*, Spermaceti - from the head cavities and blubber of the sperm whale.

Vegetable waxes
Bayberry wax - from the surface wax of the fruits of the bayberry shrub, *Myrica faya*, Candelilla wax - from the Mexican shrubs *Euphorbia cerifera* and *Euphorbia antisyphilitica*, Carnauba wax - from the leaves of the Carnauba palm, *Copernica cerifera*, Castor wax - catalytically hydrogenated castor oil, Esparto wax - a byproduct of making paper from esparto grass, (*Macrochloa tenacissima*), Japan wax - a vegetable triglyceride (not a true wax), from the berries of Rhus and Toxicodendron species, Jojoba oil - a replacement for spermaceti, jojoba is pressed from the seeds of the jojoba bush, *Simmondsia chinensis*, Ouricury wax - from the Brazilian feather palm, Syagrus coronate, Rice bran wax - obtained from rice bran (*Oryza sativa*), Soy wax - from soybean oil, Tallow Tree wax - from the seeds of the tallow tree *Triadica sebifera*.

Mineral waxes
Ceresin waxes, Montan wax - extracted from lignite and brown coal, Ozocerite - found in lignite beds, Peat waxes
Petroleum waxes: Paraffin wax - made of long-chain alkane hydrocarbons, Microcrystalline wax - with very fine crystalline structure
Petroleum jelly
A hoax circulating on the internet claims that children's chocolate candy, Kinder Joy contains a wax coating this is also used in Styrofoam containers that may cause cancer. This claim is misleading and completely inaccurate. Many chocolate products, chewing gum. and cheese contain food-grade paraffin wax to give them a shiny finish and help them remain solid at room temperature but paraffin wax is not linked to cancer and Styrofoam containers do not contain wax.

There is no evidence to suggest the paraffin wax additive in chocolate, including the wax allegedly in Kinder Joy chocolate causes cancer. This wax is approved by the FDA as edible and has been used as an additive in various foods for decades. Paraffin wax is also non-digestible, which causes it to pass through the body without being broken down. It is unclear if Kinder Joy products contain this paraffin wax additive, the listed ingredients for this chocolate treat include sugar, skimmed milk powder, vegetable fats, hazelnuts, whole milk powder, wheat flour, fat-reduced cocoa, semi-bitter chocolate, butter fat, emulsifier lecithin, wheat starch, sunflower oil, dried protein, vanillin, sodium hydrogen carbonate (baking agent), ammonium carbonate and salt. Wax is not listed as a Kinder Joy ingredient; however, wax may not always be listed as an ingredient on product labels.

There is also no credible evidence to support any links between wax consumption and cancer. As previously mentioned, this wax is approved by the Federal Drug Administration and other health organizations. In fact, many chocolate products do actually contain paraffin wax as an additive. The wax is added to the chocolate products to give them a shiny finish and help them remain solid at room temperature. It is unclear if Kinder Joy products contain this paraffin wax additive. Wax is not listed as a Kinder Joy ingredient. Food grade paraffin wax is used in the production of candy as well as

chocolate and a variety of other food products. However, the claim in the warning message that wax can cause cancer is unfounded. There is no credible evidence to support any links between wax consumption and cancer and wax does not accumulate in the body as implied in the message. Wax is an inert substance that does not interact with the human digestive system and passes unaltered through the body. Some people may experience allergic reactions to wax and swallowing a large amount of some types of wax may lead to intestinal obstruction. But, to reiterate, food grade wax has been used in various foods for many years, is non-toxic, and is not linked to cancer. The claim that polystyrene foam food containers have wax coating is untrue. In fact, the claim is absurd. There is no sensible reason to coat such containers with wax.

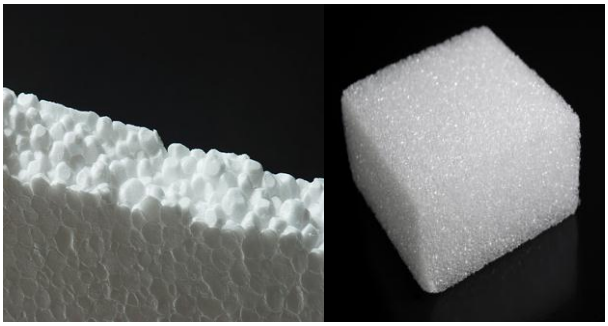

Figure-3: Styrofoam

Styrofoam is a trademarked brand of closed-cell extruded polystyrene foam currently made for thermal insulation and craft applications. It is owned and manufactured by The Dow Chemical Company.[4]

In the United States and Canada, the word *styrofoam* incorrectly refers to expanded (not extruded) polystyrene foam, such as disposable coffee cups, coolers, or cushioning material in packaging, which is typically white and is made of expanded polystyrene beads. The term is used generically although it is a different material from the extruded polystyrene used for Styrofoam insulation. The Styrofoam brand polystyrene foam, which is used for craft applications, can be identified by its roughness and the fact that it "crunches" when cut. Additionally, it is moderately soluble in many organic solvents, cyanoacrylate, and the propellants and solvents of spray paint. Another trade name for polystyrene foam is thermacol, originated by BASF for expanded polystyrene. Styrofoam is composed of 98% air, making it lightweight and buoyant. Because of its insulating properties and buoyancy, it was adopted in 1942 by the United States Coast Guard for use in a six-person life raft. Styrofoam has since found a variety of uses. Dow produces Styrofoam building materials, including varieties of insulated sheathing and pipe insulation. The claimed R-value of Styrofoam insulation is five per inch. Dow also produces Styrofoam as a structural material for use by florists and in craft products. Dow insulation Styrofoam has a distinctive blue color; Styrofoam for craft applications is available in white and green.

Styrofoam can be used under roads and other structures to prevent soil disturbances due to freezing and thawing. The EPA and International Agency for Research on Cancer have determined styrene as a possible human carcinogen. The National Bureau of Standards Center for Fire Research found 57 chemical by-products released during the combustion of expanded polystyrene foam. From July 1, 2015 New York City is the largest city in America to prohibit the sale, possession and distribution of single-use polystyrene foam.

Styrofoam-eating worms

Recently, researches discovered that mealworms, the larvae form of the darkling beetle, could digest and subsist healthily on a diet of Styrofoam. About 100 mealworms could consume between 34 and 39 milligrams of Styrofoam in a day. The droppings of mealworm were found to be safe for use as soil for crops. This warning closely mirrors another long-running Internet warning that falsely claims that instant noodles contain a cancer causing wax coating. Like the Kinder Joy warning, the noodles version claims that the wax is added to prevent sticking and that the Styrofoam containers that noodles come in also have a wax coating. Sending on false and misleading warnings about supposed health risks is counterproductive and will help nobody. It is important to check the veracity of supposed health advisory messages before sharing them with others.

Chocolates may contain paraffin wax, which is widely used to hold the chocolate in place and give it a nice hard sheen. Paraffin wax is tasteless, and comes in many different grades. Food-grade paraffin wax is very common in candies, chocolate and cheese. Furthermore, it is definitely edible (certified by the US Food and Drug Administration or FDA, and the equivalent Ministry of Health in Malaysia), or they would NOT have approved it for sale under food category. However, while it is edible, it is also non-digestible, so it will pass through your body without getting broken down. It will not cause a buildup in your system and give you intestinal obstructions.

Figure-4: Anatomy of Kinderjoy

Now that we know for a fact chocolates use paraffin wax, the next question is, does wax cause Cancer? While there are no evidence to suggest that wax can cause

Cancer, it is of no nutritional value. It may be a case of recall bias, as those who eat unhealthy food on a regular basis may be more likely to acquire Cancer. As such, statistically, those who eat chocolate (which contains wax) are more likely to get Cancer. In fact, a similar claim was also made on instant noodle. To this date, no one has actually died from "wax" build up as a result of consuming chocolate, nor claimed to have gotten Cancer because of instant noodles or chocolates.[5]

CONCLUSION

The word kinder is common in kindergarten and kinderjoy and the meaning of kinder is children who are all time in the mood of joy, so the combination of kinder and joy becomes kinderjoy which means that happiness of children with kinderjoy. Kinderjoy is the representation of attractive coating outside with internal delicious mouth watering matters inside. So manychemistry is playing on it. Outer lucrative getup with inner yummy set up to attract mostly children of age group 4-12years but this attractiveness becomes least from the beginning of teen ages. Kinder Joy is not banned in India or abroad but a bigger variant of the tasty treat with a toy is banned in USA. If you are in possession of the toy and treat even in a sealed pack, you are liable for a hefty fine. The toy is a choking hazard according to the USA authorities but Indian authorities don't mind it. So be **kind** to **kinder** to play with kinderjoy!

REFERENCES

1. Boundy, Ray H.; Amos, J. Lawrence. *A History of the Dow Chemical Physics Lab*. New York: Marcel Dekker, Inc., 117–128, 1991.
2. Uwe Wolfmeier, Hans Schmidt, Franz-Leo Heinrichs, Georg Michalczyk, Wolfgang Payer, Wolfram Dietsche, Klaus Boehlke, Gerd Hohner, Josef Wildgruber "Waxes" in Ullmann's Encyclopedia of Industrial Chemistry, Wiley-VCH, Weinheim, 2002.
3. Wilhelm Riemenschneider1 and Hermann M. Bolt "Esters, Organic" Ullmann's Encyclopedia of Industrial Chemistry, 2005, Wiley-VCH, Weinheim.
4. http://www.hoax-slayer.com/kinder-joy-wax-coating-cancer-warning-hoax.shtml#ri
5. http://phishlist.com/hoax-kinder-joy-contains-wax-coating-which-is-also-used-in-styrofoam-containers/