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Heavy Metal Commentary

Generally, when referring to lead, or any heavy metal in tea, the metal is actually "in" the leaf. If this is the case, the transference is usually about 20%. However, there have been some instances, particularly with some Chinese Green teas in which the lead is actually surface lead, e.g., from environmental issues (smog, etc.). In these cases, virtually all the lead gets "washed" into the liquor when brewing.

Note that there are very few specific limits for heavy metals published as MRL's by the EPA and enforced by FDA. In the case of lead, "U.S. EPA has adopted a Maximum Contaminant Level Goal (MCLG) of zero for lead in drinking water, based on "occurrence of low level effects" and because U.S. EPA classifies lead as Class B2, a "probable human carcinogen" (Fed. Reg. 56:32112, July 15, 1991; U.S. EPA, 2008). U.S. EPA has not adopted a Maximum Contaminant Level (MCL) for lead in drinking water because they regard the development of such a level as "not feasible" and rely on the "treatment approach" described in the final rule (Fed. Reg. 56:32112, July 15, 1991) to achieve the objective of reducing exposures to lead. However, U.S. EPA has set an "action level" for lead in drinking water of 15 ppb (40 CFR 141, 142; Fed. Reg. 56:26461-26564). This is a level the U.S. EPA believes is feasible for public water systems to attain by such measures as adjusting the physical characteristics of the water (pH, hardness) which affect the corrosivity of the water."

The general view of the FDA is that since the elimination of lead used as solder in canned goods, as an additive in gasoline and as a base in pesticides, the incident of lead in the environment has been greatly reduced. A general statement for lead from FDA is found at: (http://www.fda.gov/Food/FoodborneIllnessContaminants/Metals/ucm172050.htm)

Overview of FDA Activities Addressing Lead in Food

Lead is a naturally occurring element whose toxicity in humans has been documented throughout history.

Lead is widely present in our environment due to its natural occurrence and human activities that have introduced it into the general environment such as the use of leaded gasoline. Because lead may be present in environments where food crops are grown and animals used for food are raised, various foods may contain unavoidable but small amounts of lead that do not pose a significant risk to human health.

However, foods may become contaminated with lead if they are grown, stored or processed under conditions that could introduce larger amounts of lead into the food, such as when a root crop is grown in soil that has been contaminated from the past use of leaded pesticides on that acreage. Under such conditions, the resulting contamination of the food may pose a health risk to consumers.

FDA first recognized the need to control potential lead exposure from food in the 1930s. The earliest actions of the agency focused on limiting the potential for lead to become a component of food as a consequence of intentional uses of lead containing substances in agriculture and food processing, e.g., lead-based pesticides and lead containing solder in food cans. (Ref. 1)

During the 1970s and 1980s studies were published documenting adverse effects of lead in children at lower blood lead levels than had been previously established. In 1979, FDA stated that it intended to expand its programs to monitor and reduce lead levels in the food supply with the objective of reducing consumer's lead exposure to the lowest level that can be practicably obtained. (Ref. 2)

The goal of limiting lead contamination of food was facilitated by the development and implementation of the use of welded (non-soldered) food cans during the 1980s. This development and the concurrent prohibition of the use of lead containing gasoline in the U.S. are largely responsible for dramatic decreases in measured lead levels in the U.S. diet beginning in the 1980s. (Ref. 3)

FDA's past and current activities intended to reduce or limit lead levels in food have addressed pesticides, lead glazed ceramic ware and other house wares, bottled water, wine, food cans, food additives, candy and candy wrappers and most recently, cosmetics and lipstick (http://www.fda.gov/Cosmetics/GuidanceRegulation/GuidanceDocuments/ucm452623.htm?source=govdelivery&utm_medium=email&utm_source=govdelivery).

As you can see, FDA has concentrated on potential high lead containing sources rather than setting MRL's for all food items. This same philosophy appears to extend to other metals as well.

Arsenic: http://www.fda.gov/Food/FoodborneIllnessContaminants/Metals/ucm280202.htm

Lead: http://www.fda.gov/Food/FoodborneIllnessContaminants/Metals/ucm2006791.htm

Mercury: http://www.fda.gov/Food/FoodborneIllnessContaminants/Metals/ucm2006760.htm

Cadmium: http://www.fda.gov/ICECI/ComplianceManuals/CompliancePolicyGuidanceManual/ucm074515.htm

There are various guidance documents and other commentaries available. For ease of reference, I include them below:

http://www.fda.gov/Cosmetics/ProductsIngredients/PotentialContaminants/ucm452836.htm?source=govdelivery&utm_medium=email&utm_source=govdelivery

http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/ChemicalContaminantsMetalsNaturalToxinsPesticides/default.htm

http://www.fda.gov/ohrms/dockets/dockets/95s0316/95s-0316-rpt0254-05-vol186.pdf

http://www.govtlab.gov.hk/g/texchange/Stds%20for%20heavy%20metals.pdf

EPA also publishes information. Please see: http://www2.epa.gov/learn-issues/learn-about-chemicals-and-toxics and http://www.epa.gov/oppt/existingchemicals/pubs/findinfo.html

The pattern of low levels of transference generally carries through on heavy metals, so the effect of solubility must be taken in to account.

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Founded in 1899, the Tea Association of the USA, Inc. was formed to promote and protect the interests of the tea trade in the United States and is the recognized independent authority on Tea.

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