F•P•E

FOOD·PACKAGING·ENVIRONMENT

Expert Opinion prepared by

Professor Gordon L. Robertson
DipMgt MTech PhD FAIP FIAFoST FIFT(USA) FNZIFST
Consultant
Food•Packaging•Environment

6066 Lugano Drive
Hope Island QLD 4212
AUSTRALIA
ABN: 33 138 639 125
www.gordonlrobertson.com
Tel: +617 5510 9518

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Disclaimer

OPINION

1. In preparing this report I have relied on the brief supplied by Danny Eagleton, Packaging Development Manager, Heinz Wattie's Ltd, Hastings, New Zealand dated 5th August 2010. I have not personally sighted the cans in question or visited the manufacturers.

2. Tin and iron sulfides are not considered harmful if ingested, but may be undesirable from an aesthetic point of view. Because these compounds are insoluble in water, they are not harmful when ingested.

3. The body of the can is made from tinplated steel with an internal tin coat weight of 8.4 gsm and an external tin coat weight of 2.8 gsm. While the can body is unlacquered, both ends are internally lacquered.

4. Sulfur staining or sulfide staining is characterised by blue-black or brown marks on the inside of tinplated steel cans.

5. Although the staining of tinplate cans by foods rich in protein or containing organic sulfur compounds has been recognised for a very long time as a natural phenomenon, it nevertheless continues to give rise to occasional complaints. Despite the fact that this phenomenon has been observed for well over a century, the chemistry of the reactions involved is not well understood.

6. Sulfur and sulfur compounds may be introduced into tinplated steel cans in a number of ways; the most likely route in the case of baked beans is from sulfur-containing compounds within the ingredients, and in particular sulfur-containing proteins (for example, those containing the amino acids cysteine and methionine) in the beans. Proteins are degraded during retorting (heat processing), releasing free sulfide or sulfide compounds into the headspace and product.

7. There are two types of sulphide staining. One involves iron sulfide (sometimes called sulfide black) and the other involves tin sulfides. These two types of staining do not constitute a health hazard or lead to failure of the can. However, both types of staining may be unsightly at high levels. These stains are regarded as a cosmetic problem and do not normally lead to further corrosion.

8. Sulfide black involves a reaction between exposed iron from the can with product constituents such as phosphorus, sulfur, and oxygen. The name is misleading because the deposits may not contain sulfur but may be composed of oxides and phosphates of iron.

9. Tin sulfide is usually widespread throughout the can, and is blue-black or sometimes brown in colour. These spots are the result of reaction between exposed tin from the can and sulfur to form a tin sulfide precipitate. It is believed to result from oxidation of the tin coating and subsequent deposition of an insoluble tin sulfide precipitate on the surface. It occurs during or soon after thermal processing and shows little increase in intensity during storage.

References:

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2. Reznik, D. (2009). Cans, Corrosion. In: Wiley Encyclopedia of Packaging Technology, 3rd edition. Yam, K.L. (Ed). New York: John Wiley & Sons Inc., pp. 199-204.

3. Robertson, G.L. (2006). Metal packaging materials. In: Food Packaging Principles and Practice, 2nd edition. Boca Raton, Florida: CRC Press LLC, pp.150-151.

QUALIFICATIONS

Bachelor of Technology, Master of Technology and PhD in Food Technology.

Foundation Professor of Packaging Technology at Massey University, New Zealand 1988-1992.

Vice President in the Tetra Pak Asia Regional Headquarters 1992-2003.

Consultant in food packaging since 2003 based in Australia.

Adjunct Professor in the School of Land, Crop and Food Sciences at the University of Queensland.

Fellow of the Australian Institute of Packaging.

Fellow of the International Academy of Food Science & Technology.

Fellow of the Institute of Food Technologists (USA).

Author of the definitive book **FOOD PACKAGING PRINCIPLES & PRACTICE.**

1st edition published by Marcel Dekker in New York in 1993.

2nd edition published by CRC Press in Boca Raton, Florida in 2006.

Editor of the book **FOOD PACKAGING AND SHELF LIFE A PRACTICAL GUIDE** published in December 2009 by CRC Press in Boca Raton, Florida.

Member of the editorial board of the journal *Packaging Technology & Science*.

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