

EFFECT OF THERMAL ON BPA LEACHES FROM BABY BOTTLES

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ABSTRACT

Bisphenol A (BPA) is a hormonal disrupting chemicals and they also can mimics estrogen. BPA is a building block of polycarbonate plastic which is mostly found in many food/drinks containers and studies showed that BPA can leaches into the contents over time. When these plastic materials product degrade, BPA could release into the environment and routinely ingested by human and animals. Once BPA is broken down inside the body, it will undergo metabolic changes and pose the greater health threat to the consumers. The chemicals in polycarbonate plastics could lead to health effect such as cancer, changes in the brain and reproductive system and early puberty.

The analysis of BPA is done by using High Performance Liquid Chromatography (HPLC) method. HPLC methods can evaluate the amount of BPA migrate from the plastic into the deionized water used in this studies. HPLC can detect Bisphenol A concentration as low as $0.2 \mu\text{g}/\text{dm}^3$ respectively. HPLC works based on the mechanism of adsorption, partition and ion-exchange but it is also depending on the type of stationary phase involved. The standard solution of BPA is prepared by mixing 10 mg of BPA in 100mL of acetonitrile and will be later diluted before injected into HPLC. The sample solution is prepared by heating the deionized water inside the baby bottles at temperature range 40°C to 100°C and left for a while before injected into HPLC.

From the experiment done, all the 3 brands of baby bottles either unused or used bottles shows the BPA concentration reading in standard room temperature condition at less than 0.002 ppm. However, U.S Food & Drug Administration had set a safe daily exposure to BPA which is at 50 micrograms per kilogram of body weight. Even though the baby bottles is not true as it claims which is BPA-free label product, they still safe to use but need to keep changing the bottles monthly or could be weekly. BPA start to leached out from baby bottles even at low temperature which is at 40°C due to broken bond of the chemicals. As temperature of water keep increases, the BPA concentration level in water that had been detected using HPLC also keep increasing. Since heat could break BPA chemicals bonds in plastic product, consumers are advice not to heat or used the product to hard as it could make the BPA chemicals leached out.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Bisphenol A or also known as BPA is an important chemical that found in production of polycarbonate, epoxy resins, unsaturated polyester and plastics materials. Almost all materials we used nowadays contain BPA especially in the coatings of food and drink cans, kitchen dishes and baby bottles due to its excellent properties. Bisphenol A has been used in food packaging since the 1960s (Diamanti-Kandarkis, *et al*, 2008). Some properties of BPA that make many applications produce material by including them are high tensile strength and melting point, clarity, light weight and durability. Other than that, BPA also were used in coatings of thermal receipt paper before it is then changes to more environmental friendly receipt paper (Dotsch, *et al*, 2011).

At first, Bisphenol A is treated as neutral to human health, but later research study found that it can bring negative effect to human health but not to environment. Most biochemical studies have confirmed that BPA can behave in a similar way to estrogen and other hormones in the human body (Kannoy, *et al*, 2007). Estrogen is a key hormone in the development of young bodies and reproductive systems. Bisphenol A is known as endocrine disruptors which tell the body cells that the hormone estrogen is around and can potentially cause all sort of troubling and development consequences. Because of its size and shape, BPA manages to fit into the receptors in human body that recognize estrogen through counterfeit key fitting way (Vandentorren, *et al*, 2011). Since BPA acts like hormones properties, it is later raise the concern of the community about its suitability in some consumer products and food containers.