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To cite this article: Zainon Binti Mat Sharif *et al* 2017 *IOP Conf. Ser.: Mater. Sci. Eng.* **203** 012015

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# Solving Cracking Phenomenon in Premium Transparent Toilet Soap Production Using Stretched LLDPE Film Wrap

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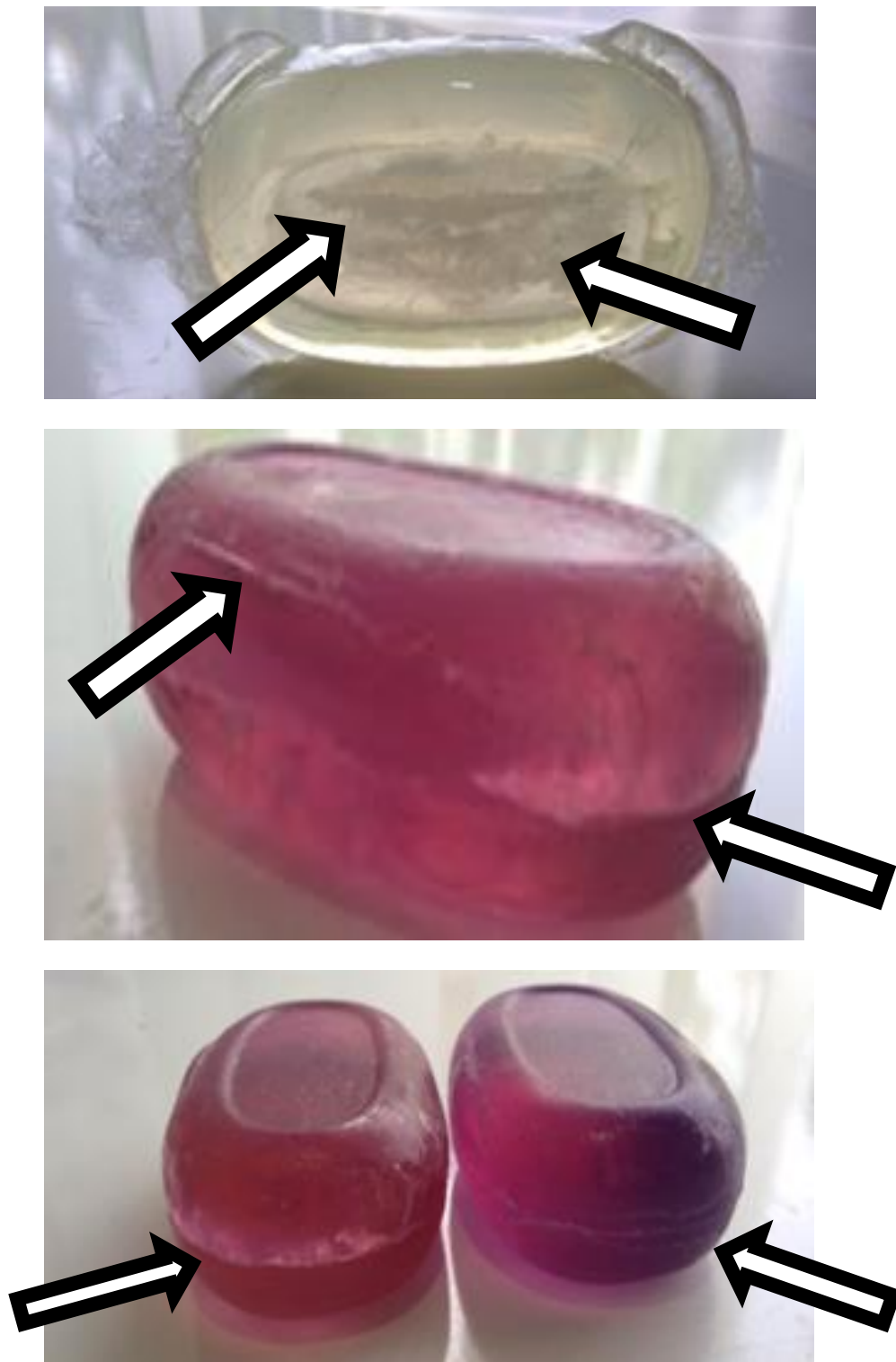
**Abstract.** Cracking phenomenon in soap production is an imminent problem. It renders the soap aesthetically unpleasing. This study attempts to find best solution to solve cracking phenomenon in premium soap production. The adopted approach is a stamping method with stretched LLDPE wrap film. The result shows that stretched LLDPE wrap film able to solve the cracking problem. The appearance of the premium transparent was improved. This paper presents the results and the SOP for stretched LLDPE film wrap for soap making industries to adopt.

**Keywords:** cracking phenomenon, toilet soap, LLDPE wrap, stamping method

## 1. Introduction

Scientifically, soap is a blend of sodium or potassium salts with various naturally occurring fatty acids. Soap are chiefly utilized as surfactants for washing, showering and cleaning. They are additionally utilized as a part of textile spinning and also are important components of lubricants. There are many types of soaps like opaque soap (example brand Lux and May), transparent soap, liquid soap and others. Premium transparent toilet soap is a clear soap with a high glycerine content hence it also referred as glycerine soap. It is recognizably different from other soaps because it is transparent. The clarity is due to the arrangement of the soap molecules, which can be excited through the expansion of alcohol and sugar [1]. The making of premium transparent toilet soap involved lots of processes and techniques. Correct techniques will yield beautiful premium transparent toilet soap and vice versa. One of the problems facing soap production is the cracking phenomenon in premium transparent toilet soap. A cracking phenomenon in the premium transparent toilet soap will give bad expectation to customers. Example of cracking phenomenon in the premium transparent toilet soap is shown in *Figure 1*.





*Figure 1: Cracking phenomenon in transparent soap (arrows shown)*

The customers claimed that the premium transparent toilet soap that exhibits cracking problem is a rejected soap. Due to the rejection problems, the production cost has increased dramatically and time has been wasted to reproduce the premium transparent toilet soap.

Cracking can be due to a various reasons such as bar design, degree of distortion of the blank during stamping, composition and level of fragrance and other additives, and the efficiency of soap line finishing. There are two types of cracking; wet and dry crack. Wet cracking caused by washing utilization and normally it give rise to ugly lines on the soap bar. It is important to solve this problem in order to ensure quality of the final product. Dry cracks is due to fissure formation via air entrapped in the soap during final extrusion [4].

This paper describes the solution to cracking phenomenon using stamping method with LLDPE wrap film to solve cracking phenomenon. The stretched wrap film material is made from linear low density polyethylene (LLDPE). The function of this stretchable films is to ensure moisture protection and occur during storage. The premium transparent soap will be coated with stretch wrap film before stamping process.

## **2. Method and Materials**

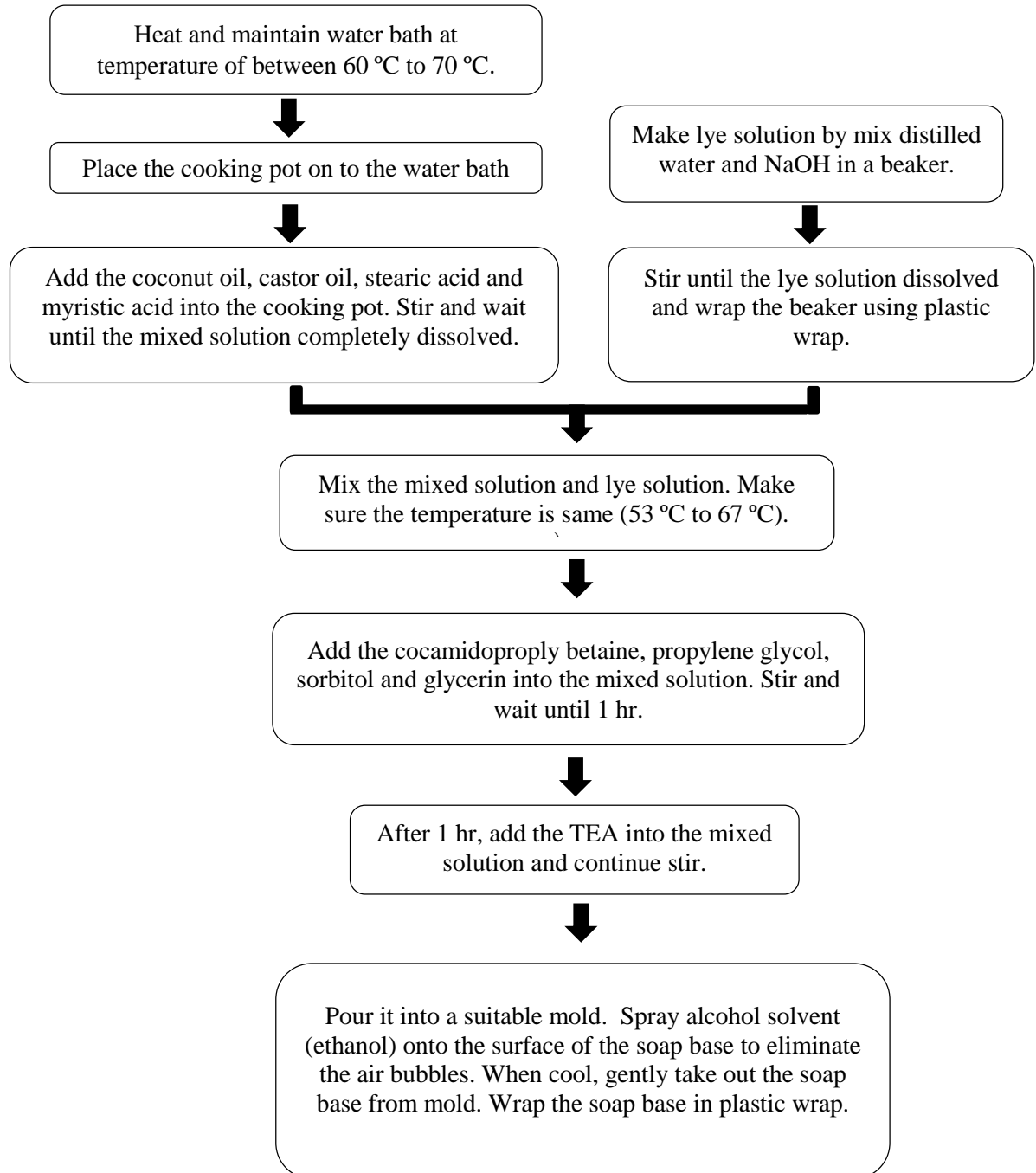
### **2.1 Preparation of premium transparent toilet soap**

Lye solution, oil blend, solvent and sugar solution were prepared according to the following steps (as shown in 2.3 Procedure Flowchart). Oil blend was heated using water bath technique until the temperature of the water reaches 57°C - 62°C. Then, the lye solution was added into the pot and stirred until the thin emulsion forms. After that, solvent was poured into the pot, stirred and wrapped with plastic wrap for 2 hours. After 2 hours, sugar solution was added and allows the base mixed for a few minutes. Lastly, pour the transparent soap base into the mould and allows the base to set up. The transparent soap base was stored for 2 weeks before re-melting and pouring process. The storage was important for stabilizing the chemical reaction in transparent soap base. After 2 weeks, the transparent soap base was re-melted and added with colour and fragrance.

### **2.2 Preparing the stamping method with stretched wrap film**

All the premium transparent toilet soaps were coated with stretch wrap film before stamping process. The temperature of premium transparent toilet soap is 16°C during the stamping process. The pressure of stamping machine used is 8 tonnes.

### 2.3 Procedure Flowchart



### 3. Results and Discussion

#### 3.1 Observation of stretched wrap film premium transparent soap.

The results of the stamping method with stretch wrap film are presented in the Figure 2.



*Figure 2: Premium transparent toilet soap after stamping method with stretch wrap*

Figure 2 shows that there is no cracking problem occurred after stamping method with stretched wrap film. The surface of the premium transparent toilet soap was smooth. This is due to the containment of moisture content in the premium transparent toilet soap. The moisture in the transparent soap will decrease if the transparent soap was exposed to the open air before stamping process. To prevent the moisture loss, transparent soap was wrapped with stretched wrap film. A good transparent soap should have moisture content between 12% and 20% [2]. The function of stretchable films is moisture protection and preventing cracking during storage.

Stretched wrap film is a highly stretchable plastic film that can wrapped around the items. The elastic recovery keeps the items tightly bound. Stretch wrap that was used in this study is shown in Figure 3.



*Figure 3: Stretch wrap*

The material for the stretch wrap film is low density polyethylene (LLDPE). Granules of linear low density polyethylene are shown in *Figure 4*.



*Figure 4: Granules of linear low density polyethylene*

LLDPE is a considerably linear polymer (polyethylene) with significant quantities of short branches commonly made by copolymerization of ethylene with long chain olefins (Wikipedia, 2015). The properties of stretched wrap film such as strength and clarity. It makes the transparent soap more clear after stamping method. The benefit of the LLDPE stretch wrap film are ability to protect the transparent soap from exposure to the elements, speed up movement went wrapping process, excellent visual characteristics for better presentation and easy to use.

#### **4. Conclusion**

This study shows that stretched wrap film can solve cracking phenomenon problem as evidence by the smooth soap production. Soap making industry can adopt and adapt this procedures to remove cracking problem.

#### **Acknowledgement**

The authors would like to express greatest appreciation to the Dean of College of Graduate Studies (COGS), Universiti Tenaga Nasional (UNITEN) for giving the permission to publish this paper.

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