CMS can be produced by substitution of the hydroxyl groups with sodium monochloroacetate in the presence of strong alkali. Carboxymethylation can be performed in water as a solvent or in a water-miscible organic solvent containing a small amount of water such as ethanol, isopropanol, methanol or toluene. The use of organic solvent will preserve the final product in the granular form and the side product can be washed out easily but some of them may be having potential toxicity and carcinogenic effect. In this study, CMS was investigated the level of toxicity by using brine shrimp lethality (BSLT). Brine shrimp test method was used to screen CMS for their biological activity. The screening results showed that the LC₅₀ of CMS is more than 96.1 mg/ml dose concentration. In conclusion, CMS is not cytotoxicity to Artemia salina nauplii and BSLT method is simple, inexpensive and convenient assay for the detection of cytotoxic compound.

**Keywords:** Artemia salina nauplii, subtitution, Cytotoxicity, Carboxymethyl Starch, Brine shrimp

**INTRODUCTION**

- Sago starch is play important role in the polymer research because this is from natural source and biodegradable.
- Through modification, the properties of native starch can be improved such as decreasing retrogradation, syneresis, and gelling tendencies of pastes, maintaining high shear stability or adding hydrophobic/hyrophilic groups into the starch chain
- Starch becomes cold water soluble by substituting the hydroxyl groups with sodium monochloroacetate (SMCA) to give carboxymethyl starch (CMS).
- CMS is a water soluble polysaccharide that finds many applications in the food and non-food industries.
- The carboxymethyl group is hydrophilic in nature and when introduced into the starch granule it weakens or strains the internal bond structure holding the granule together.
- The higher the level of modification the lower the pasting temperature until the starch granules are render soluble or swell in water at room temperature.
- CMS is a polysaccharide derivative which has an advantage over starch in thermal stability, predominant crosslinking, higher dissolubility and more popular application in the oil drilling industry, pharmaceuticals, cosmetics, nutrients, pesticides, foodstuff and capsulation of cell. [Doan B. et al., 2012; Karim A. et al., 2013].
- The use of organic solvent will preserve the CMS in the granular form and the side product can be washed out easily but some of them may be having potential toxicity and carcinogenic effect.
- In order to ensure the CMS is not toxic it needed to screen test using brine shrimp lethality method.
- Brine shrimp lethality test (BSLT) has been used for toxicity screening of a variety of plant extracts, heavy metal, pesticides, food additives and drugs.
- This method has been increasing globally due to lower cost, higher sensitivity for the detection of cytotoxic compound and use smaller samples than other similar method. [Ali M. et al., 2013; Srintorn P. et al., 2004].

**OBJECTIVE**

In this study CMS was investigated the level of toxicity by using BSLT.

**MATERIALS AND METHOD**

Sago starch (Nitesi Sago Industries Sdn Bhd, Mukah (Serawak), Sodium monochloroacetate, Isopropanol, methanol, ethanol were purchased from BDH chemical limited Poole (England), sodium hydroxide (Scharlau chemical S.A, Germany), Brine shrimp eggs (Artemia salina nauplii, 96-well microplate, sea-salt (sigma), Plastic perforated partition with several 2mm holes, pipette; other reagents used are all of analytical grade.

**RESULTS AND DISCUSSION**

CMS from Sago Starch, have the lower levels of toxicity. Table 1 showed that Artemia salina are dead 62.5% after exposure 24 h up to 100 mg/ml and all of Artemia salina dead at concentration 200 mg/ml. Since the LC₅₀ was 96.01 mg/ml of medium toxic was not considered (Figure 4). Ali M et al., 2013 report, according to experiment results of many researchers, compounds with LC₅₀ less than 1000 μg/ml were considered toxic.

**CONCLUSION**

The screening results showed that the LC₅₀ of study carboxymethyl starch (CMS) is 96.1 mg/ml dose concentration. In conclusion, CMS is not cytotoxicity to Artemia salina nauplii and BSLT method is simple, inexpensive and convenient assay for the detection of cytotoxic compound. So it can be used to form nano carriers to deliver drug, especially in oral administration of poorly absorbed therapeutic drugs

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