

## **Istihalah: Analysis on The Utilization of Gelatin in Food Products**

Mohammad Aizat Jamaludin<sup>+1</sup>, Nor Nadiha Mohd Zaki<sup>2</sup>, Mohd Anuar Ramli<sup>3</sup>, Dzulkifly Mat Hashim<sup>4</sup> and Suhaimi Ab Rahman<sup>5</sup>

<sup>1</sup> PhD. Student, Halal Policy and Management, Halal Products Research Institute, Universiti Putra Malaysia

<sup>2</sup> Research Officer, Laboratory of Halal Science Research, Halal Products Research Institute, Universiti Putra Malaysia

<sup>3</sup> Lecturer, Department of Fiqh and Usul, Academy of Islamic Studies, Universiti Malaya

<sup>4</sup> Head, Laboratory of Halal Services, Halal Products Research Institute, Universiti Putra Malaysia

<sup>5</sup> Head, Laboratory of Halal Policy and Management, Halal Products Research Institute, University Putra Malaysia

**Abstract.** This paper discusses the issue of gelatin used in food products from Islamic and science perspective. With the development of food technology, variety of food has been produced and some of them are from gelatin based products. Issue arises when the halal status of gelatin is questionable. In food industry, gelatin could derive either from pig skin and cattle hides which are not clear about the status of halalness. This cause concern among muslim and therefore a careful study needs to be done. This paper uses *Istihalah* method in order to determine the halal and haram status in modern food products. *Istihalah* or complete process of transformation from one substance into another substance has been applied in gelatin based food products. It is suggested that chemical composition of gelatin remain unchanged in food products because the amino acid in gelatin is still intact and did not undergo any chemical transformation although the production process involve extreme condition.

**Keywords:** Gelatin, food products, *Istihalah*, halal and haram, Islam

### **1. Introduction**

The Muslims community represents 23.4% or 1.6 billion of the world population. The majority of Muslims are from Asia Pacific which represent 61.9% and Middle-East, 20.1%. These numbers are expecting to increase 2.2 billion in 2030. This means that the demand for halal (permitted by Islamic Law) products will be increased.

Food industry is one of the main concerns in Muslims community. The rapid development in food technology results the emergence of various food products and food ingredients in market. Many food ingredients are produced from doubtful sources. In addition, lack of awareness from Muslim consumers might lead to the difficulties in choosing purely halal food products in market. One of the most controversial issues in food industry in Muslims world is gelatin based food products.

Gelatin uses as value-added ingredient in foods because of its unique properties. Issues arises because of the main sources of gelatin used in food industry are from pig and cattle. These animal sources are used because they provide best quality of gelatin as compared to other sources such as fish, poultry and marine. Furthermore, the abundance sources of pig and cattle decrease the issues of shortage of raw materials. Therefore, the uncertainty in determination of halal and haram gelatin sources needs to be clearly defined by Islamic Law.

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<sup>+</sup> Corresponding author. Tel.: + 60389417344; Fax: + 60389439745  
E-mail address: eizuhdi08@gmail.com

Generally, most of Muslim jurist agreed that gelatin derived from slaughtered and permitted animals is halal. However, there is argument on gelatin that is derived from pig and carrion. The halal and haram sources of this matter have been debated among Muslim jurists. Some of them agreed that gelatin extracted from the prohibited sources is haram. Whereas the other opinion supported the idea that gelatin from haram sources is halal because it does already undergo *Istihalah* process (Hammad, 2004).

*Istihalah* literally means transformation and conversion of one material to other material. It is one of alternative methods of determination on halal and haram. Basically, the main sources of *Istihalah* are from Quran, *Sunnah* (prophetic tradition), *Ijma'* (consensus of legal opinion) and *Qiyas* (analogy) (Nyazee, 2000). While, secondary sources of *Istihalah* namely, *Maslahah* (public interest), '*Uruf*' (custom), *al-Istihsan* (juridical preference), *Sad al-Dhari'ah* (blocking the means), *al-Istishab* (presumption of continuity) and others (Audah, 2010). In addition, there are also an alternative sources such as *al-Dharurah* (necessity), *al-Istihalah* (transformation), *al-Istihlak* (decomposition) and *al-Istibra'* (quarantine) (Hammad, 2004).

This paper is an attempt to apply an *Istihalah* method on gelatine and to scientifically analyze these issues. The scientific evident obtained will be a guideline for researcher to choose which opinion of Muslim jurist is more relevant to be applied on current issues of gelatin.

## 2. Theory and Methodology

Basically, *Istihalah* is derived from Arabic word. Etymologically, it is derived from the root ح و ل (حال), which means transform or change (Ibn Manzur, 1990). While the term *Istihalah* is derived from استحالة - يستحيل. It is synonym with the word انقلب (change) and تغيّر (exchange).

*Istihalah* can be defined as a transformation of materials to other materials (non-reversible transformation) (Qal'ahji, 1996). Zuhayli (1997) also defines *Istihalah* as transformation or conversion of material to other material which involves conversion of the composition and properties includes the conversion of filthy (*najs*) materials into pure (*thahir*) materials. Hammad (2004) add that *Istihalah* is a transformation of filthy or haram materials to other materials which include physical appearance and its properties such as name, odor, taste, color and nature. Therefore, *Istihalah* can be defined as a complete transformation occurred physically and chemically (Aizat & Radzi, 2009).

Besides, there are two opinions on *Istihalah* application by Muslim jurist. First opinion suggested that application of *Istihalah* can be applied into various situations as agreed by Hanafi, Maliki, Ibn al-'Arabi, Ibn Taimiyyah, Ibn al-Qayyim, al-Syawkani and Ibn Hazm al-Zahiri school of thoughts. They widely applied *Istihalah* method in natural and synthetics transformation (Ibn Taymiyyah, 2005). As an example, the fermentation of wine to vinegar is considered halal whether it undergoes natural or synthetic process. On the other hand, the Syafii and Hanbali school of thoughts tended to limit the application of *Istihalah* in certain issues only. They only accepted natural process of transformation without any intervention of synthetic process. i.e. natural transformation of wine to vinegar (al-Syarbini, 1994).

Therefore, it is agreed that the first opinion from Hanafi school of thoughts is more appropriate to be applied in this research because it widened the scope of transformation process, in this case for gelatin based products. In addition, this opinion is relevant with the current development in food processing because it involve various treatment (chemically and physically).

### 2.1. *Istihalah* Process

Figure 1 shows the process of *Istihalah*. There are three main elements, namely raw materials, conversion agents and finish products. The mixing process occurred as a result of the interaction between raw material and conversion agent, naturally or synthetically. Then, the finished product will undergo conversion process which is differed physically and chemically from the original material.

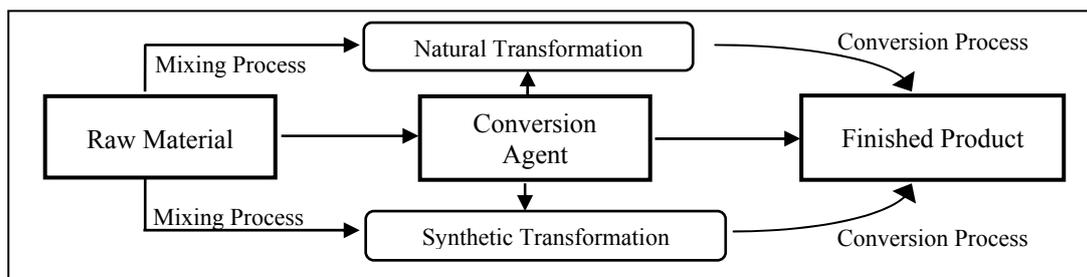


Figure 1: *Istihalah* Process

### 3. Analysis of Gelatin Based on *Istihalah* Method

Gelatin is a protein which is derived from partially hydrolyzed collagen obtained mainly from skin and bones of vertebrates (Karim & Rajeev, 2008). Collagen consists of tertiary, secondary and primary structure (Figure 2a). Partially hydrolyzed collagen could mean the cleavage of tertiary and secondary structure into smaller molecules. Meanwhile, primary structure of gelatin consists of amino acid (Figure 2b) which is the smallest molecule that could be found in gelatin. According to Schrieber & Gareis, (2007), the composition of collagen encompasses all 20 amino acids. Glycine, proline and hydroxyproline are the largest numbers of amino acid exist in gelatin.

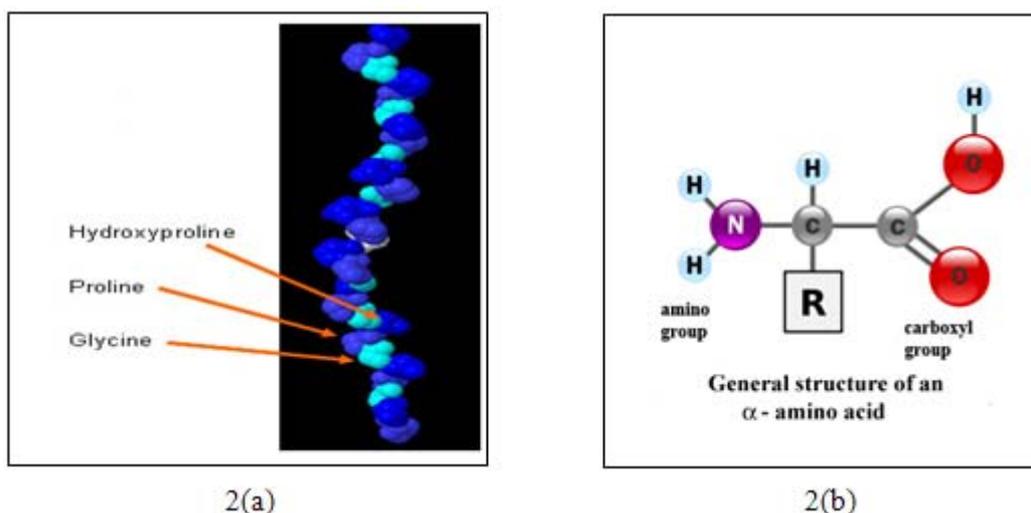


Figure 2 (a): Tertiary structure of collagen; (b): Amino acid structure

Gelatin is a very important ingredient as value-added properties in food products. It is widely used as texture stabilizer, foaming agent, emulsifying agent, thickener and other. Gelatin can be found in various food products such as ice-cream, dairy products, jelly, puddings, beverages and meat products. The broad usage of gelatin in food products leads to the argumentation among Muslim consumers because of its questionable sources. The Gelatin Manufacturer's of Europe (2011), states that main source of edible gelatin is extracted from pigskin (80%), cattle hide split (15%) and the remaining 5% comes from pig and cattle bones, poultry and fish. Islam forbade its followers to consume haram and doubtful (*syubhah*) foods. It is stated in Al-Quran:

*Forbidden to you (for food) are: dead meat, blood, the flesh of swine, and that on which hath been invoked the name of other than Allah. that which hath been killed by strangling, or by a violent blow, or by a headlong fall, or by being gored to death; that which hath been (partly) eaten by a wild animal; unless ye are able to slaughter it (in due form); that which is sacrificed on stone (altars); (forbidden) also is the division (of meat) by raffling with arrows: that is impiety.*

(Al-Maidah, 5:3)

From the verses above, it is evident that Muslims are forbidden to consume foods classified as dead animals or carrion (*maytah*), blood, pork and meat dedicated for other than Allah (Nurdeng, 2009). It is also stated in the Quran that all animal that is allowed by Islam must be slaughtered according to Islamic Law (Riaz, 2004).

Therefore, it is obvious that Muslim consumers are not allowed to consume pork products. However, argument from Muslim jurist arise on the issues of pork derivatives that is claimed already undergo an *Istihalah* process. Hammad (2004) suggested that the complete transformation has been occurred in finished products.

In food production line, gelatin can be extracted from pigskin, cattle bone and hide, thus it is clearly stated that gelatin can be derived from both halal and haram sources. Gelatin will be added with other ingredients, mixes together and undergo various processing methods include heat treatment, enzymatic reaction, pasteurization and others. This method involved extreme/minimal condition that can physically and/or chemically modify the food matrix structure, in order to produce satisfy food products.

In *Istihalah* application, raw material must mix with other substances and produce another material (Figure 1). The transformation of raw materials to other products could happen physically (by observation) or chemically changes. Basically, the physical appearance of gelatin has been transformed. Gelatin also has been mixed with other substances in order to produce particular products.

However, it is believed that the chemical composition of gelatin is remained unchanged. It is suggested that the amino acid in food products is still remained intact and did not undergo any chemical transformation although the production process involve extreme condition. Denaturation of protein (which involves heat treatment or alcohol or acid and alkali or heavy metals) could only disrupt the tertiary and secondary structure of protein (Figure 2a) and do not break the peptides bond and amino acids (Figure 2b). Furthermore, Hoque *et al.* (2009) suggested that excessive heating could degrade the gelatin; meanwhile lower heat treatment could only influence the stretching and unfolding of gelatin strands. Thus, the amino acid molecules in gelatin are not affected by physical or chemical treatment (Figure 3).

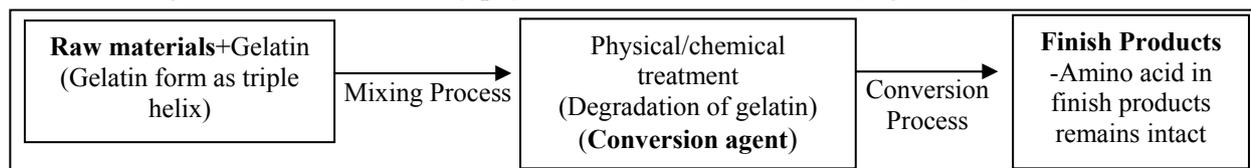


Figure 3: Conversion Process of Gelatin

Hence, it is suggested that gelatin only transforms physically, not chemically. Because of that reason, *Istihalah* method in gelatin cannot be fully applied. Most of Muslim scholars suggested that the application of *Istihalah* only can be applied when the complete transformation (physically and chemically) occurred during the process (Ghananim, 2008; Aizat & Radzi, 2009). For examples, the conversion of wine into vinegar undergo complete changes physically (odour, colour and taste) and chemically (chemical structure). Because of this reason, the halal and haram status determination in these issues should be referred to the sources of origin of extracted gelatin. As a result, the argument which claims that *Istihalah* process occurred on pork after undergo conversion process cannot be accepted.

#### 4. Conclusion

All gelatin derived from halal sources and slaughtered according to Islamic Law is permitted for Muslim. Meanwhile, gelatin extracted from pig and not slaughtered animal are prohibited. This prohibition based on the characteristics of gelatin that remains unchanged chemically; hence *Istihalah* or transformation process in gelatin is not completely occurred. Therefore, the opinion of Muslim jurist that claim gelatin derived from pork are permitted by *Istihalah* process are not acceptable because it is not parallel with scientific evident.

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