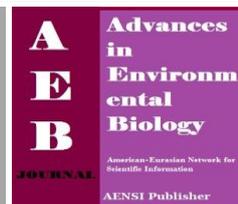




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## Gelatin as an ingredient in Food and Pharmaceutical Products: An Islamic Perspective

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### ABSTRACT

Islam is one of the various religions on the face of this earth which has categorized the type of foods suitable for human consumption. Thus, the integral concept of Islam that governs the quality and sanctity of food is *halalantayyaban* i.e.; lawful and pure. Gelatin, an animal by-product owing to its gelling property finds immense application in the processing and manufacturing of various foods and pharmaceutical products. But the question is whether the source of gelatin is halal or non-halal. The studies show that a major proportion of gelatin supplied globally comes from pig. Pertaining to this data, the major Muslim population is under threat as Islam prohibits the consumption of pork in any form except to save one's life under life threatening condition which Allah SWT clearly mentions in Quran. This paper points out the situations under which the gelatine in spite of being from halal sources becomes haram. It also attempts to highlight the concept of *fiqh istihalah* and its process. The paper further focuses on the issues related to gelatin in food and pharmaceutical industry and discusses the legal aspects assigned towards the regulation and monitoring of halal and non-halal products specially the halal food quality standards in Malaysia.

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## INTRODUCTION

The current development in the halal industry is very much centred in the foods and pharmaceuticals. The issue of permissibility of food in Islam has always been on the halal criterion but in general, people fail to understand that in the Holy Qur'an the concept of 'halal' always come together with the concept of '*tayyib*'. In the Holy Qur'an, it is stated clearly that "*Oye people! Eat of what is on earth, lawful and good; and do not follow the footsteps of the Evil One, for he is to you an avowed enemy*" (Al-Baqarah, 2:168). The Glorious Qur'an uses the phrase '*halalantayyiban*' which exemplifies 'lawful' and 'good'. In other words, when we discuss about the Islamic perspective on food and pharmaceutical products, it should be noted that there are two basic criteria that are being emphasized;

- (i) Halal (must be lawful or permissible according to Islamic law, and
- (ii) Tayyib (must be of good quality and safe).

Islam teaches that the saving of life is important and should be held above all other religious beliefs. Allah Almighty states that "*necessities overrule prohibitions*," and although pork is specifically prohibited in the diet, it is acceptable in extreme situations wherein no lawful alternative is found [1]. The concept of halal is broad and should not be limited to consumables or food products, but rather envisages different aspects of human lifestyle ranging from inter-relationship, clothing style, social and business transactions, trade and financial services, investments or any other area as far as the guidance specified by *Qur'an* and *sunnah* is being followed [2].

This paper discusses the concept of *istihalah* in terms of fiqh and shows *anistihalah* process of gelatine and also a general production process of gelatin. The paper focusses the issues regarding use of gelatin in food and pharmaceutical industries and explains the quality standards framed by legal authorities and regulatory bodies present in Malaysia that controls and monitors the different companies and their manufacturing and supplies.

#### Discussion:

##### Halal and Haram Gelatin:

Gelatin is used on a large scale to improve the quality of food and pharmaceutical products [3]. In general, Muslim jurists share a common ideology that gelatin derived from slaughtered and permitted animals is

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permissible (*halal*). But as far as pork and carrion is concerned, the Muslim jurists have contradictory view on the permissibility of the gelatin. Few groups believe that gelatin extracted from the prohibited sources is not permissible (*haram*), while for others the opinion is entirely different as they believe that gelatin from non-permissible (*haram*) sources is *halal* because it has undergone *istihalah* process [4]. The issue of gelatin derived from pork skins, is a debatable topic that is frequently discussed in halal arena. According to the Shafi' Imam hadith, gelatin is categorically forbidden if it comes from animals that are not permissible to eat, i.e. pig or unslaughtered cattle or beef. However, Hanafi scholars hold fast to the general methodological principle that something impure which is transformed at the molecular level into a new substance has become pure. A common example is parts of a pig (impure) becoming soap (pure); the same reasoning applies to gelatin [5]. The process employed, according to Hanafi scholars, is significant enough to assure that the resultant product no longer bears a close resemblance to the original object. As such, it is now considered pure and is acceptable for consumption [6].

Prophet Muhammad (p.b.u.h) himself said: "The differences in my community are a manifestation of mercy" [7]. It is this balance between rigorous tradition and a flexibility that allows for lively debate and differences of opinion which is itself an outgrowth of this rigorous tradition that has impelled traditional Islamic jurisprudence to exist and thrive fourteen centuries after the basic principles were laid down [7].

#### *Fiqh Istihalah:*

The discussion regarding the process of transforming certain items or products from one form to another within Muslim jurists gave rise to the use of terms like *istihalah* (transformation) or *inqilab* (changes), [8]. *Istihalah* literally means transformation and conversion of one material to other material. Basically, the main sources of *istihalah* are from *Quran*, *Sunnah* (prophetic tradition), *Ijma'* (consensus of legal opinion) and *Qiyas* (analogy) [9]. The other forms of *istihalah* are, *Masalah* (public interest), *al-Istihsan* (juridical preference), *al-Istishab* (presumption of continuity) and others [8]. There are also the alternative sources such as *al-Dharurah* (necessity), *al-Istihlak* (decomposition) and *al-Istibra'* (quarantine) [10].

*Istihalah* is fundamentally derived from Arabic word and etymologically, it is derived from the root, *حول* (ح), which means transform or change [11]. While the term *Istihalah* is derived from – *يستحيل - استحالة* (ح), It is synonymous to *انقلاب* (change) and *تغير* (exchange). A broad definition of *Istihalah* is the transformation of materials to other materials (non-reversible transformation) [12]. Zuhayli [13] 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 [10] adds that *Istihalah* is a transformation of filthy or haram materials to other materials which include physical appearance and its organoleptic properties such as odour, taste, colour and nature. Therefore, *Istihalah* can be defined as a complete transformation occurred physically and chemically [14-16]. Besides, there are two opinions on *Istihalah* application by Muslim jurists. Firstly, application of *Istihalah* can be applied into various situations as agreed by Hanafi, Maliki, Ibn al-'Arabi, Ibn Taimiyyah, Ibn al-Qayyim, al-Syawkanani and Ibn Hazm al-Zahiri school of thoughts. They widely applied *Istihalah* method in natural and synthetic transformation [17]. For instance, the fermentation of wine to vinegar is considered halal whether it undergoes natural or synthetic process. On the other hand, the Shafi' 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 [18]. Figure 1 shows a general flow chart of gelatin production.

#### *Process of Istihalah:*

Figure 2 shows the process of *istihalah*. The major elements of *istihalah* are the raw materials, conversion process and finished products. The mechanism of this process can be explained on the basis of interaction between the raw material and the conversion method that can either be natural or synthetic. Thus, the finished product formed as a result of different conversion process differs both physically and chemically from the original or starting material.

#### *Gelatin and Food Industry:*

If we consider the world population, the Muslim community alone shares 23.4% or 1.6 billion representing 61.9% from the Asia-Pacific region and Middle-East, 20.1%. The numbers are still increasing and is expected to touch a margin of 2.2 billion in 2030 which implies that the demand for halal food products will be increased [19]. A rapid and global growth in food technology has given a new dimension of food consumption where different categories of food items are accessible to more or less all major classes of world population. The major controversial food category for Muslim community is gelatin based food products and therefore it becomes more crucial to validate the authenticity of gelatin in a particular food product. According to the Gelatin Manufacturer's of Europe [20] the edible gelatin is extracted from pig skin (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. Besides, eating of haram materials and using it as an adulterant or additives in food products are also forbidden, for example Allah says:

*“Forbidden unto you are carrion and blood and flesh of the swine, and that over which is invoked the name of other than Allah, and the strangled, and the dead through beating, and the dead through falling from a height, and that which has been killed by (the goring of) horns, and the devoured of wild beasts, unless you have cleansed (by slaughtering) it in the proper, lawful way, while yet there is life in it, and that which has been immolated unto idols. And (forbidden is it) that ye swear by the divine arrows. This is an abomination.”* (Al-Maidah, 5: 3).

Gelatin account of its value-added properties find immense application in food products. It is widely used as texture stabilizer, foaming agent, emulsifying agent, thickening agent and is used in various food products such as ice-cream, dairy products, jelly, puddings, beverages and meat products. Commercial gelatins vary from 50-300 Bloom grams and, except for specialty items, are free of added colours, flavours, preservatives, and chemical additives. Gelatin is a generally recognized as safe (GRAS) food ingredient [21]. The explicit usage of gelatin in food products creates suspicion and is a major point of argumentation among Muslim consumers because of its questionable sources. Table 1 gives the list of various food products with gelatin as ingredient. In general, due to lack of knowledge and public information it is very difficult for the consumers to determine the halalness of food products available in the market.

Therefore, it is important for the Muslim consumers to abstain from consuming pork products. However, the point of argument between Muslim jurists is on the issues of pork derivatives claimed to have undergone an *tihalah* process. Hammad [10] suggested that *tihalah* is not applied until and unless a complete transformation has occurred in the finished products [14].

#### *Gelatin and Pharmaceuticals:*

The preservation of human well-being and health has been prescribed by Allah, and with modern advances in pharmaceutical industry, most diseases can be cured. The question is whether Muslims should continue to consume medicines designed to safeguard life without asking questions or should we now be challenging the industry about the origin of many of these ingredients and whether or not they are compliant with an Islamic lifestyle [22]. One of the more well-known ingredients in pharmaceutical preparations is gelatin. Starches have a property of gelatinisation where the starch molecules unwind, disperse and cross-link to thicken up a liquid (for example: thick syrup). This natural process is called gelatinisation. For instance, the ‘Pre-gelatinised corn starch’, in which gelatinisation is a natural process and being vegetable-derived, this is acceptable and halal compliant [22].

As narrated by Abu Darda (r.a.a), a companion of Prophet Muhammad (s.a.w), “The Prophet (peace be upon him) said Allah has sent down both the disease and the cure, and He has appointed a cure for every disease, so treat yourselves medically, but use nothing unlawful” [22]. The problem is that many drug formulations are so complex that even trained chemists cannot ascertain with accuracy the origin of some of the ingredients used in pharmaceutical preparations. The solution lies in either directly asking the manufacturers for the origins of the *mashbooh* or dubious ingredients, or buying halal certified pharmaceuticals [22].

#### *Capsules:*

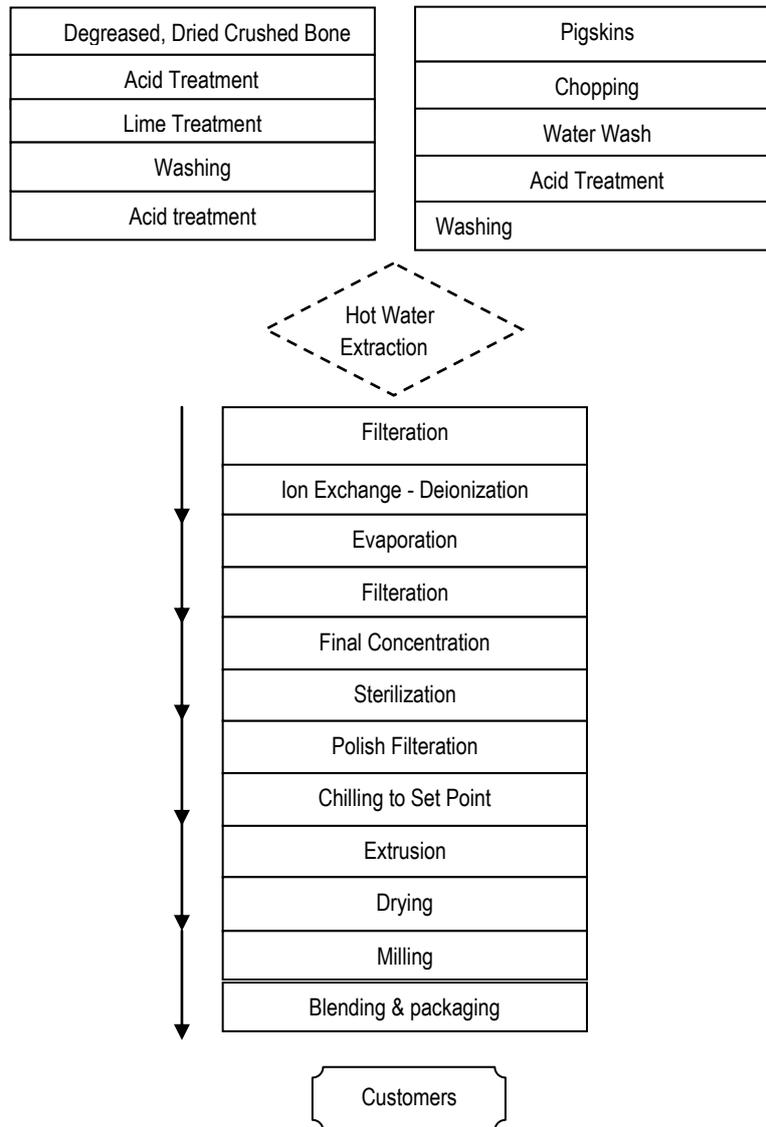
The two main types of capsules are hard-shelled, which are normally used for dry, powdered ingredients; and soft-shelled capsules, used for oils (such as flaxseed oil, cod liver oil, and royal jelly to name a few) and for active ingredients that are dissolved or suspended in oil. Both of these classes of capsules are made from either gelatin or plant-based gelling substances such as carrageen (edible red seaweed), agar-agar (seaweed), pectin and modified forms of starch and cellulose. Hypromellose (short for hydroxypropyl methylcellulose or HPMC; E-Number: E464) isolated from natural sources (such as plant materials or bacterial cell cultures) as starting material is an alternative to animal gelatin, but is a lot more expensive to produce and is generally used for health supplements [22].

Since gelatine is derived from animal bones, skin and tendons, it is likely to be haram unless it is from animals or birds allowed to be eaten by Muslims and which have been slaughtered in a halal way, as mentioned above. As narrated by *Abu Hurayrah*, who was a companion of the Prophet Muhammad (s.a.w), “The Apostle of Allah (s.a.w) prohibited unclean medicine.”

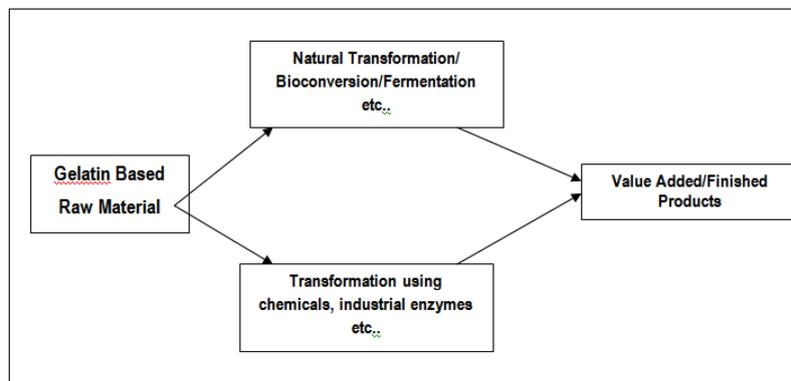
#### *Gelatin Production Process:*

There is Halal certified bovine-based gelatin in the market, but unless the capsule manufacturers make this clear on their packaging and seek approval/certification by a third party (in this case a Halal certifier which is a well-recognised Muslim organisation), it is best to go for vegetable/ plant-based alternatives. A typical capsule may contain the following ingredients; 5-hydroxytryptophan, dicalcium phosphate, microcrystalline cellulose, capsule shell (gelatin), magnesium oxide, silicon dioxide, magnesium stearate, stearic acid, and vitamin B<sub>6</sub> [22]. In this example, the capsule shell is made from gelatin, and as the product is not halal certified, it is therefore

hard to tell whether the origin is from haram or halal animals. This information can only be obtained directly from the manufacturer. Thus, it clearly illustrates the difficulty faced by consumers while interpreting the ingredients list on medicines [22].



**Fig. 1:** Schematic flow diagram of gelatin production (Source: GMIA, Gelatin handbook).



**Fig. 2:** The Process of *Istihalah* (Adapted and modified from [19]).

### Prescribing medications:

Many medications contain at least one inactive ingredient, the consumption of which may be prohibited by certain religions or personal beliefs. When designing a treatment regimen, health care providers may only take into consideration a patient's allergies, medical history, and other medications. However, the patient's culture and religion or personal beliefs must be considered and the corresponding information should be actively solicited before designing a medication regimen [23]. One study found that "63% of the total patient sample surveyed thought that physicians should inform them when prescribing drugs with ingredients that might be forbidden by patient's religious beliefs." [24]. Patient's religion and his or her religious beliefs have the potential to influence medical decisions and can cause conflict regarding medical care. Certain religious groups have beliefs regarding the dietary use of porcine and bovine products that could limit treatment options during surgery, particularly as many surgical and pharmaceutical products contain prohibited materials [1].

**Table 1:** Gelatin as an ingredient in food-stuffs (Source:[21]).

Gelatin Based Food-stuffs	Use Level(%)		Gelatin Bloom	
Dairy Products	0.2	1.0	150	250
Frozen Foods	0.1	0.5	225	250
Gelatin Desserts	7.0	9.0	175	275
Confectionery:				
Gummy Bears	7.0	9.0	200	250
Marshmallows	1.7	2.5	225	275
Circus Peanuts	2.0	2.5	225	250
Lozenges	0.5	1.0	50	100
Wafers	0.5	1.0	50	100
Bakery Fillings & Icings	1.0	2.0	225	250
Meat Products	1.0	5.0	175	275
Wine, Beer, Juices	0.002	0.015	100	200

### Standards and Regulation:

Clearly, the halal industry has tremendous potential but is currently paddled by numerous issues such as fragmented standards with little or no mutual recognition, lack of regulatory framework in most countries and an uneven level of awareness even amongst Muslim consumers. Inevitably, these issues will have to be resolved as they become more compelling in the light of threats to food security especially in Muslim majority countries [25]. Human beings cannot change the unlawful (*haram*) into lawful food as Allah is the only who has the right [6]. Based on the Malaysian Halal Food Standard, MS 1500:2009 [26], *halal* food must fulfill the following conditions:

- i) The food or its ingredients that are not filthy (*najis*) according to shariah law.
- ii) The food does not contain any ingredients that are filthy (*najis*) according to shariah law.
- iii) The food that is safe and not harmful.
- iv) The food is not prepared or manufactured using equipment that is contaminated with things that are filthy (*najis*) according to shariah law.
- v) The food or its ingredients does not contain any human parts or its derivatives that are not permitted by shariah law.
- vi) During its preparation, processing, packaging, storage or transportation, the food is physically separated from any other food that does not meet the requirement stated in all above items (i-v) or any other things that have been decreed as filthy (*najis*) by shariah law.

As required by SIRIM (Standards and Industrial Research Institute of Malaysia) and the Ministry of Health Malaysia, food industries and food manufacturers are encouraged to voluntarily use the international standards as well as additional standards for the halal standards requirement in processing food. According to SIRIM [27], there are three main standards that are needed to be carried out by food manufacturers in Malaysia to fulfil the requirements and these are; HACCP (Hazard Analysis Critical Control Points), GHP (Good Hygiene Practices) and Halal Standards. A major incentive laid upon by the government of Malaysia to consider Malaysia as a Halal Food Hub is the implementation of halal standards. Its development also involved various organisations that includes Department of Islamic Development Malaysia, JAKIM [27].

The important guidelines prescribed by halal standard comprises halal food preparation and handling; basic requirements for food products, food trade and food business in Malaysia. The halal standard should accompany MS 1480 (Food safety according to HACCP system) and MS 1514 (General principles of food hygiene) and used by JAKIM that forms a basis for halal authentication and certification process. However, its implementation needs to be supplemented by other requirements of certification process [28].

### Future Prospects:

Future developments such as the design and introduction of a database of foods and pharmaceuticals should be promoted. This database could indicate which preparations contain animal material and, if available, offer suitable non-animal alternatives. This type of record and information can play a vital role in public and

professional awareness and will facilitate a better customer and patient care. Advanced biomolecular techniques like recombinant DNA technology and protein engineering can be employed to produce animal gelatin in some non-animal expression vector on a large scale to get halal gelatine in order to meet market demand. Furthermore, the food quality standards and regulations with regard to halal foods and pharmaceuticals needs to be revised and updated to curb the manufacture and supplies of non-halal and spurious ingredients by certain companies and thus rendering them to follow and comply with the guidelines and rules of organisation.

#### Conclusion:

To conclude, in Islam halal and tayyib food is perceived for an individual's prosperity and well-being. The gelatin derived from porcine, unslaughtered animals or other unclean sources that are not permissible under Islamic law are haram. Istihalah which is generally considered to result in halal and tayyib products is applied and valid when both physical and chemical transformation has taken place. In food industry, the concept of halal should be considered basic in certifying the use of gelatin in food products. In developing a medication regimen or dosage form, the pharmaceutical firms should use halal gelatin or gelatin from other sources which are permissible and good from Islamic viewpoint. The label of food and pharmaceutical product should also give information regarding inactive ingredients that sometimes becomes objectionable and questionable and abide by the halal food quality standards during the entire process of manufacturing and production of goods meant for human consumption.

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