THE EFFECTS OF MOISTURISER'S PHYSICO-CHEMICAL PROPERTIES ON CUSTOMERS PREFERENCE TOWARDS FOREIGN AND LOCAL PRODUCTS

HAZREENA HAMZAH

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Faculty of Industrial Sciences & Technology
UNIVERSITI MALAYSIA PAHANG

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ABSTRACT

Moisturisers are colloidal in nature involving water globules microscopically dispersed throughout an oily medium. Modern chemical process industries utilize high shear mixing technology to create novel colloids which can produce an even better product. The long-term stability of particular colloid is great importance in a number of industries such as cosmetic and pharmaceutical. The objectives of this research are to conduct a survey on facial moisturiser and on customer's preception, to characterise the physiochemical properties of different moisturiser and to determine the relationship between customer preferences to the physiochemical properties of moisturiser. The compositions of four bands, being two local brands and two foreign brands, of moisturiser have been collated and compared. These moisturisers contain a variety of ingredients, which make them exhibit necessary properties. It was found that the ingredient of local moisturiser differs from that of foreign brand. A survey has been done to determine the preferences in choosing a moisturiser among student Universiti Malaysia Pahang. The perception and product testing surveys found that preferences for international product were slightly higher than that for local products. The stabilities of the moisturiser were studied using thermal gravimetric analysis (TGA). Weight losses with time when the sample was exposed at fixed low temperature and and weight losses due to temperature increase from 30 °C to 200 °C at 10 °C/min were studied. Based on the weight loss profile, sample A and B were found to be most stable, D slightly less stable than B while sample C were the most unstable. However it was also observed that sample A tends be unstable at 45 °C. Base on the TGA result sample A and B were fould to be more stable under normal condition in which the moisturiser may be used. It can be concluded that the preferered product tend to be more stable. Hence the advantage of foreign brand moisturiser is that it tend to be made up of colloid that are more stable than that of the local branded moisturiser.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUNDS

Appearance comes first in woman's life. Regardless of age, ethnicity, and nationality, how woman looks on the outside always matter. And by this, comes a big helper called cosmetic. Cosmetics are defined as a preparation externally applied to change or enhance the beauty of skin, hair, nails, lips, and eyes. Also included in the general category of cosmetics are skin care products. These include creams and lotions to moisturise the face and body which are often formulated for different skin types. As for moisturiser it is applied to protect the skin from UV radiation and damage, skin lighteners, and treatment products to repair or hide skin imperfections such as avoid skin from dehydration. Moisturisers are complex mixtures of chemical agents specially designed to make the external layers of the skin (epidermis) softer and more pliable, by increasing its hydration and by reducing evaporation. Moisturisers prevent and treat dry skin, protect sensitive skin, improve skin tone and texture, and mask imperfections.

The large consumption of facial care product was influenced by consumers' preception on beauty. Other factors that also enhanced sales especially in Malaysia are the presence of whitening product and product that protects the skin from UV rays. Hence the desire to maintain the beauty of the skin is being satisfied by the presence of technlogically innovative facial care products (ECRM- online, 2003). It is interesting to note that despite the complexity, and hence variability, that may exist for these systems, the specifications for moisturisers in, for example, the British Pharmacopoeia focus almost entirely on the chemical composition rather than the physical characteristics. Clearly, the nature of the microstructure necessitates the development and use of a range

of techniques which are capable of characterising these systems, both for enhancing the basic understanding of cream structure and to control the quality of the product. It is important for product developers to understand how to measure skin moisturization so as to determine whether the functional component of a formula is acting as a moisturizer, humectant or emollient. There is a critical balance between clinical measurements and the consumer's perception of performance. By most accounts, consumers make an initial assessment of a moisturizer's performance based on how the product applies to their skin, in addition to perceptions later in the day of relief from dry skin symptoms. Consumers will continue to use a product if their symptoms are continually reduced and healthier skin is maintained longer, ideally greater than 24 hr.

A colloid is a mixture of two phases in which one (the dispersed phase) is distributed in the other (the continouos phase). An emulsion is a colloid in which both phases are liquids. A mixture containing very small droplets of one liquid dispersed in another liquid. Moisturisers are all emulsions of water and oily materials and all are stabilised in some way to stop separation. In certain circumstances, the particles in a colloidal dispersion may adhere to one another and form aggregates of successively increasing size that may settle out under the influence of temperature. This will depend upon the balance of the repulsive and attractive forces that exist between particles as they approach one another. The term stability of colloidal system is one in which the particles resist flocculation or aggregation and exhibits a long shelf-life. If all the particles have a mutual repulsion then the dispersion will remain stable. However, if the particles have little or no repulsive force then some instability mechanism will eventually take place for example flocculation, aggregation.

Colloidal destabilization at higher temperatures is caused by two different mechanisms depending on the surfactant concentration. Up to a surfactant concentration, the surfactant micelles dissolve before the breakdown of the dispersion. The breakdown is triggered by desorption of surfactant molecules from the particle surface causing flocculation via hydrophobic interactions. Since the surfactant concentration influences the adsorption-desorption equilibrium, the breakdown temperature increases with increasing surfactant concentration. Surfactant micelles are still present when the dispersion breaks down and destabilization is caused by high

temperature depletion flocculation. Since higher surfactant concentrations result in a larger number of micelles in solution, the breakdown temperature for concentrations decreases with increasing surfactant concentration. Adjusting the hyrdophile and lipophile balance of the emulsifier is a very important aspect for achieving emulsion stability. Emulsions prepared with hydrophobically modified water-soluble polymers are stable for years. The lotion's dermatological emulsions are thermodynamically unstable due to its positive interfacial energy. When the emulsion tries to reach its thermodynamic equilibrium it causes the emulsion to break up back into its component phase. In order for the product to be able to sustain it's shelf life qualities, the formula must attempt to delay the separation process. The delay can be accomplished by adding specific mixed emulsions compiled of ionic or non-ionic surfactants combined with fatty amphiphiles.

Pharmaceutical moisturisers are emulsions which are widely used as a means of altering the physical properties of the skin (particularly the hydration state) and as vehicles for the delivery of drugs. It has been proposed that o/w creams are composed of four phases; a hydrophilic gel phase composed of surfactant and fatty alcohol molecules with a layer of water arranged between lamellar structures, a bulk water phase, a lipophilic phase containing excess fatty alcohol in a hydrated state and a disperse phase (Eccleston, 1977, 1984; Junginger, 1984). Adding the melted oils to the hot water phase, stirring strongly until the particle size of the emulsion has reduced sufficiently, and then cooling while maintaining stirring usually make the emulsion. External stabilizers such as carbomer are usually added to the water at the beginning and neutralized at the end before or during cooling. As with almost all cosmetics a preservative is essential and is usually added at the end or during the cool down phase.

The list of additives is endless but includes such things as perfume, color, vitamins; antioxidants plant acids, ultra violet absorbers. Cosmetically desirable additives are often unstable and can present a challenge to the formulator to incorporate satisfactorily into an acceptable cream lotion.Parabens are the most widely used preservatives in cosmetic products. Cosmetics sold on a retail basis to consumers are required by law to declare ingredients on the label. This is important information for consumers who want to determine whether a product contains an ingredient they wish to

Temperature is an important parameter that should be taken into account when modelling colloidal stability, since temperature could affect the stability of possible released colloids and, thus, have impact on their sedimentation rate and thereby the colloid concentration in solution. Very little has been done on modelling the effect of temperature on colloidal stability. Theoretical approximations have been proposed for the temperature effect on the kinetics of colloidal particle aggregation in terms of their attachment factor. So it it relevent to study the stablity of the colloid in moisturiser at different temperature.

Moisturiser is a generic term used to signify an ingredient that adds moisture to the skin, refer to humectants, which maintain skin hydration and to describe emollients that soften skin. Unfortunately, these terms are used interchangeably but each of these materials provides different performance benefits to skin and is quantified by different clinical methods. Moisturiser typically describes the function of a finished product and tends to include polar materials that are hygroscopic and able to hold water in place. The skin's natural moisturizing factor also plays an important role in moisturizing the stratum corneum. Thus, moisturizing ingredients are chosen based on their ability to substitute, replenish or maintain skin's natural moisturizing components. Chemically, parabens are esters of p-hydroxybenzoic acid. The most common parabens used in cosmetic products are methylparaben, propylparaben, and butylparaben. Typically, more than one paraben is used in a product, and they are often used in combination with other types of preservatives to provide preservation against a broad range of microorganisms. The use of mixtures of parabens allows the use of lower levels while increasing preservative activity. So the objectives of this research are to:

1) Survey of product and survey of the customer preception on local and international moisturisers.
2) Characterise the physiochemical properties of different moisturisers.
3) Determine the relationship between customer preference to the physiochemical properties of moisturisers.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews literatures that are relevant to the purpose of this study which is generally to analyze the stability of the product. Hence, this chapter of literature review begins with the general understanding of the moisturiser, the colloid stability, the composition of moisturiser, kinetics rate reaction in colloid and lastly the customer's dependence on purchasing a beauty product.

2.2 GENERAL UNDERSTANDING OF MOISTURISER

The skin is a complex organ with many layers. Its structure is designed to minimize moisture loss from the body while preventing foreign materials from entering. To accomplish these functions, the skin must have a protective covering of lipids, or oil-soluble molecules. Exposure to everyday conditions can strip the skin of its protective lipid covering. Therefore moisturisers containing some oil-soluble components are often used to restore the skin to its natural condition. There is a huge assortment of moisturisers to assist in customer's needs. Some people prefer scented moisturisers compared to unscented. Others like quick absorbing moisturisers (Marianne case, 2003). A person may need lotion to heal dry skin while another might use it to prevent dry skin.

Moisturisers act on the most external of the skin layers, stratum corneum. Most, if not all, agents present in moisturizers are unable to penetrate deeper layers such as dermis and hypodermis. The stratum corneum has approximately 30% water, of

which a third is tightly bound to hygroscopic molecules and lipids in the skin. This fraction of water content is proportional to external relative humidity, and the thickness and flexibility of the stratum corneum increase with added water content. Evaporative loss of water of the skin increases in certain circumstances, especially if relative air humidity is decreased. The remaining two thirds of water content are part of the biological tissue, such as keratin, and usually do not change in non-pathological conditions. Figure 2.1 showes the skin layer of a human and the functional of each layer in human skin.

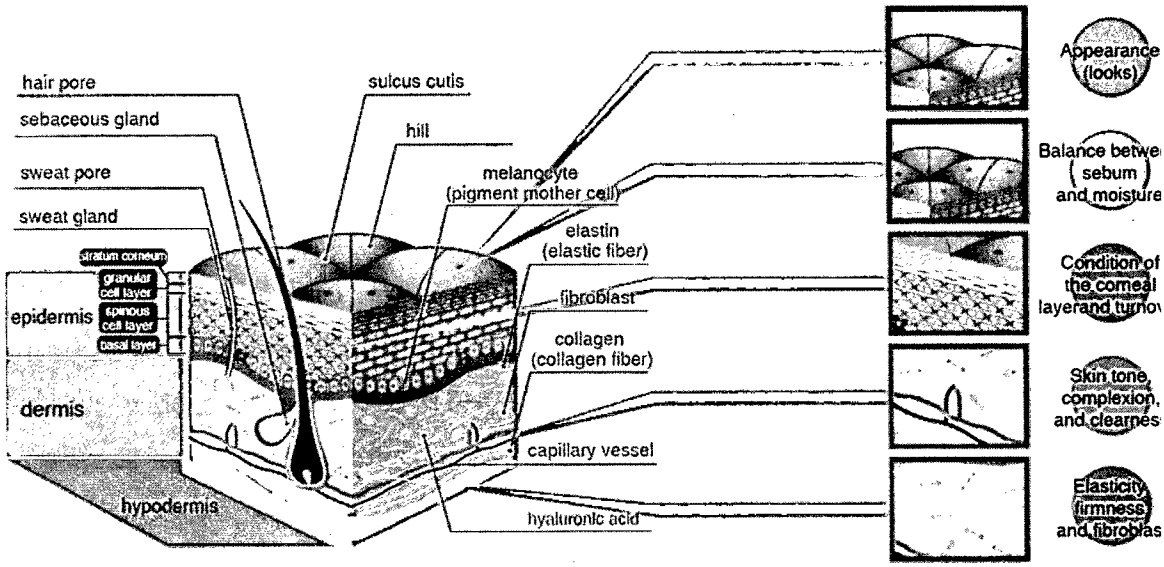

Figure 2.1: Skin structure

Besides imparting or restoring normal levels of hydration to the skin, moisturisers can have several additional intended and unintended effects on its users, including building a barrier against the loss of water through the epidermis, repairing scaly, damaged or dry skin resulting from external environmental aggressions or internal changes, repairing or postponing age effects on the skin. The formulator must design, therefore, a dermatological product which not only has good physical and chemical stability and cosmetic appeal, but which also provides an optimum environment to enable the active agent to reach the intended target site. The system must be non-irritant to the skin, easily applied and removed from the skin and where appropriate, capable of incorporating buffers, co-solvents, antioxidants, additional

polymeric stabilizers and preservatives.Structured and semisolid emulsions intended for application to the skin and mucus membranes such as moisturiser's cream, are generally complex mixtures of recipients whose stability and bioavailability vary greatly. Knowledge of the physicochemical properties of such formulations is essential to optimize manufacturing conditions, provide cosmetic elegance and to optimize the delivery of the drug or cosmetic agent to the skin. (G.M.Eccleston, 1996).

2.3 FACTORS AFFECTING CONSUMER PRECEPTION ON FACIAL CARE PRODUCT

Customer behavior is an ongoing process when individual or groups select, purchase, use or dispose of products, services, ideas and experience to satisfy needs and desires (Askegaard et.al, 1999). Moreover, Askegaard et.al (1999) noted that people do not buy the product for what they do but for what they mean. That sentence implies that the roles that products play in our lives go well beyond the tasks it performs. Customer will choose the brand or product that has an image consistent with his or her underlying ideas. Therefore, understanding customer behavior helps the producer of cosmetic to understand more about factors that influence customers.

In this part, the authors focus on customer behavior and factors that affect their behavior toward skin care products. Women have been aware of their appearance for long times. They always maintain and take care of their physical image to be attractive and staying competitive in this society (Blanchin et al., 2007). Currently, appearance, image and youthful are becoming more and more important in this society. So many women have turned and focused on their appearance more than in the past because they want to be beautiful and young. According to Blanchin et al. (2007), their previous study clarify the connection between female and beauty care as below,

"The relation between female and beauty care can be seen as a simple relation to her appearance. They want to feel good about themselves, to be in harmony and to reach a mental physical equilibrium. Women want to be proud of their bodies. This is why they use products to embellish themselves".

Moreover, shelf space for cosmetic and skin care products were limited to few products but now there are many kinds of skin care products available for women such as facial foam, day and night cream, anti-aging cream, sun protection and etc (Pitman, 2005). L'Oréal, and Olay can be good examples because these brands have launched section to respond to their customer needs. Therefore, women have become more comfortable about buying products and service to improve or enhance their personal appearance and to embrace more sophisticated products and grooming concepts (Imogen, 2005).

Customers in different age groups have different needs and want. While people who belong to the same age group differ in many other ways, they tend to share a set of values and common cultural experiences that they carry throughout life (Askegaard et al., 1999). In term of skin care products, younger generation tend to be more open to skin care products than older generation. In a relation with this kind of market, Amanda (2004) revealed that women who are in the 18-24 years age group, were driving apparel spending and are increasingly spending money on appearance related products as well.

One factor that might affects purchasing behavior is be occupations because some women have to take care and maintain their appearance. Staying competitive in term of appearance in workplace or school is becoming more and more importance. As Antoinette (2001) said that many working women and students believe personal appearance does influence whether someone is promoted or succeed professionally. Therefore, spending patterns are found among different occupational groups (Prakask and Vinith, 2007). Income plays as an important factor in purchasing behavior. According to Chunhapak et al., 2008, noted that people who have different income have different selection of product. Moreover, people who have high income are more ready to buy expensive products but people who have low income are not. Therefore, income is one factor that affects purchasing behavior.

In term of skin care product, Blanchin et al., (2007) said customers should have enough time and sufficient income to purchase and use the product. Living area is one factor that influences customer's consumption. Elsey and Sukato (2009) said that consumer behavior might change according to location; urban and rural area. People

who live in urban area do not have the same desires as people who live in rural area. In case of skin care products, rural women do not concern more about using skin care products because the lifestyles there are less competitive and relatively relaxed but many urban people do (Elsey & Sukato, 2009). Location of living area can make the difference in purchasing behavior. According to the research of Prakask & Vinith (2007), 50% of the urban respondents and 53.3% of those belonging to the sub urban areas made their purchases individually, while 32 % of urban consumers purchased cosmetics with their spouses.

The influence from group of people (friends and colleagues, etc.) or family is considered as an important element that affects on other purchasing behavior. According to Elsey & Sukato (2009), friends or family possibly convinced consumers into purchasing a particular product. Celebrity endorsement is one factor that affects on customer's purchasing behavior. It can be seen as a significant impact nowadays. They (celebrities) have influences on product's perspective. In term of skin care products, celebrities have changed perception about the cosmetic. According to Cheng et al (2010),

"Increasing endorsement of celebrities opinion-former who openly admits to using skincare product and publicizing that women can make themselves look better with the product had contributed to changed women's attitude toward the idea of consuming grooming products. Young women choose brand or product through the imitation of celebrity endorser because they are known for their looks and style which resonate well with the excellent tastes".

Branding is defined under the holistic approaches as the sum of all element of the marketing mix such as the product, price, promotion and distribution. In other words, brand is the promise of the bundles attributes that someone buys that provides satisfaction (Ambler & Styles, 1996) brand origin is believed to affect the consumers' perception towards the equality of brands. Thackor and Lavack (2003) introduced multiple inputs that determining brand origin being the location of ownership, location of manufacture, location of assembly, origin of top management, their press report and marketing communication. Using these factors, consumer formulates their general perceptions, attitudes, expectation and intention about the product and the brands.

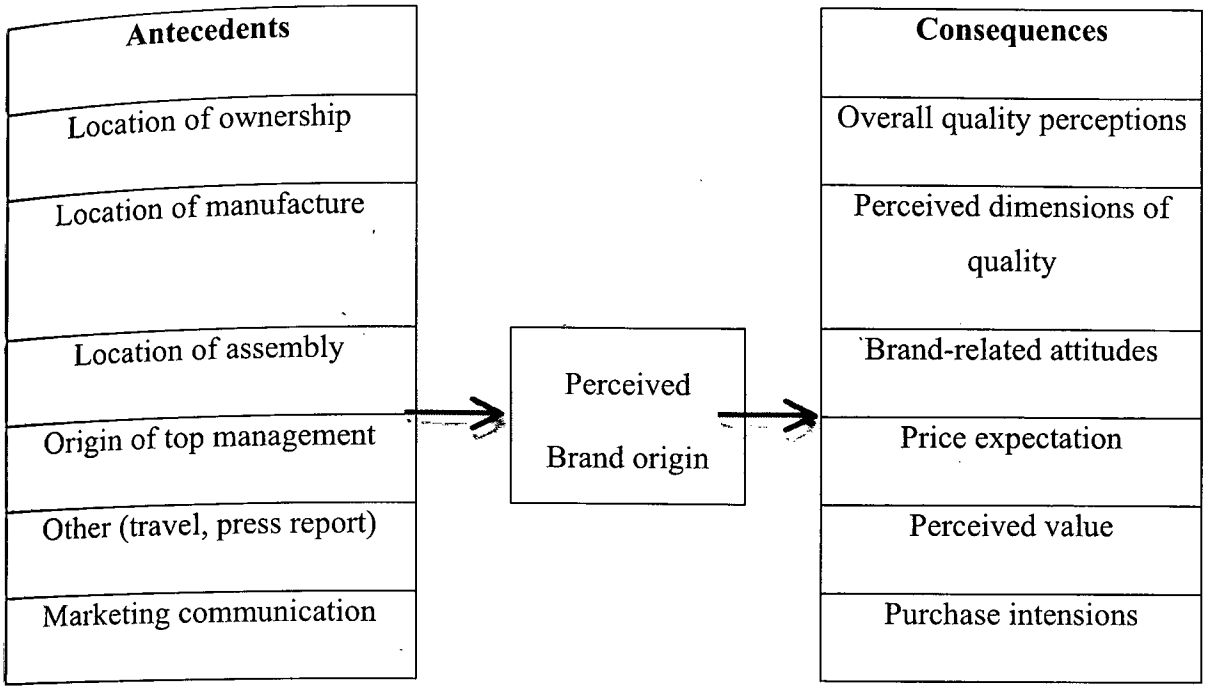

Figure 2.2: A model of the antecedents and the consequences of brand origin

Figure 2.2 was introduced by Thakor and Lavack (2003) in their study on effect of perceived brand origin associations on consumer perceptions of quality. The study had estimated the effect of two factors being the perceived location of corporate ownerships a measure of brand origin and the perceived location of component source and assembly as a measure of brand origin. The results indicated that the brand origin association is more influential than the country origin in terms of consumer evaluation of products, since country of manufacture had no effect on product quality ratings when the country of corporate ownership was also present.

Hence, consumer perceived that the brand origin of a product to be associated with the country where the brand's corporate parent resides, rather than the country which the production its components are manufactured at any given time. The study had shows the importance of origin associations to brands, and it is also became a viable methodology for investigation of origin effects in brand dominated settings (Thackor & Lavack, 2003).

Price and uniqueness are indicator of product position in the marketplace as mentioned by Micheal Porter (Kumar *et al.*, 2006). In the process of deciding to purchase facial care products, consumers use price in two alternative ways. First seek

lowest price to avoid financial risk, or second, seek highest price in an effort to gain high product quality (MacDonald & Sharp, 2000). For many products, consumers have learned from experience that there is a positive corelation between a product price and its quality of a product from price alone, without actual product trial (Ordonez, 1998). Similarly, the price- quality correlation may also lead to consumers to expect to pay a higher price for a higher quality brand than a lower quality brand. Several studies in the market literature show that consumers, believing price and quality to be postively correlated, often infer quality from price. However, this is not a wise decision as the correlation of quality and price are not true most of the time (Ordonez, 1998). According to Davies and brito (2004). Quality of products has two components. First is the extrinsic cue such as brand image and packaging. Second is the intrinsic cue such as better taste, texture or performance in use.

Rao and Monroe (1998) suggest that unfamiliar buyers tend to use price as an indicator of quality to a greater extent. The meta analysis of Rao and Monroe study indicates that the relation between price and perceived quality of consumer goods, and between brand name and perceived quality are postive and statistically significant. On the other hand, a study on differences between national brands and store brands that the average quality of one in four of the store brands was actually higher than the national brands, although the store brands is lower (Apelbaum *et al.*, 2003; Davis and Brito, 2004). Hence the price does not necessarily indicate quality, since price premium for the national brands exist even when they are lower quality.

2.4 COLLOID STABILITY

Colloids are a dispersion of one phase in another. The dispersed phase and medium can be solid, liquid, or gas. Table 2.1 shows the classification of a colloid system.

Table 2.1: Classification of colloid system

Name	Dispersed Phase	Dispersion Medium	Applications	Example
Foam	Gas	Liquid	Froth	Fire extinguisher
Solid Foam	Gas	Solid	Insulating foam	Flame retardants
Sol, Paste, Latex	Solid	Liquid	Synthesis of particulate materials	Sol gel, microemulsion
Smoke, Aerosol	Solid	Gas	Spray	Cosmetics and paints
Emulsion	Liquid	Liquid	Dairy, pharmaceutical, nanotechnology	Milk products, body fluids

The lyophobic colloids, even if they are thermodynamically unstable, can be made metastable for a long period of time if an energy barrier of a sufficient height opposes the colloidal state to the bulk state. When the barrier is absent or too small, then the particles tend to recover the bulk state by aggregating in a reversible or an irreversible way. This process is known as the flocculation (reversible) or coagulation (irreversible). The natural tendency of colloidal particles to aggregate is coming both from the thermal energy of the particles, also known as Brownian motion and the dipole–dipole attractions among uncharged molecules, usually described as the van der Waals interaction.The frequency and efficiency of the inter-particle collisions depend on the number and size of the particles in the dispersion. For a model dispersion of uniform spherical particles, figure 2.3 shows that the ratio between the interparticle distance (H is the distance between the particle surfaces) and the particle diameter (Jean-Claude Vanovervelt, 2005).

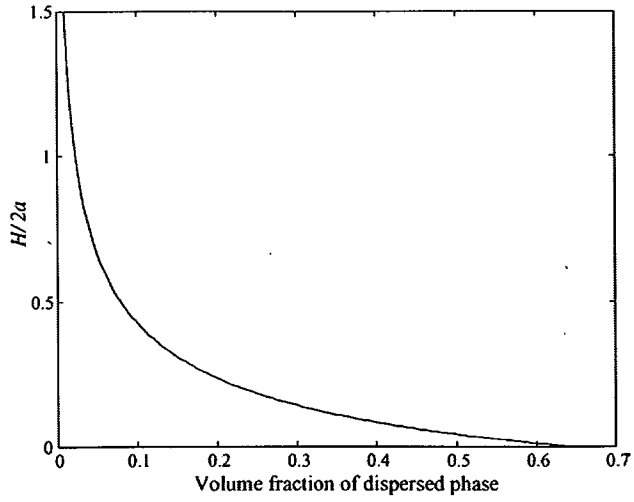

Figure 2.3: Ratio of the sphere separation distance and the particle diameter as a fuction of particle volume fractio for a dispersion of uniform spherical particles in random packing

The present study shows that for emulsions, there exists an optimum temperature at which stable and finely dispersed nano-sized droplets can form. The emulsions stored at the optimum temperatures, which are dependent on the non-ionic surfactant concentration, can retain the nano-sized state with smallest droplet sizes, lowest polydispersity indices, and superior stability compared to the emulsions stored at other temperatures. Furthermore, returning them to the optimum temperatures can destabilize emulsions that have been destabilized after prolonged storage at non-optimal temperatures. This effect appears to be thermally reversible. (Jeffery Liew, Q. Dzuy Nguyen, 2007).

Experimental evidences of the influence of temperature on the surface charge density in other inorganic colloids have been reported by (Tarì et al, 2007). An increase in temperature reduces the surface charge density on composition particles, which reduces their interparticle pair potential and their stability. According to the theory, charged particles are stabilised by electrostatic repulsion between the diffuse electrical double layers surrounding the particles. The double layer compression is the main mechanism for decreasing the stability of colloidal particles. Ionic strength, pH and temperature are critical parameters in electrostatically stabilised systems since they

influence the thickness of the double layer. An increase in temperature reduces the double layer thickness and should thereby reduce the colloidal stability.

Temperature can also affect the surface potential of the particles, since temperature can readily displace the equilibrium between the ionized groups and the medium. The surface potential determines the repulsion potential for the interaction between the particles. In the case of moisturiser creams, increasing temperature leads to fewer ionized groups, which reduces the surface potential. The sedimentation process of particles can be considered as a bimolecular reaction, where the particles collide and form larger aggregates that deposit due to gravitational forces. For a bimolecular reaction, as temperature increases the thermal energy of the particles also increases. This leads to higher frequency of collisions between pairs of particles with the necessary activation energy to aggregate, hence the kinetics of the sedimentation process should be faster. For theoretical framework, less stable colloidal suspensions are in general expected at higher temperatures.

The principles of colloid stability are described with some emphasis on the role of surface forces. Electrostatic stabilization is the result of the presence of electrical double layers which, on approach of particles, interact, leading to repulsion. Combining this electrostatic repulsion with van der Waals attraction forms the basis of theory of colloid stability. This theory can explain the conditions of stability/instability of colloidal particles. Particles containing adsorbed or grafted nonionic surfactant or polymer layers produce another mechanism of stabilization, referred to as steric stabilization. This arises from the unfavorable mixing of the stabilizing layers when these are in good solvent conditions and the loss of entropy of the chains on significant overlap. The flocculation of sterically stabilized dispersions can be weak and reversible or strong and irreversible depending on the conditions. The colloid stability of such systems is governed by the balance of various interaction forces such as van der Waals attraction, double-layer repulsion and steric interaction. The van der Waals attraction is combined with the double-layer repulsion can be established to describe the conditions of stability/instability.

In addition to colloids, modern chemical process industries utilize high shear mixing technology to create novel colloids. Incorporating previously blended emulsifying wax into the formulation can also prevent the separation of the emulsion. The effect of temperature on ionic micelles may also affect the mechanism of moisturizing lotion on the skin. While the exact mechanism is not entirely understood, it is believed that the temperature change that occurs when the lotion is applied to the skin induces a phase change; causing the humectant (glycerin) to move from the micellular interface to the external surface of the emulsion. The humectant is then able to transfer to the stratum corneum in order to moisturize the skin. Perhaps the higher temperature of the skin destabilizes the micellular structure, releasing the humectant inside.

The evaporation and absorption of the moisturiser is a very complex system. When moisturiser is applied to skin thinly, emulsion destabilization often occurs during the use. When a dermatological emulsion is rubbed onto the skin water evaporates and the oil droplets coalesce. Coalesence occurs when the interaction energy between substrates and adatoms is small, clusters can detach themselves from any given location on the surface and diffuse as entities over the surface. The clusters behave more like liquid droplets than solid crystallites when they coalesce. They can even liquefy, but re-solidify immediately after to assume the prior configuration. After the application of the lotion the composition will change as water and other volatile solvents evaporate. The film stays on the skin to protect it and the drug is absorbed into skin. Solid-stabilized emulsions are obtained by shearing a mixture of oil, water, and solid colloidal particles (stephane, 2003).

2.5 COMPOSITIONS IN MOISTURISERS

The important substaces that constitute a basic moisturiser include humectants, emolloint and occlusive. Humectants are generally promote water retention within the stratum corneum. Humectants in lotion will reduce the drying out of such creams on exposure to the air (Harry, 1976). The process of absorption by humectant can cause the increase of transepidermal water content from thr dermis to the epidermis and finally lost to the environment (Centurion, 2003). Hence, occlusive agents are almost always

combined with humectant. They can work together to enhance epidermal hydation because occlusive agent can create a hydrophobic barrier over the skin and hence transpidermal water loss. Common substance with humectant properties include glycerin, honey, hyaluronic acid, panthenol, and propylene glycol. The common substance used occlusive includes lanolin acid, stearic acid, cetyl alcohol and stearyl alcohol. Another important substance is an emollient. Lipids and oils are the main constituent of a emollient. It is added int moisturiser's formulation to give out a charateristic of smooth skin after application. Common substances that process emollient properties include cyclomethicone, dimethicone, isopropyl myristate, and decyl oleate. Technology is used to continuously develop and improve these substances asthetic properties and efficiency (Rawling *et al*,. 2004).

The reason for preserving cosmetic products is to avoid product spoilage. Figure 2.4 shows the chemical structure of methylparaben, which is common preservative in moisturiser. When microorganisms proliferate in, for instance, a cream, they break down the emulsion causing thinning, separation, pH changes, malodor, colour change, etc which means that the product not only looks and smells different but also may not function properly when used. Creams usually contaminated with moulds go black/grey on the surface and although some of these molds are not harmful, they can be off-putting to the customer. There was a study that had identified parabens in human breast tumor samples supplied by 20 patients. The study was concerned primarily with the use of deodorant containing parabens. Although researches that are studying this issue agree that the information to date on the link of parabens and cancer is hardly conclusive and requires more study, the consumers have become concern toward the usage of parabens as preservative (Begoun, 2005). This created controversy on the safety of parabens usage in cosmetics. An a consequence of this, the cosmetics ingredients review expert panel published in the journal of the American College of Toxicology saying that parabens as a cancer causing agent. As of January 2004, the evidence is inadequate to conclude in the existence of any casual link between antiperspirant use and breast cancer (Anonym, 2005).