THE PRODUCTION OF ANTI AGING CREAM WITH UV PROTECTION FROM CHICKEN FEATHERS

SITI NUR KHAIRUNISA BINTI MOHD AMIR

BACHELOR OF CHEMICAL ENGINEERING

UNIVERSITI MALAYSIA PAHANG

UNIVERSITI MALAYSIA PAHANG

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THE PRODUCTION OF ANTI AGING CREAM WITH UV PROTECTION FROM CHICKEN FEATHERS

SITI NUR KHAIRUNISA BINTI MOHD AMIR

Thesis submitted in fulfilment of the requirements for the award of the degree of Bachelor of Chemical Engineering

Faculty of Chemical & Natural Resources Engineering
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I dedicate this thesis to my family for giving me a lot of supports and inspirations.

The most amazing and great parents;
Mr. Mohd Amir bin Mohamad & Mdm. Zairina binti Ismail

Also my sweetess younger brother;
Muhammad Nizamuddin bin Mohd Amir

This is for all of you.

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The development in the making of anti aging creams from chicken feathers gives me such a beautiful memorable moment in life. It began from the toughest moment in order to make the very first step in the beginning, to the brightest moment by the time this project won the gold medal at BioMalaysia 2011.

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ABSTRACT

A research entitled the development of biomedical and cosmetic products from keratin protein. Protein builds up most of the outer surface on human body. In this research, chickens feathers will be used as protein sources. Hence, the protein in the chicken feather is extracted and used in the personal care products. The personal care products focused in this research is anti aging cream with ultra violet (UV) protection. The production of anti aging cream is using formulation created by safe and cheap ingredients easily available in Malaysia. The cream is then analyzed with pH meter, micro centrifuge, particle size analysis, rheometer, phase separation and tested with rat skin. All the data collected shows the creams are stable, no phase separations happen to cream and no irritation on the rat skin. In conclusion, there is no harm and safe in the usage of this anti aging cream with UV protection.

ABSTRAK

Penyelidikan ini dihasilkan untuk mengkaji akan penghasilan produk-produk bio-perubatan dan kosmetik dari keratin protein. Protein ini biasanya terhasil secara semulajadi di lapisan kulit manusia. Dalam penyelidikan ini, bulu ayam dijadikan sebagai sumber protein. Jadi, protein akan diekstrak dari bulu ayam dan digunakan dalam produk-produk penjagaan diri. Penghasilan krim anti penuaan dengan perlindungan UV yang dihasilkan dari bahan-bahan yang murah dan mudah didapati di Malaysia adalah fokus utama dalam penyelidikan ini. Krim ini diuji dengan penganalisis saiz partikel, rheometer, pengasingan fasa yang berlaku pada krim dan juga kesan pengunaan krim ini kepada tikus makmal. Berdasarkan peemerhatian dan keputusan yang diperolehi daripada kajian yang dijalankan, tiada perubahan warna, tiada pengasingan fasa yang berlaku pada krim dan juga tiada kesan seperti kemerah-merahan yang terhasil di lapisan kulit tikus makmal Kesimpulannya, krim anti penuaan ini selamat digunakan.

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LIST OF ABREVIATION

UV	-	Ultra Violet

CHAPTER 1

INTRODUCTION

1.1 Background of study

Chicken feather wastage is made up approximately eleven million pound from the commercial poultry processing plant annually. The disposal process for chicken feather is expensive. It is also can be difficult because the chicken feather is burning up with the incinerator plant, buried in the soils and also recycled as a low quality of poultry foods. These processes mostly give the bad effects to the environment, especially the burning of chicken feather which will release the green house gasses in the air. There are several alternatives invented based on the chicken feather application, but the wastage of chicken feather is still does not change as much as possible because of its low requirement.

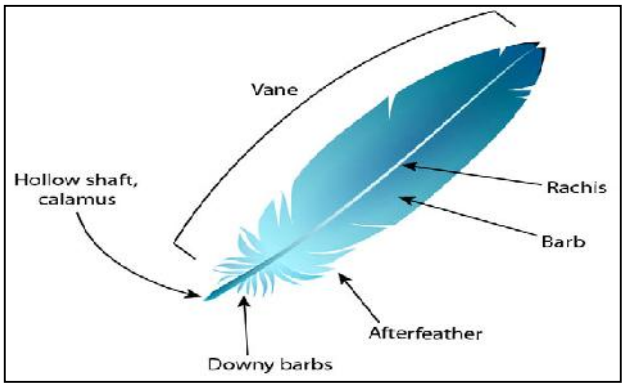


Figure 1.1: The anatomy of a chicken feather

Keratin is a natural protein extracted from the chicken feather as shown in Figure 1.1. In the developed country, the usage of keratin in the personal care products is widely used. The personal care product produced from the keratin protein is conditioning shampoo, anti aging cream, facial cleanser and others. There are some differences between the personal care products already produced by the other developed country because the raw materials to extract the protein is sheep wool while in this research, the extraction of keratin protein is from chicken feathers. These two materials will produce two different sequences of amino acids.

1.2 Problem Statement

1.2.1 The chicken feather waste is increasing throughout the year and it will cost a lot in the treatment processes.

1.2.2 Large amount of chicken feather available from meat industry creating environmental problems.

1.2.3 High cost of production of keratin protein from sheep wool in Malaysia.

1.2.4 Develop the production of personal care formulation from beta keratin protein produced by the chicken feather because an increasing demand for keratin based products such as anti-aging cream, shampoo.

1.3 Research Objectives

1.3.1 To extract the keratin protein from the chicken feather.

1.3.2 To find a suitable method for solubility and later on purify the keratin protein.

1.3.3 Analyze the composition of the keratin protein.

1.3.4 To produce an anti-wrinkle treatment cream from keratin protein produced by chicken feather.

1.3.5 To prepare the formulation of personal care products from keratin protein and analyze the research products.

1.4 Scope of Study

1.4.1 Study the production of keratin protein from chicken feather by identified reducing agent.

1.4.2 Study of the purification and analysis of keratin protein composition.

1.4.3 The production of personal care products by using the formulation gathered.

1.4.4 Testing and analyzing the products from the keratin protein.

1.5 Rationale and Significance

This research is to be done to develop the new products from the natural protein extracted from chicken feather. Chicken feathers are resistance to degradation and these characteristics contributes to environmental effects. Extraction of natural protein called keratin will be one of a solution in managing the wastage of chicken feathers. Keratin protein has a wide range of use in cosmetic and biomedical products such as conditioning shampoo and anti aging cream. The beta keratin protein will be used to develop new product instead of using alpha keratin protein because the natural protein extracted from chicken feathers is beta keratin protein and the amino acids composition of these alpha and beta keratin are both different.

CHAPTER 2

LITERATURE REVIEW

2.1 Feathers

Chicken feather is a material which produced keratin protein. “The structures of the chicken feather consist of beta keratin as its major structural instead of alpha keratin (R.H. Sawyer et al., 2000)”. The keratin protein is used in bio-medical and cosmetic products and this research is about the development of these products with the usage of chicken feather as a keratin source.

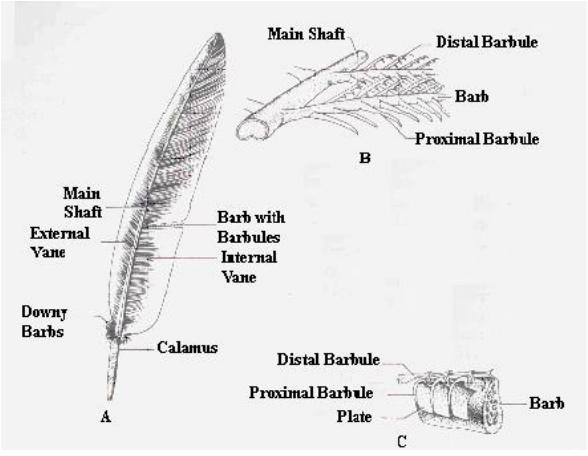


Figure 2.1 Structure of chicken feather

2.2 Protein

Proteins play a big role in the human system daily life which provides the structure to the human body system and also transporting oxygen in the human blood regulating system. Human bodies depending on proteins to perform the life better and protein also have its composition and structure. The differences of each protein classification play its different role in the human body.

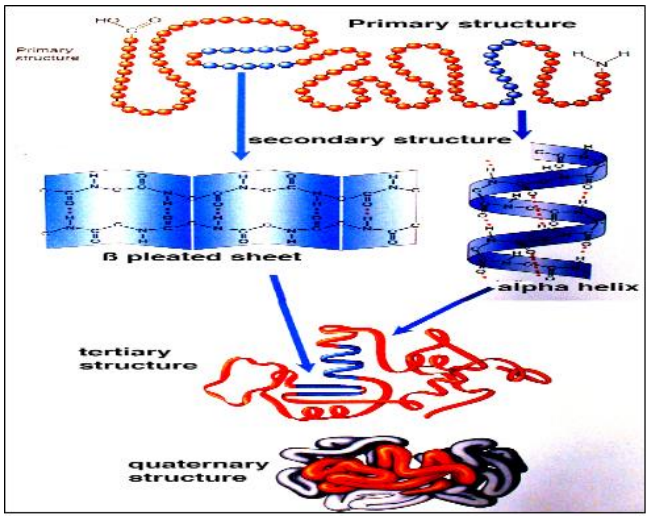


Figure 2.2 The protein structure

2.3 Keratin

"Keratin is a major component of mammalian hair, bird feathers and covered the outermost layer of skin in most animals. The ability to flex in multiple directions without tearing is an important quality of keratin and it is also provides a tough and fibrous matrix in tissues (Sheen and Judy P, 2002)". Keratin proteins have the secondary structure and it is categories in the class of fibrous protein. Fibrous proteins have an elongated shape relatively simple and regular linear structure. The mechanical strength of keratin proteins is high because it is connecting tissues in animals and forming skeletal.

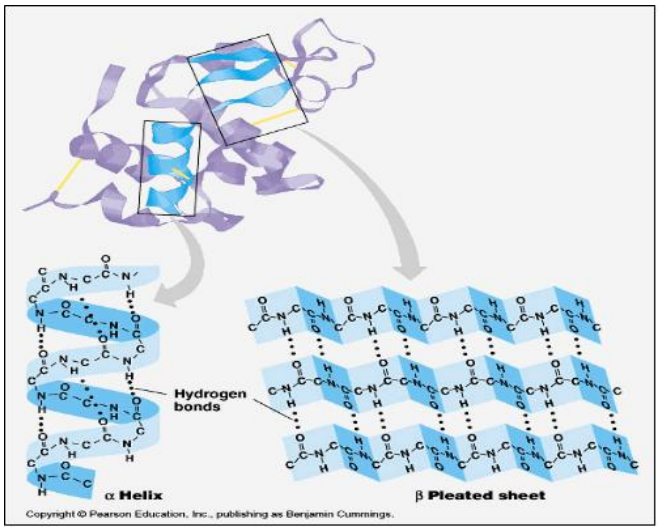


Figure 2.3 Alpha helix and beta pleated sheet of keratin

There are two types of keratin, which are alpha-keratin and beta-keratin. Alpha-keratins are found in the soft tissues protein fibres of sheep wool, hair and skin. It is twisted together and formed like a rope strand. Alpha-keratins amino acids sequences rich in cysteine and poor in hydroxyproline and proline. Beta-keratins are found in the hard tissues protein fibres such as bird feathers, nails, fish scales and others. The beta-keratins amino acids sequences rich in small uncharged glycine and alanine and poor in cysteine,proline and hydroxyproline.

Table 2.1 The Amino Acid Composition of Chicken Feathers

Amino Acid	uM/mg Protein*[1]	% Amino Acid in Protein
Aspartic Acid	0.358	4.76
Threonine	0.345	4.11
Serine	1.292	13.57
Proline	0.875	1.01
Glutamic Acid	0.624	9.18
Glycine	1.008	7.57
Alanine	0.411	3.66
Valine	0.618	7.24
Cystine	0.088	2.11
Methionine	0.017	0.025
Isoleucine	0.376	4.93
Leucine	0.570	7.48
Tyrosine	0.102	1.85
Phenylalnine	0.267	4.11
Lysine	0.039	0.57
Histidine	0.001	0.016
Arginine	0.377	6.57

*Based on sample as 100% protein
[1]Micro mole per milligram of protein

"Keratin is insoluble in water and organic compound. The chemical properties of keratin are weak acids and bases. It is characterized by cystine content in the sequence of keratin amino acids and it can be hydrolysed, reduced and oxidized. High strength of keratin is influenced by the two cysteine molecules by disulphide bonds (Krystyna Wrzesnieska-Tosik, 2007)". "Keratin protein fraction is used in the formulation of anti-wrinkle treatment cream, sulfite hair straightener, conditioning shampoo and other personal care (R.J. Kelly and A.D. Roddick-Lanzilotta, 2003)".

A covalent chemical bond between two sulfur atoms which is derived from the two sulfhydryl or thiol groups called disulfide bond. The thiol groups usually from the side chain of amino acid cysteine and it is in the reduced forms. The oxidation reaction is occurs

when two sulfhydryl groups covert to a disulfide linkage, while the reduction reaction occurs when the disulfide bonds is reduced to yields two thiols.

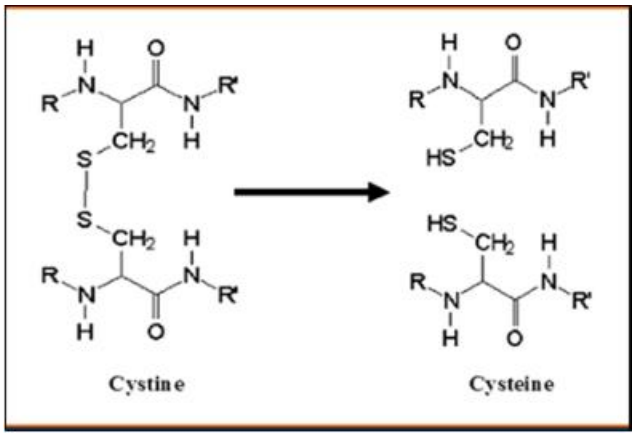


Figure 2.4 The reduction of disulfide bond

Keratins gene family (KRT) is responsible to provide an instruction for the making of protein called keratin. Human generally has at least 54 functional keratin genes. Each of the keratin genes is divided into two types of keratin which are type I and type II. Type I keratins genes are located in a cluster on chromosome 17 and designed through KRT9 to KRT20. Type II keratins genes are found in a cluster of chromosome 12 and designated through KRT1 to KRT8. Differ tissues have the different combination of keratin protein from type I and type II. These combinations will form a structure called a heterodimer and each of heterodimer make an interaction to form keratin intermediate filament. However, the instruction of genes in the production of keratin also happens to the other mammals.

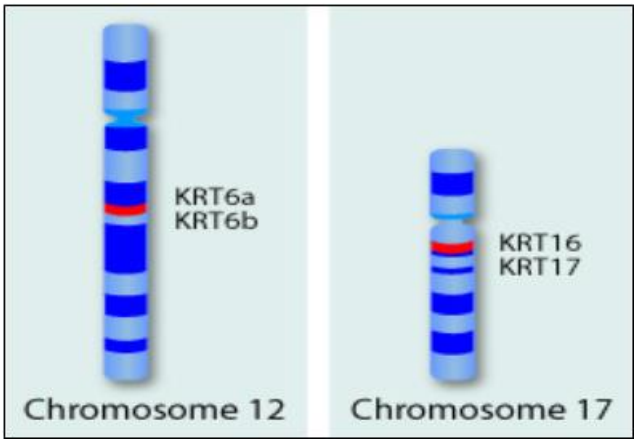


Figure 2.5 Chromosome of keratin gene family in human being

Biomedical research is solving medical problems by using theories and it can be prove or deny through observation and experimentation. Animals which are having the similar characteristics as human in terms of skin, hair and others can be use to get the best result because if the positive result appear from the test, it does mean that human can use the biomedical products. Animals play a big role in the biomedical research because most of the medical advances in the countries all around the world are dependent on the animal research. Based on the research, the formulation can be use to cure many diseases and can be save millions of life.

2.4 Ultra Violet in Anti Aging Cream

Human development makes process of all organs in the body are different in each stage. As human beings grow older, the maximal functioning and reverse capacity is decreasing and this phenomenon called an ageing process (M. Yaar and B.A. Gilchrest, 2007). The appearances of skins for most age changed because of the chronic UV induced damaged labeled as photoageing. Collagen synthesis in skin is inhibited because incomplete degradation of collagen by UV leads it to accumulate as partial fragments in the skin. As the collagen degradation products increased, the less or no collagen will produce.

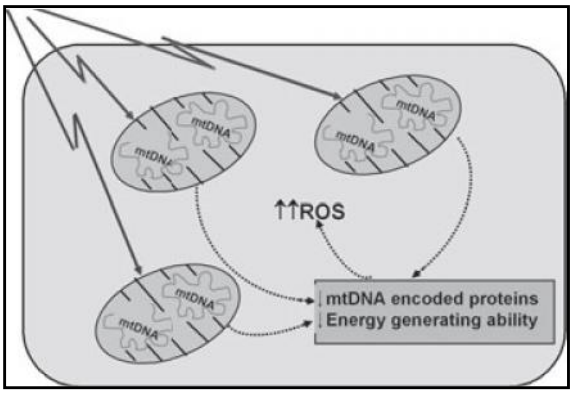


Figure 2.6 The mechanism of photoageing in skin. *(M. Yaar and B.A. Gilchrest, 2007)*

Figure 2.6 shows the reaction of mitochondria in skin if it is affected by UV. Pro-inflammatory cytokines expression will be induced by reactive oxygen species. Cell ability to generate energy is reduced if the reactive oxygen species is increasing. Large mitochondria's DNA deletions cause proteins containing carbonyl groups in skin to damage.

2.5 Keratin in Anti Aging Cream

The invention of anti aging cream with UV protection from chicken feather is a vital part in this research. Keratin provide a quick fix improvement in reducing wrinkles in skin rapidly because it can boost the protein expression which give result to cell growth.

Keratin also has anti-inflammatory property which is suitable for various skin conditions. The skin condition can be acne, eczema, and dermatitis. This can prove that keratin's cream can be applied by person that having sensitive or irritated skin. Antioxidant properties in keratin make the usage of keratin's cream much more applicable because of its ability to neutralize the effect of free radicals which main cause of skin ageing.

A healthier skin having keratin layers of skin that acts as barrier from UV and microorganisms attacks. Moisturizer of the skin can be retaining with the existent of keratin layers since its hold the moisture in skin. A detail of the healthier complexion and problem skin is shown in Figure 2.7.

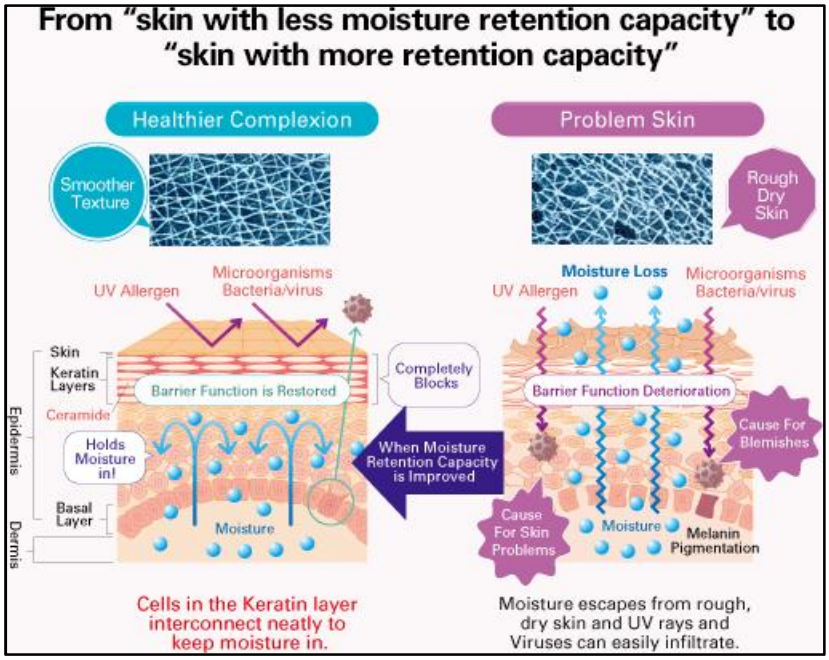


Figure 2.7 Healthier complexion and problem skin

2.6 Oil in Water Cream

Basically, the base cream formulation is divided into two general bases which are oil in water and water in oil. By definition, the main difference to determine either it is oil in water or water in oil is the ability of oil or water droplet to disperse in water and oil. However, the type of emulsifier is determined the type of the cream itself.

Parameters	Paraffin oil	Coconut oil	Palm kernel oil	Stearic acid	Beeswax	Lanolin
Colour	Colourless	Pale yellow	Yellow	White	Off white	Yellow
Odour	Bland	Sweet	Sweet	None	Honey like	Woolly
State	Liquid	Liquid	Liquid	Solid	Solid	Semisolid
H_2O Solubility	Insoluble	P miscible	P miscible	Insoluble	Insoluble	S miscible
SG at 28°C	0.8548	0.8810	0.8720	-	-	-
R.I at 40°C	1.476	1.454	1.449	-	-	-
Viscosity (cs)	10.12±0.02	50.34±0.04	49.82±0.01	-	-	-
Mpt. in°C	-	-	-	39-60	62-70	40-44
pH	7.97±0.01	4.00±0.06	5.00±0.07	-	-	-
TAV (mg KOH g^{-1})	-	1.66±0.02	0.66±0.02	610±0.2	24.52±0.03	5.86±0.20
FFA (%)	-	0.84	0.34	309.4	12.35	2.95
SV (mg KOH g^{-1})	-	274.34±0.02	249.96±0.06	238.00±0.15	28.00±0.07	88.48±0.02
EV (mg KOH g^{-1})	-	272.68±0.01	249.30±0.05	372.00±0.04	3.48±0.05	82.62±0.18
PV (mg Eq Kg^{-1})	ND	ND	ND	ND	ND	ND
IV (mgI_2/100 g)	-	3.5×10^{-3}	1.37×10^{-3}	-	-	-

SG = Specific Gravity, RI = Refractive Index, Mpt = Melting point, TAV = Total Acid Value, EV = Ester Value, PV = Peroxide value, P miscible = Partly miscible, S miscible = Slightly miscible, Results are mean±SD of three determinations

Figure 2.8 Physicochemical analysis of oils and some raw materials (F.O. Oyedeji and I.E. Okeke, 2010)

Parameters	Paraffin oil emulsion	Coconut oil emulsion	Palm kernel oil emulsion	VMC
Colour	White	Off white	Pale yellow	Pink
PH	6.8±0.06	6.37±0.02	7.19±0.01	7.16±0.07
Conductivity (ms cm^{-1})	0.12±0.02	0.19±0.01	0.13±0.01	0.01±0.01
Microscopic examination	Even sized globules	Even sized globules	Uneven globules	Even sized globules
Dye uptake using water soluble dye	Takes up dye	Takes up dye	Takes up dye	Takes up dye
Emulsion type	Oil in water	Oil in water	Oil in water	Oil in water
Total acid value (mgKOH g^{-1})	26.36±0.01	48.43±0.03	46.59±0.01	34.33±0.02
Free fatty acid (%)	13.28±0.01	24.39±0.01	23.46±0.07	17.29±0.01
Saponification value (mg KOH g^{-1})	123.20±0.04	138.88±0.09	155.63±0.02	84.00±0.08
Centrifugation (5000 rpm for 1h)	Stable emulsion	Stable emulsion	Emulsion separates into layers	Stable emulsion
Cyclical temp variation (25-45 soluble dye°C)	Stable emulsion	Stable emulsion	Emulsion separates into distinct layers	Stable emulsion
pH after cyclical variation	7.00±0.04	6.50±0.01	6.26±0.01	7.35±0.04

VMC = Popular Moisturising Cream bought from a Nigerian market used as control, Cyclical temperature variation was carried out 24 h for 3 cycles and then the pH of the emulsion was taken, Results are mean±SD of three determinations

Figure 2.9 Physicochemical analysis of the emulsions (F.O. Oyedeji and I.E. Okeke, 2010)

2.7 Rheology Test

The measurement of material flow is called rheology test. There are several characteristics can be determined by doing rheology test. There are viscosity and flow curves, oscillation test and creep test. Rheology influences residual stresses, cycle times, and also the void content. Product characterization also employed by rheological measurement.

"The most common needs of rheological tests on pharmaceutical and cosmetics products are to study the fundamental nature of selected system, the quality control of overall processes and different parameters effect for each formulation (Peter Herh et al.,1998)".

2.8 Particle Size Test

Size distribution of individual particles in a sample can be analyzed by using particle size analysis. Particle size analysis main features are dispersion of samples into discrete units and particle separation depending on the particle size. Data analyzed by particle size analysis is presented in several ways and usually it is visualized by a cumulative particle size distribution curve. Figure 2.10 shows the different particle shapes will affect the particle size calculation.

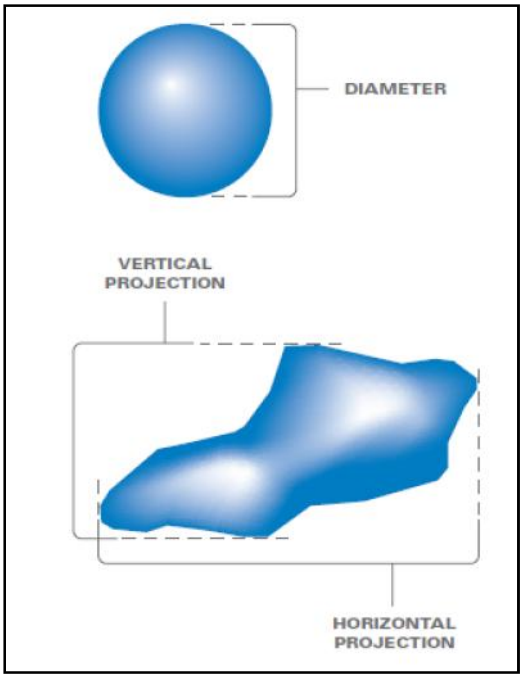


Figure 2.10 Difference of particle shape in the formulation

CHAPTER 3

RESEARCH METODOLOGY

3.1 Introduction

The research methodology is details methods in the production of personal care products. The personal care product produced from this research is anti aging cream. Anti aging creams are formulated and keratin is used as active ingredients. The formulation is followed with the testing procedure. In this research, there are seven test is done. These are color, phase separation, particle size analysis, rheology and toxicity test.

3.2 Materials and Ingredients

Formulation of anti aging cream in this research is divided into two. In these two different formulations, some of the chemicals are difference. The chemicals used in this research as shown in Table 3.1. The production of anti aging cream is based on weight percentage of 100% for each 100g formulation.

3.3 Methods

Table 3.1: Composition percentage of each material in Anti aging Cream

Formulation / Materials	A2	A3	A4, F1	A5,F2
Cetostearyl Alcohol	3.0	3.0	12.5	12.5
Palm Oil	-	-	20.0	20.0
Isopropyl Palmitate	6.0	6.0	-	-
Sunflower Seed Oil	6.0	6.0	-	-
Glycerin	3.0	3.0	12.0	12.0
UV Protection Agent	3.0	3.0	5.0	5.0
Lecithin	1.0	1.0	-	-
Keratin	1.0	2.0	1.0	2.0

3.3.1 Research Methodology of Extraction of Protein

Feathers Treatment

1. Soak the chicken feather in ether for 24 hours.
2. Wash the feathers with soap water and dry the wet feathers under the sunlight.
3. Collect all the dried feathers and blend the feather. Keep the blend feathers in the sealed plastic bag carefully.

Dissolving of Chicken Feather

1. Prepare the sodium sulfide solution in the conical flask.
2. Weight the blend feathers and add in into the sodium sulfide solution.
3. Stir the solution for 6 hours and maintain the condition of solution at 30°C and pH range of 10 to 13.
4. Filter the solution and centrifuge the solution at 10000 rpm for 5 minutes.
5. Filter the solution to get the supernatant liquid.
6. Place the supernatant liquid in a beaker and stir the solution.

Protein Precipitation

1. Add an ammonium sulfate solution into the solution and centrifuge the solution at 10000 rpm for 5 minutes.
2. Filter the solution to get supernatant liquid and solid particles.
3. Repeat step 1 and 2.

Protein Purification

1. Pour the deionized water into the solid particles and stir the solution
2. Centrifuge the solution at 10000 rpm for 5 minutes and filter the solution to get supernatant liquid and solid particles.
3. Use sodium hydroxide solution to dissolve the solid particles.
4. Centrifuge again the solution at 10000 rpm at 5 minutes. Collect the liquid and discard the solids.
5. Repeat steps 1 to 4 for three times.

3.3.2 Research Methodology of Anti Aging Cream Formulation A2 and A3

Solution A

1. 3.0 g of glycerin is weighted and put in the 250ml beaker. The glycerin is then put in the 70°C water bath. Stir the solution for 2 minutes.
2. After 2 minutes, 3.0g of cetostearyl alcohol is pour into the glycerin solution. The mixture is stirred for 5 minutes until all the solid particles dissolve.
3. Isopropyl palmitate and sunflower seed oil are then put into the solution. Stir the solution for a minute until all the mixture mix well.

Solution B

4. Lecithin is dissolve in the warm distilled water.

The mixture

5. Then the solution B is pour into the solution A.
6. Solution is stirred for 2 minute. Then, put UV protection agent, preservative and penetration enhancer into the solution.
7. The mixture solution is then transferred to the magnetic stirrer hotplate to continuously stirred and cool it down until the room temperature.
8. After the solution reached the room temperature, the API and perfume are put into the solution. Continuously stirred the solution for 3 minutes.
9. The solution is then stirred with the homogenizer for 5 minutes with 14500 rpm.

3.3.3 Research Methodology of Anti-Aging Cream Formulation A4, A5, F1 & F2.

Solution A

1. 12.5 g of glycerin is weighted and put in the 250ml beaker. The glycerin is then put in the 70°C water bath. Stir the solution for 2 minutes.
2. After 2 minutes, 12.5g of cetostearyl alcohol is pour into the glycerin solution. The mixture is stirred for 5 minutes until all the solid particles dissolve.
3. The palm oil is then put into the solution. Stir the solution for 2 minutes until all the mixture mix well.

Solution B

4. The citric acid is dissolve in the distilled water.

The mixture

5. Then the solution is pour into the solution A.
6. Triton is weighted and heats the solution for 1 minute, pour triton solution into the mixture of solution A and B. Then, put UV protection agent and penetration enhancer into the solution.
7. The mixture solution is then transferred to the magnetic stirrer hotplate to continuously stirred and cool it down until the room temperature.
8. After the solution reached the room temperature, the API is put into the solution. Continuously stirred the solution for 3 minutes.
9. The solution is then stirred with the homogenizer for 5 minutes with 14500 rpm.

3.4 Characterization of Anti Aging Cream

3.4.1 Color

The cream samples are placed at the room temperature for 28 days. After 28 days, it will be observed either the color is changing or the same as the beginning.

3.4.2 Phase Separation

All samples are observed of its stability. It has been left at room temperature for 28 days at room temperature. After 28 days, the creams are observed if there are phase separation occurred.

3.4.3 Centrifuge Test

The centrifuge test is done by using micro centrifuge. The micro centrifuge is adjusted to several rpm for five minutes. Appearance of the anti aging cream once it is centrifuged is observed. Volume of oil separated is recorded and its percentage is calculated to identify the most stable cream base.

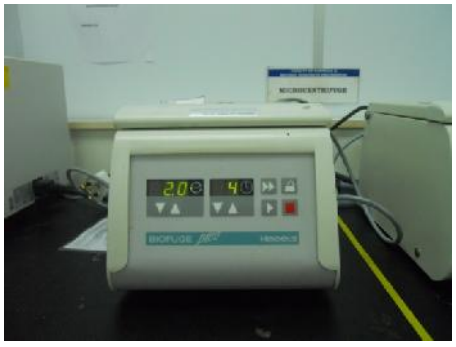


Figure 3.1 Micro Centrifuge

3.4.4 pH Test

The pH of the anti aging cream is analyzed using pH meter. The pH value for each cream formulated is recorded.

Figure 3.2 pH meter

3.4.5 Particle size test

Laser Particle Size Analyzer (BT-9300H) is used to analyze the particle size test for the cream produced. Figure 3.1 and 3.2 shows the particle size analyzer with circulating and dispersing system respectively. Both of these two equipments used in order to identify the particle size of formulated creams.

Figure 3.3 Particle size analyzer

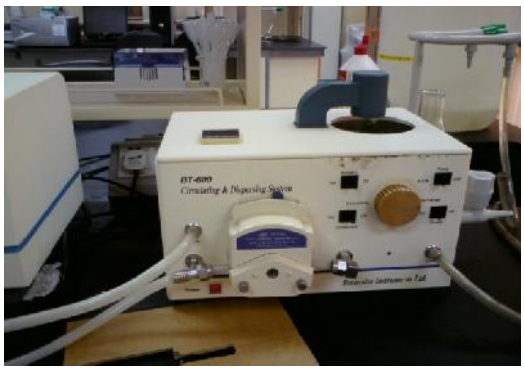


Figure 3.4 circulating and dispersing system

3.4.6 Rheometer

The other characteristics of anti aging creams are identified using rheometer. Rheometer as shown in Figure 3.3 is used in this research.

Figure 3.5 Rheometer

3.4.7 Toxicity test

The toxicity test is handled by applying the cream on the rat skin surfaces. After 28 days, the appearances on the rat skin are observed.

CHAPTER 4

RESULTS & DISCUSSION

4.1 Introduction

In this chapter, result from the research is discussed. It will comprise the characterization of anti aging cream in term of color, phase separation, centrifuge test, pH test, particle size test, rheology test and toxicity test.

4.2 The Anti Aging Cream

The preparation of anti aging cream is by using several chemicals which having varies properties. It can be a surfactant, emulsion, stabilizer and preservative. The production of anti aging cream is run in the 70°C to provide an ambient temperature for base cream. Water bath is used to give an evenly heat distribution around the beaker while the experiment in progress.

Base cream is cooled first before mix it with active ingredient because to prevent the keratin from denatured and lose its properties. Homogenizer is used as a final step in the experiment is to homogenize the cream.

From the observation, it can be seen that the viscosity of formulation A2 and A3 is less than formulation of A2 and A3. The differences in term of the viscosity are depending on the cream composition. As shown in Table 3.1, the distilled water added to formulation

of A2 and A3 is more than formulation A4 and A5. However, the viscosity differences are less if compared the composition of distilled water used.

Each chemical used in this experiment is having its own properties. Some of these chemical have multiple function. So, it will affect the formulation even there are little differences of composition. The details and function of cetostearyl alcohol, glycerin, isopropyl palmitate and distilled water in this research are stated as below:

4.2.1 Cetostearyl Alcohol

Cetostearyl alcohol is the mixture of cetyl and stearyl alcohol. Cetyl alcohol alone could provide emulsifier and thickening agent in cream. However, stearyl alcohol may be providing the lubricant effect. Since the cetostearyl alcohol is the combination of these two chemicals, so it has all these characteristics.

4.2.2 Glycerin

The main role of glycerin in the cream formulation is as emollient and humectants. Emollient can be describing as a substance that having the ability as softening and relaxing agent.

4.2.3 Isopropyl Palmitate

Isopropyl palmitate acts as emollient and thickening agent in most cosmetics. It is an ester of palmitic acid and isopropyl alcohol with the isomers. Isopropyl pamitate has the ability to enhance the silkiness in skin.

4.2.4 Distilled Water

Distilled water plays as a vital part in the anti aging cream formulation. It provides moisturizing properties and work as diluents in cream. The existence of distilled water in

the formulation does not affect the activities of keratin as active ingredients because it is known as inert carrier.

4.3 Color

Creams are placed at room temperature. After 28 days, all creams are observed. Initial colors of all creams are white and by 28 days, there are no changes in cream colors. It can be seen in Figure 4.1.

Figure 4.1 The color remain white after 28 days

4.4 Phase separation

In term of phase separation, an anti cream is observed as the cream is produced after a month. As the observation is done, the result shows that all cream has no phase separation. It shows that creams at its stable condition. In Figure 4.2, it shows that there is no phase separation in cream while in Figure 4.3, the phase separation is occurring because of an unstable mixture.

Figure 4.2 The phase separation does not occur

Figure 4.3 Phase separation

4.5 Centrifuge Test

From the experiment, the result of the centrifuge test is recorded. The result is recorded in Table 4.1

Table 4.1 The result of micro centrifuge test

RPM / Cream	2000	6000	8000	10000	12000
Formulation A2	No change	No change	No change	0.1ml oil separation	0.2ml oil separation
Formulation A3	No change	No change	No change	0.05ml oil separation	0.1ml oil separation
Formulation A4	No change	No change	No change	No change	0.05ml oil separation
Formulation A5	No change	No change	No change	No change	No change

Percentage of oil separation:

At 10000 rpm

Formulation A2:

$$Percentage\ of\ oil\ separation = \frac{1.5ml - (1.5 - 0.1)}{1.5} \times 100\%$$

$$Percentage\ of\ oil\ separation = 6.67\%$$

Formulation A3:

$$Percentage\ of\ oil\ separation = \frac{1.5ml - (1.5 - 0.05)}{1.5} \times 100\%$$

$$Percentage\ of\ oil\ separation = 3.33\%$$

At 12000 rpm

Formulation A2:

$$Percentage\ of\ oil\ separation = \frac{1.5ml - (1.5 - 0.2)}{1.5} \times 100\%$$

$$Percentage\ of\ oil\ separation = 13.33\%$$

Formulation A3:

$$Percentage\ of\ oil\ separation = \frac{1.5ml - (1.5 - 0.1)}{1.5} \times 100\%$$

$$Percentage\ of\ oil\ separation = 6.67\%$$

Formulation A4:

$$Percentage\ of\ oil\ separation = \frac{1.5ml - (1.5 - 0.05)}{1.5} \times 100\%$$

$$Percentage\ of\ oil\ separation = 3.33\%$$

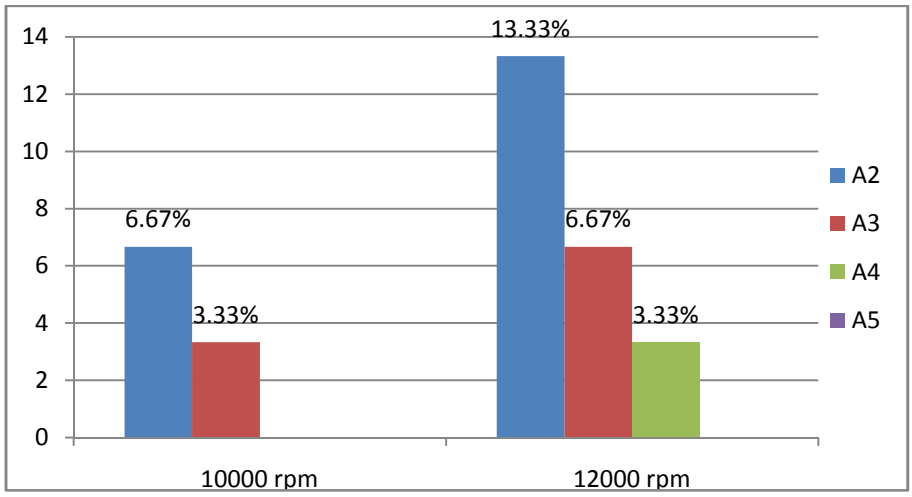


Figure 4.4 Percentage of oil separation in each anti aging cream

From the result shows in Table 4.1, it shows that Formulation A5 is the most stable formulation because there is no creaming phenomenon happen at 12000 rpm. Creaming phenomenon is the condition of anti aging cream to disperse and separate the oil to the upper layer of creams.

4.6 pH Test of Anti Aging Cream

The pH test result of anti aging cream is done to know the chemical characteristics of the anti aging cream either it is acidic, neutral or alkaline. All the reading recorded is stated in Table 4.2.

Table 4.2 The pH values of each formulation

Formulation	A2	A3	A4	A5
pH Value	6.62	6.79	7.58	7.74

From the results, it shows the pH value for formulation A2 and A3 is in the acidic range while the formulation A4 and A5 in the neutral range. The formulation of A2 and A3

having pH which are about the human skin pH. The pH of human skins is in the range of 4.5 and 7 acidic to kill bacteria and germ. If the alkaline cream is used, the bacterial is easier to attack the skin and make skin unhealthy.

4.6 Rheology Test

Rheology test is observed by using Rheometer. From the result, it shows that the creams are stable. The following result is getting from the formulation F2.

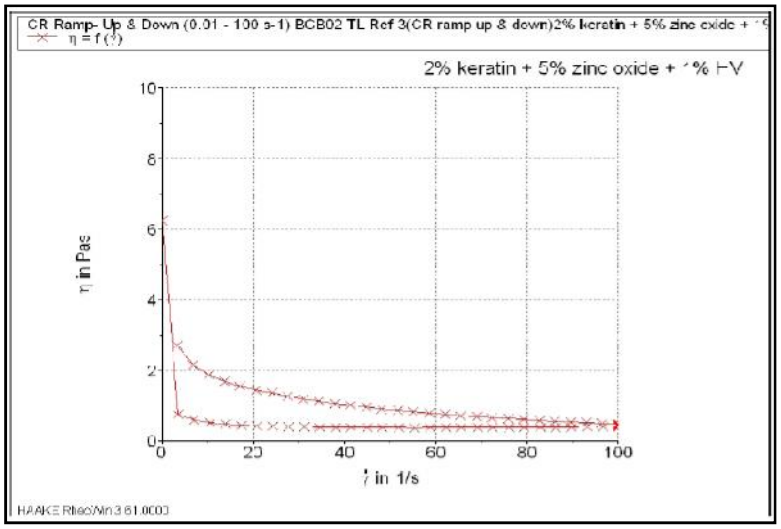


Figure 4.5 CR ramp up & down

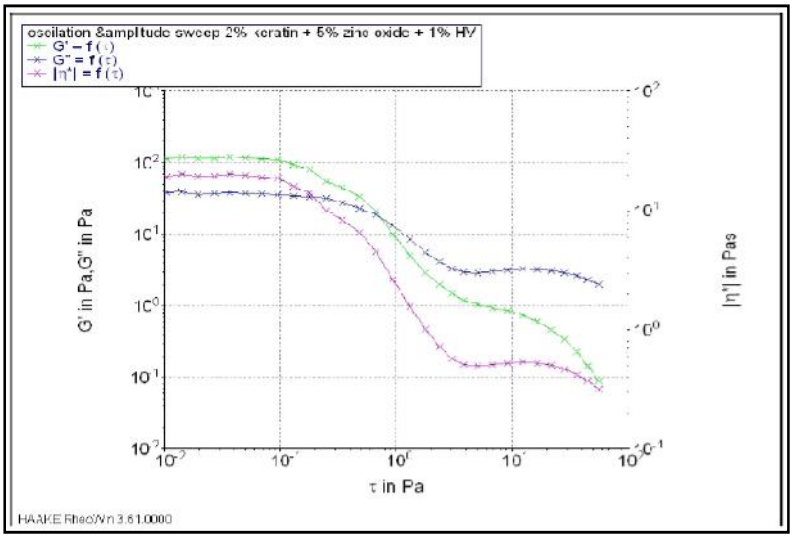


Figure 4.6 Amplitude sweep

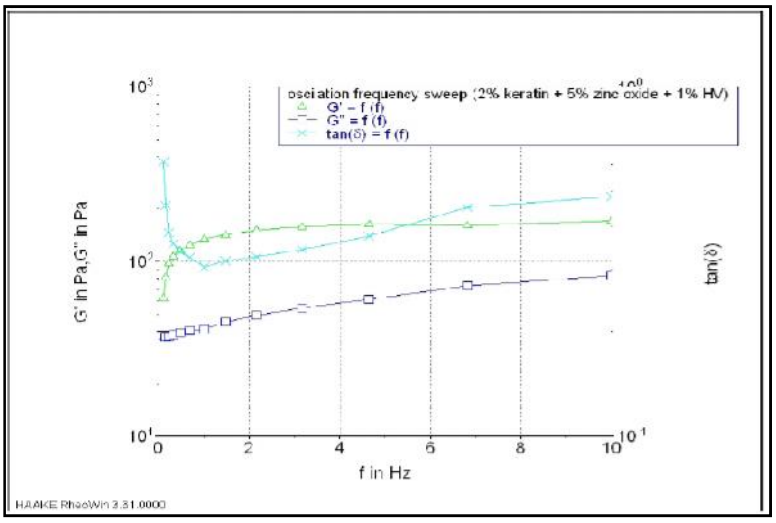


Figure 4.7 Frequency sweep

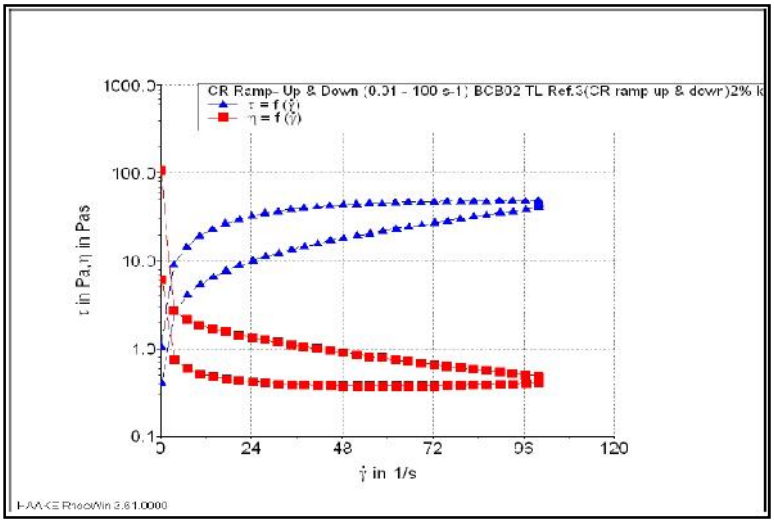


Figure 4.8 Thixotropy, yield stress and pseudo plastic behavior

The amplitude sweep shows the structures of the anti aging cream is changing if strain is applied on it. The linear graph shows the structure is maintain, if the graft shows decreases as shown in Figure 4.6, the structure of the cream is started to change. The change is due to the larger stress and these phenomenons give result to the breakdown of the anti aging cream structures.

The nature of material is identified by using frequency sweep. It is about the particles interaction and colloidal forces effects. Result shows in Figure 4.7, it shows G' values are greater than G". So, the structures of the anti aging cream at low strains are more solid like.

Based on the result shows in Figure 4.8, the sample is the time dependant because the sample is returned to the initial value. Yield stress is the critical stress point for fluids to move. In this research the flow is decreases as it is produced a thixotropic loop. "Thixotropic is the type of desired flow behavior in cosmetics and pharmaceutical products (Peter Herh et al.,1998)". The overall result of the rheology test is stated at Appendix B.

4.5 Particle Size Test

The result from particle size test show as in Figure 4.9, 4.10 and 4.11. The result of this testing is further analyzed.

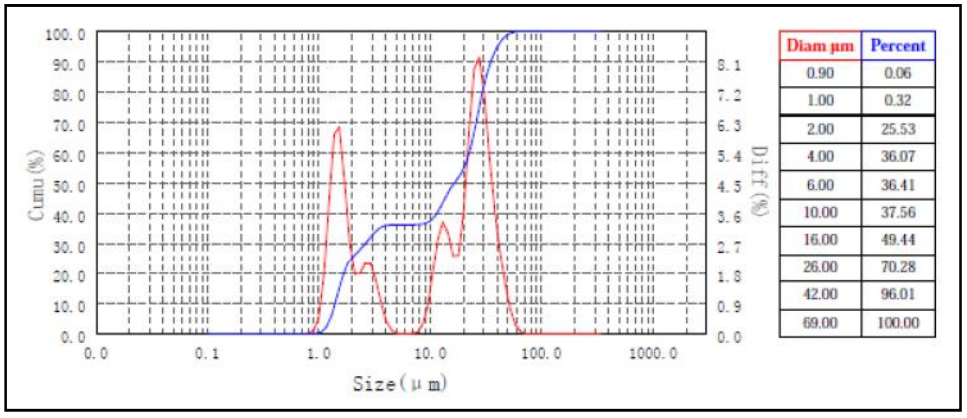
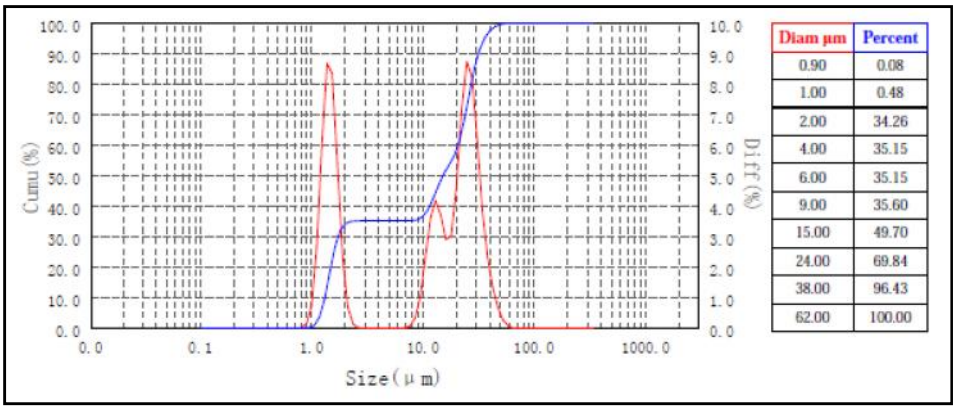
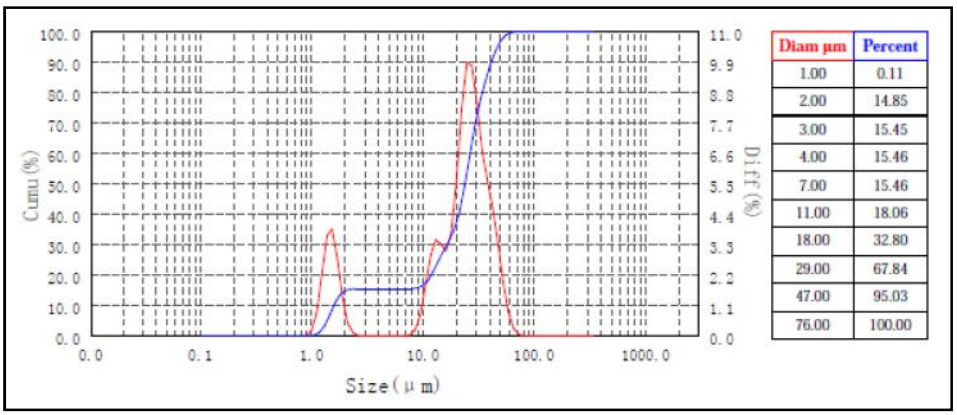


Figure 4.9 Particle size analysis for Formulation B1



Diam μm	Percent
0.90	0.08
1.00	0.48
2.00	34.26
4.00	35.15
6.00	35.15
9.00	35.60
15.00	49.70
24.00	69.84
38.00	96.43
62.00	100.00

Figure 4.10 Particle size analysis for Formulation B2



Diam μm	Percent
1.00	0.11
2.00	14.85
3.00	15.45
4.00	15.46
7.00	15.46
11.00	18.06
18.00	32.80
29.00	67.84
47.00	95.03
76.00	100.00

Figure 4.11 Particle size analysis for Formulation B3

The calculation:

From Figure 4.9 (Formulation B1),

$$Span = \frac{D_{v0.9} - D_{v0.1}}{D_{v0.5}}$$

Interpolation methods is used to get the values of $D_{v0.9}$, $D_{v0.1}$ and $D_{v0.5,}$

$D_{v0.9}$:

$$D_{v0.9} = \left(\frac{(90 - 70.28)}{(96.01 - 70.28)} \times (42 - 26)\right) + 26$$

$$D_{v0.5} = 38.26\ \mu m$$

$D_{v0.1}$:

$$D_{v0.1} = \left(\frac{(10 - 0.32)}{(25.53 - 0.32)} \times (2 - 1)\right) + 1$$

$$D_{v0.1} = 1.03\ \mu m$$

$D_{v0.5}$:

$$D_{v0.5} = \left(\frac{(50 - 49.44)}{(70.28 - 49.44)} \times (26 - 16)\right) + 16$$

$$D_{v0.5} = 16.26\ \mu m$$

The span value:

$$Span = \frac{38.26 - 1.03}{16.26}$$

$$Span = 2.29$$

From Figure 4.10 (Formulation B2),

$D_{v0.9}$:

$$D_{v0.9} = \left(\frac{(90 - 69.84)}{(96.43 - 69.84)} \times (38 - 24)\right) + 24$$

$$D_{v0.5} = 34.61 \mu m$$

$D_{v0.1}$:

$$D_{v0.1} = \left(\frac{(10 - 0.48)}{(34.26 - 0.48)} \times (2 - 1)\right) + 1$$

$$D_{v0.1} = 1.28\ \mu m$$

$D_{v0.5}$:

$$D_{v0.5} = \left(\frac{(50 - 49.70)}{(69.84 - 49.70)} \times (24 - 15)\right) + 15$$

$$D_{v0.5} = 15.13\ \mu m$$

The span value:

$$Span = \frac{34.61 - 1.28}{15.13}$$

$$Span = 2.20$$

From Figure 4.11 (Formulation B3),

$D_{v0.9}$:

$$D_{v0.9} = \left(\frac{(90 - 67.84)}{(95.03 - 67.84)} \times (47 - 29)\right) + 29$$

$$D_{v0.5} = 43.67 \mu m$$

$D_{v0.1}$:

$$D_{v0.1} = \left(\frac{(10 - 0.11)}{(14.85 - 0.11)} \times (2 - 1)\right) + 1$$

$$D_{v0.1} = 1.67\ \mu m$$

$D_{v0.5}$:

$$D_{v0.5} = \left(\frac{(50 - 32.80)}{(67.84 - 32.80)} \times (29 - 18)\right) + 18$$

$$D_{v0.5} = 23.40\ \mu m$$

The span value:

$$Span = \frac{43.67 - 1.67}{23.40}$$

$$Span = 1.79$$

From the result calculated, it shows the relative of particles size in this formulation are B3 < B2 < B1. However, the differences of SPAN values among these three formulations are very little. The overall result of particle size test is stated as Appendix C.

Table 4.3 Summary of the SPAN values from the calculation

Formulation	B1	B2	B3
Span value	2.29	2.20	1.79

4.7 Toxicity Test

Toxicity test is a test conducted by applied the cream on the rat skin. After 28 days, it observed that no rashes appear on the rat skin.

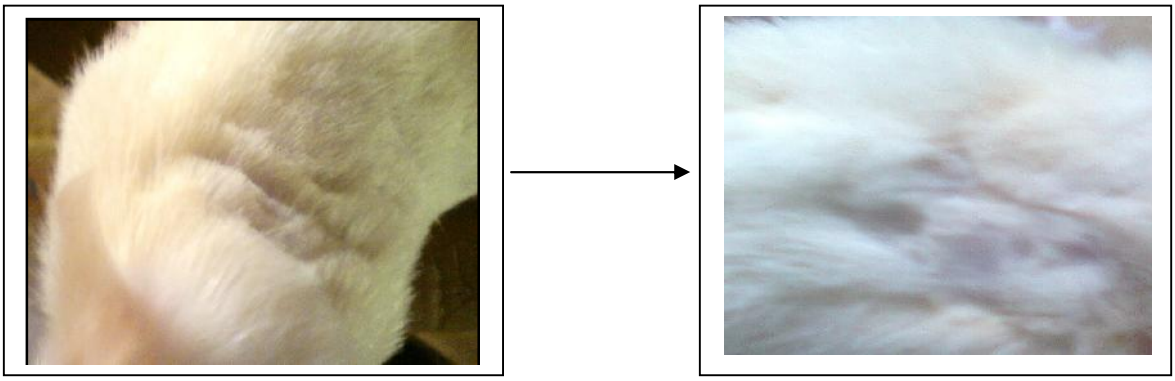


Figure 4.12 The rat skin before applying the cream

Figure 4.13 The rat skin after applying the cream

CHAPTER 5

CONCLUSION & RECOMMENDATION

5.1 Conclusion

Formulation of anti aging cream from chicken feather in this research is divided by two types of formulation. The differences among these two formulations are the base cream. However, the physical properties of the cream are slightly the same and all cream in stable condition. The same purified keratin protein is used in the production of anti aging cream to analyses the activity of keratin in skin. The usage of keratin in an anti aging cream give the skin firmness improves, stimulate the production of the new skin cells. The additional properties in the keratin protein makes the keratin is more applicable to use because it has the anti-inflammatory and antioxidant properties. So, the usage of keratin protein from chicken feather in the anti aging cream is the valuable invention for a healthier skin and life.

5.2 Recommendation

In the long run, more formulation should be done to get the most suitable base cream. The testing process also must be widening. It can be in term of dermatology test, in-vitro and anti-microbial test. These testing can make the cream invented to be more applicable in the world wide. The keratin protein used in the cream production must be the same composition of amino acid in it to make sure there are no differences in the analyzed result.

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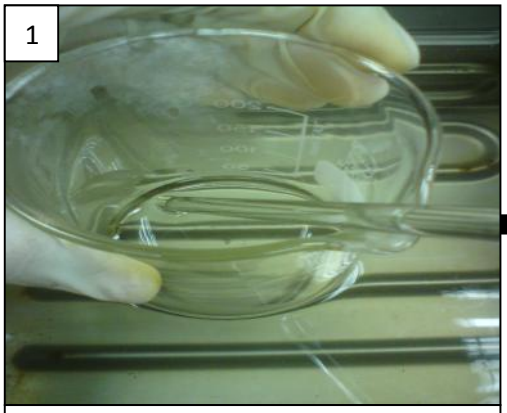
APPENDIX A

The Production of Anti Aging Cream from Chicken Feather

Methods with Pictures

THE PROCESS FLOW: PRODUCTION OF ANTI AGING CREAM

1

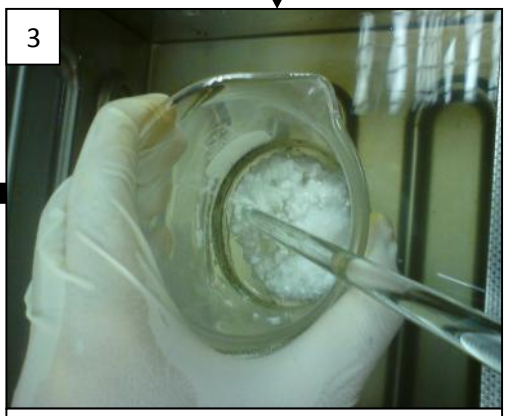


Glycerin in 70°C water bath.

2

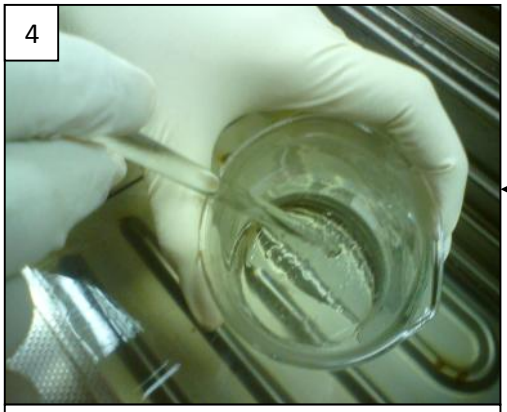
Cetostearyl alcohol is pour into the glycerin solution.

3



Stir the solution until all solid particles dissolve.

4

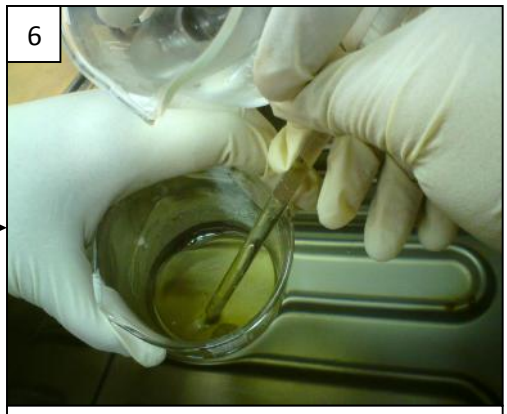


Clear solution of glycerin and cetostearyl alcohol.

5

Prepare the palm oil solution.

6



Mix the solution with palm oil.

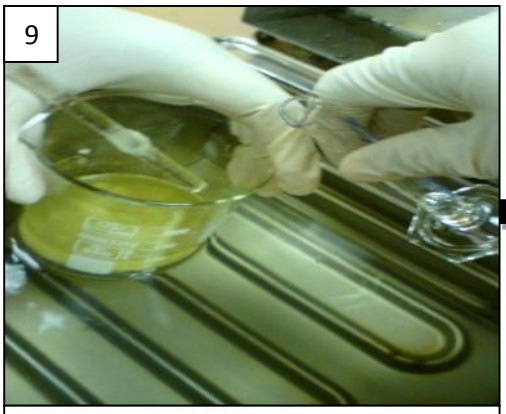
7

Mixture of water base and oil base solution

8

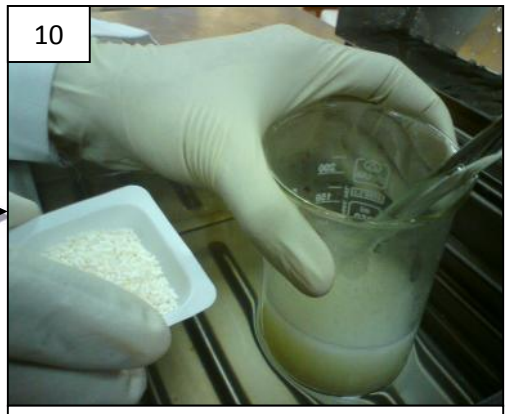
The water and oil base solution after stirred for several minutes.

9



Surfactant is added to mix water and oil base solution.

10

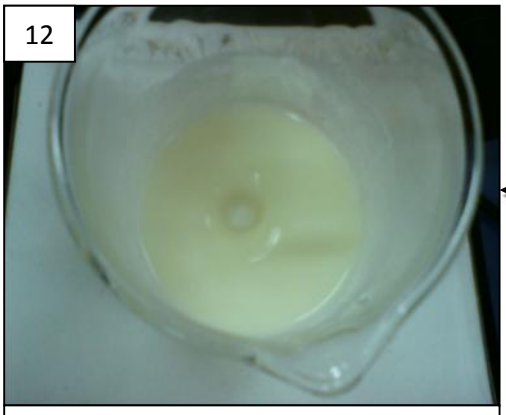


Add UV protection agent and penetration enhancer.

11

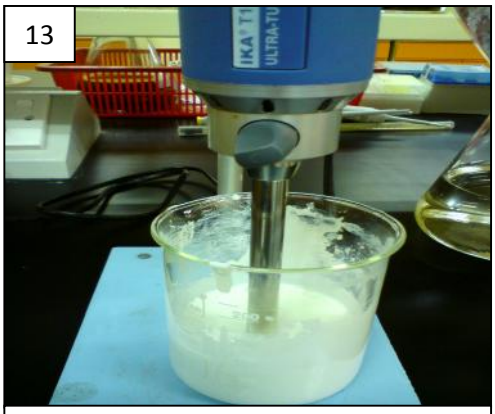
Solution is placed on the hot plate stirrer.

12



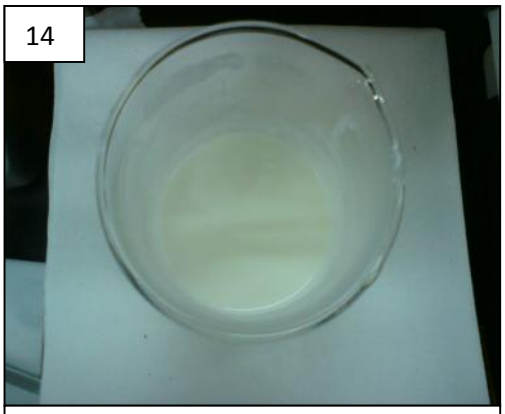
Add active ingredients and perfume in the solution.

13



Mix well the solution using Homogenizer.

14



The anti aging cream is prepared.

APPENDIX B

Result of Rheology Test

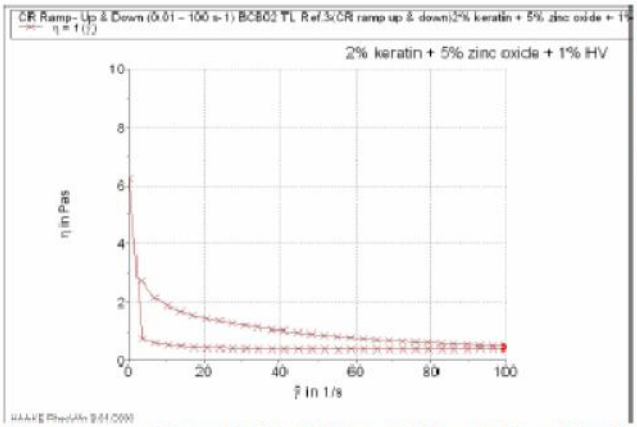
Anti Aging Cream Formulation

CR Ramp Up & Down

HAAKE RheoWin 3.61.0000 Page 1

Company	UIAM Kuantan	**Measure device**	MARS II		
Operator	Kulliyyah of Pharmacy	**Temperature device**	UTC <---> MARS II		
Date/Time	24.05.2011 / 15:23:54 PM	**Sensor**	PP35 Ti	**Gap**	0.999 mm
Substance	anti aging cream	**A-factor**	118800.000 Pa/Nm		
Sample no	3	**M-factor**	17.509 (1/s)/(rad/s)		
Description	2% keratin + 5% zinc oxide + 1% HV				

Comment



Element definition / Notes

ID 3: 25.00 °C, t 30.00 s, CR, 0.000 1/s,

ID 4: Reset total time

ID 11: CR lin, 0.01000 1/s - 100.0 1/s, t 120.00 s, #30, T 25.00 °C

ID 13: CR 100.0 1/s, t 30.00 s, #5, T prev °C

ID 14: CR lin, 100.0 1/s - 0.01000 1/s, t 120.00 s, #30, T prev °C

Filename: C:\Program Files\RheoWin3\Data\anis\CR Ramp-Up & Down (0.01 - 100 s-1) BCB02 TL Ref.3 (CR ramp up & down)2% keratin + 5% zinco

Job: C:\Program Files\RheoWin3\Jobs\anis\CR Ramp - Up & Down curve.rwj

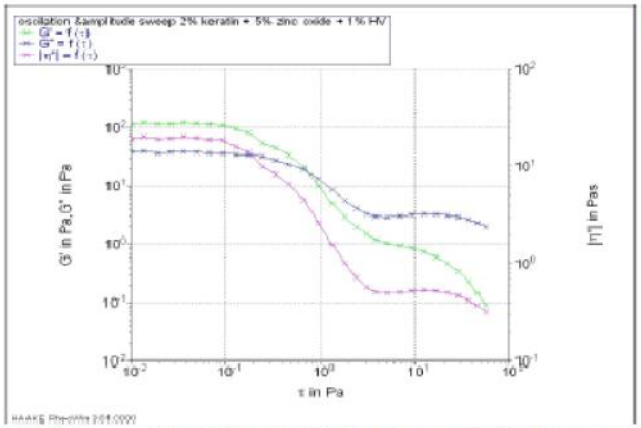
	t in s	η in Pas	τ in Pa	T in °C	γ̇ in 1/s	
1-2	67.77	2.727	9.185	24.98	3.368	
1-3	71.90	2.138	14.57	25.02	6.817	
1-4	76.04	1.870	19.20	25.06	10.27	
1-5	80.18	1.692	23.21	25.00	13.72	
1-6	84.32	1.560	26.78	24.99	17.17	
1-7	88.46	1.447	29.85	25.03	20.62	
1-8	92.59	1.357	32.65	24.96	24.07	
1-9	96.73	1.271	34.97	24.97	27.52	
1-10	100.9	1.194	37.00	24.98	30.97	
1-11	105.0	1.127	38.79	25.00	34.43	
1-12	109.1	1.063	40.25	25.00	37.87	
1-13	113.3	1.008	41.64	25.00	41.33	
1-14	117.4	0.956	42.78	24.94	44.78	
1-15	121.6	0.907	43.73	24.99	48.23	
1-16	125.7	0.862	44.56	25.02	51.68	
1-17	129.8	0.822	45.34	24.98	55.13	
1-18	134.0	0.783	45.88	25.02	58.58	
1-19	138.1	0.748	46.38	25.04	62.04	
1-20	142.2	0.716	46.91	25.00	65.48	
1-21	146.4	0.686	47.28	24.97	68.93	
1-22	150.5	0.656	47.50	25.04	72.39	
1-23	154.7	0.630	47.78	25.03	75.83	
1-24	158.8	0.605	47.96	24.98	79.28	

Oscillation Amplitude Sweep

HAAKE RheoWin 3.61.0000 Page 1

Company	UIAM Kuantan	Measure device	MARS II		
Operator	Kulliyyah of Pharmacy	Temperature device	UTC <---> MARS II		
Date/Time	24.05.2011 / 16:00:52 PM	Sensor	PP35 Ti	Gap	1.000 mm
Substance	anti aging	A-factor	118800.000 Pa/Nm		
Sample no	3	M-factor	17.506 (1/s)/(rad/s)		
Description	2% keratin + 5% zinc oxide + 1% HV				

Comment



Element definition / Notes

ID 3: 25.00 °C, t 30.00 s, CS, 0.000 Pa,

ID 4: Reset total time

ID 5: CS log, 0.01000 Pa - 100.0 Pa, f 1.000 Hz, #30, T prev °C

Filename: C:\Program Files\RheoWin3\Data\anis\oscillation &amplitude sweep 2% keratin + 5% zinc oxide + 1% HV.rwd

Job: C:\Program Files\RheoWin3\Jobs\anis\Oscillation Amplitude Sweep.rwj

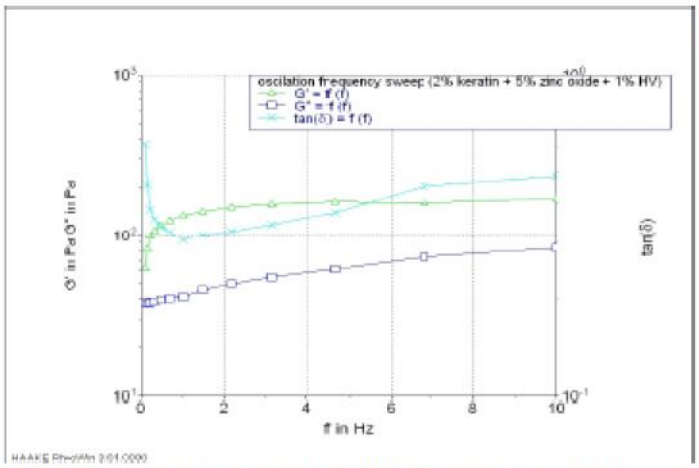
	t in s	t_seg in s	τ in Pa	T in °C		
1-1	3.078	1.468	0.01024	24.89		
1-2	8.578	6.968	0.01405	24.99		
1-3	14.28	12.67	0.01933	25.02		
1-4	20.13	18.52	0.02655	25.00		
1-5	25.78	24.15	0.03645	24.97		
1-6	31.47	29.86	0.05010	25.04		
1-7	37.21	35.60	0.06890	24.98		
1-8	43.06	41.45	0.09468	24.99		
1-9	49.30	47.69	0.131	25.02		
1-10	55.07	53.46	0.180	25.00		
1-11	60.73	59.12	0.250	24.97		
1-12	66.97	65.36	0.346	25.01		
1-13	72.66	71.05	0.481	25.01		
1-14	78.37	76.76	0.673	25.00		
1-15	84.20	82.59	0.945	24.99		
1-16	89.87	88.26	1.322	24.97		
1-17	96.19	94.58	1.814	24.99		
1-18	102.4	100.8	2.384	25.06		
1-19	108.1	106.5	3.029	25.00		
1-20	113.8	112.2	3.858	25.02		
1-21	119.5	117.9	5.068	24.96		
1-22	125.3	123.7	6.842	25.00		
1-23	131.1	129.5	9.310	24.95		

Oscillation frequency sweep

HAAKE RheoWin 3.61.0000 Page 1

Company	UIAM Kuantan	**Measure device**	MARS II		
Operator	Kulliyyah of Pharmacy	**Temperature device**	UTC <---> MARS II		
Date/Time	24.05.2011 / 16:15:04 PM	**Sensor**	PP35 Ti	**Gap**	1.000 mm
Substance	anti aging	**A-factor**	118800.000 Pa/Nm		
Sample no	3	**M-factor**	17.507 (1/s)/(rad/s)		
Description	2% keratn + 5% zinc oxide + 1% HV				

Comment



Element: definition / Notes

ID 0: 25.00 °C, ⊥ 1.00 °C, t 30.00 s, CS, 0.000 Pa,

ID 9: Reset total time

ID 2: CS log, 0.1000 Hz - 10.00 Hz, 0.05000 Pa, #6, T 25.00 °C

Filename: C:\Program Files\RheoWin3\Data\anis\oscillation frequency sweep (2% keratin + 5% zinc oxide + 1% HV).rwd

Job: C:\Program Files\RheoWin3\Jobs\anis\Oscillation Frequency Sweep.rwj

Evaluation

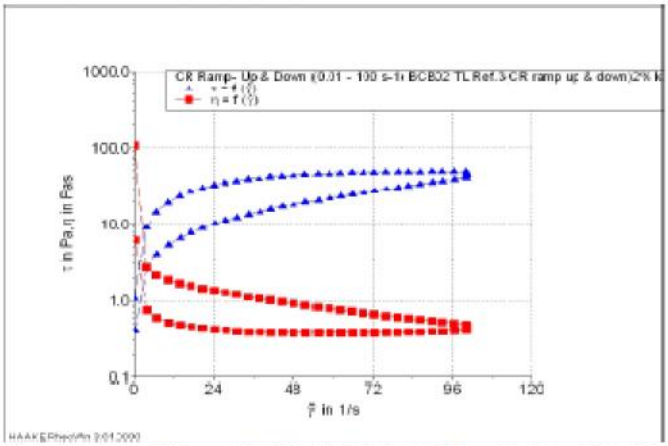
	G' in Pa	G" in Pa	f in Hz	|η*| in Pas	tan(δ)	
1-1	62.28	37.95	0.100	116.1	0.609	
1-2	81.29	37.22	0.147	98.95	0.458	
1-3	98.42	37.69	0.215	77.86	0.383	
1-4	107.6	38.37	0.316	57.48	0.357	
1-5	116.3	39.31	0.464	42.09	0.338	
1-6	124.7	40.46	0.681	30.63	0.324	
1-7	134.8	41.08	1.000	22.43	0.305	
1-8	142.4	45.19	1.468	16.20	0.317	
1-9	151.5	49.37	2.154	11.77	0.326	
1-10	158.6	54.23	3.162	8.438	0.342	
1-11	163.6	61.27	4.642	5.989	0.375	
1-12	160.4	72.60	6.813	4.114	0.453	
1-13	171.6	83.16	10.00	3.035	0.485	

Pseudo Plastics Behavior, Thixotropy and Yield Stress

HAAKE RheoWin 3.61.0000 Page 1

Company	UIAM Kuantan	**Measure device**	MARS II		
Operator	Kuliyyah of Pharmacy	**Temperature device**	UTC <---> MARS II		
Date/Time	24.05.2011 / 15:23:54 PM	**Sensor**	PP35 Ti	**Gap**	0.999 mm
Substance	anti aging cream	**A-factor**	118800.000 Pa/Nm		
Sample no	3	**M-factor**	17.509 (1/s)/(rad/s)		
Description	2% keratin + 5% zinc oxide + 1% HV				

Comment



Element definition / Notes

ID 3: 25.00 °C, t 30.00 s, CR, 0.000 1/s.
ID 4: Reset total time
ID 11: CR lin, 0.01000 1/s - 100.0 1/s, t 120.00 s, #30, T 25.00 °C
ID 13: CR 100.0 1/s, t 30.00 s, #5, T prev °C
ID 14: CR lin, 100.0 1/s - 0.01000 1/s, t 120.00 s, #30, T prev °C

Filename: C:\Program Files\RheoWin3\Data\anis\CR Ramp- Up & Dowr (0.01 - 100 s-1) BCB32 TL Ref.3 (CR ramp up & down) 2% keratin + 5% zinco
Job: C:\Program Files\RheoWin3\Jobs\anis\CR Ramp - Up & Dowr curve.rwj

	τ in Pa	η in Pas	γ̇ in 1/s	T in °C		
1-1	1.074	108.7	0.009876	24.99		
1-2	9.185	2.727	3.368	24.98		
1-3	14.57	2.130	6.017	25.02		
1-4	19.20	1.870	10.27	25.08		
1-5	23.21	1.692	13.72	25.00		
1-6	26.78	1.560	17.17	24.99		
1-7	29.85	1.447	20.62	25.03		
1-8	32.65	1.357	24.07	24.96		
1-9	34.97	1.271	27.52	24.97		
1-10	37.00	1.194	30.97	24.98		
1-11	38.79	1.127	34.43	25.00		
1-12	40.25	1.063	37.87	25.00		
1-13	41.64	1.008	41.33	25.00		
1-14	42.78	0.956	44.78	24.94		
1-15	43.73	0.907	48.20	24.99		
1-16	44.56	0.862	51.68	25.02		
1-17	45.34	0.822	55.13	24.98		
1-18	45.88	0.783	58.58	25.02		
1-19	46.38	0.748	62.04	25.04		
1-20	46.91	0.716	65.48	25.00		
1-21	47.28	0.686	68.93	24.97		
1-22	47.50	0.656	72.39	25.04		
1-23	47.78	0.630	75.83	25.03		

APPENDIX C

Result of Particle Size Analysis

Anti Aging Cream formulation

PARTICLE SIZE ANALYSIS BY BT-9300H

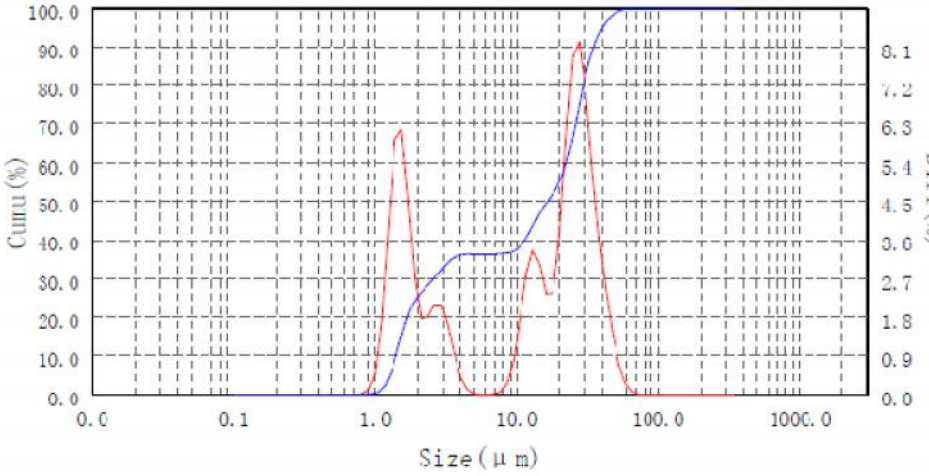
Sample:	1% Keratin + 1% Cremcphcre +	Sample Owner:	Anis
Medium:	Water	Measured By:	Anis
Operator:	Anis	Date:	2011-05-20
Remarks:			

Time: 15:17:26
Mode: 5.3-1

D(v,0.5): 10.42 um	D[4,3]: 10.97 um	D[3,2]: 4.05 um	Obscuration:30
SSA: 548.34 m^2/Kg	Particle RI: 1.449+0.010	Medium RI: 1.333	Span: 2.05

D03=1.19 um	D06=1.29 um	D10=1.39 um	D16=1.55 um	D25=1.95 um
D75=27.68 um	D84=31.46 um	D90=35.18 um	D97=43.88 um	D98=46.58 um

Diam μm	Diff%	Cumu%	Diam μm	Diff%	Cumu%	Diam μm	Diff%	Cumu%	Diam μm	Diff%	Cumu%
0.10-0.12	0.00	0.00	0.90-1.06	0.63	0.68	8.03-9.50	0.66	37.13	71.94-85.15	0.00	100.00
0.12-0.14	0.00	0.00	1.06-1.26	4.00	4.68	9.50-11.25	2.48	39.61	85.15-100.80	0.00	100.00
0.14-0.17	0.00	0.00	1.26-1.49	8.76	13.44	11.25-13.32	4.82	44.43	100.80-119.32	0.00	100.00
0.17 0.20	0.00	0.00	1.49 1.76	8.48	21.92	13.32 15.76	4.69	49.12	119.32 141.24	0.00	100.00
0.20 0.23	0.00	0.00	1.76 2.08	4.28	26.20	15.76 13.66	3.68	52.80	141.24 167.20	0.00	100.00
0.23-0.28	0.00	0.00	2.08-2.47	2.82	29.02	18.00-22.09	6.47	59.27	167.20-197.92	0.00	100.00
0.28-0.33	0.00	0.00	2.47-2.92	3.28	32.30	22.09-26.15	11.45	70.72	197.92-234.28	0.00	100.00
0.33-0.39	0.00	0.00	2.92-3.45	2.73	35.03	26.15-30.95	12.27	82.99	234.28-277.33	0.00	100.00
0.39-0.46	0.00	0.00	3.45-4.09	1.12	36.15	30.95-36.64	8.82	91.81	277.33-328.28	0.00	100.00
0.46-0.54	0.00	0.00	4.09-4.84	0.26	36.40	36.64-43.37	4.91	96.75	328.28-340.00	0.00	100.00
0.54-0.64	0.00	0.00	4.84-5.73	0.01	36.41	43.37-51.34	2.40	99.15	340.00--319.99	0.00	100.00
0.64-0.76	0.00	0.00	5.73-6.78	0.01	36.42	51.34-60.77	0.74	99.89			
0.76-0.90	0.05	0.05	6.78-8.03	0.05	36.47	60.77-71.94	0.11	100.00			



Diam μm	Percent
0.90	0.06
1.00	0.32
2.00	25.53
4.00	36.07
6.00	36.41
10.00	37.56
16.00	49.44
26.00	70.28
42.00	96.01
69.00	100.00

Company.Dandong Bettersize Instrument Ltd Tel.0086-415-6154440 Fax.0086-415-6170645
Address:No.9 Ganquan Road Jinquan Industrial Park.Dandong Border Economic Cooperation Zone,118300 Liaoning,China

PARTICLE SIZE ANALYSIS BY BT-9300H

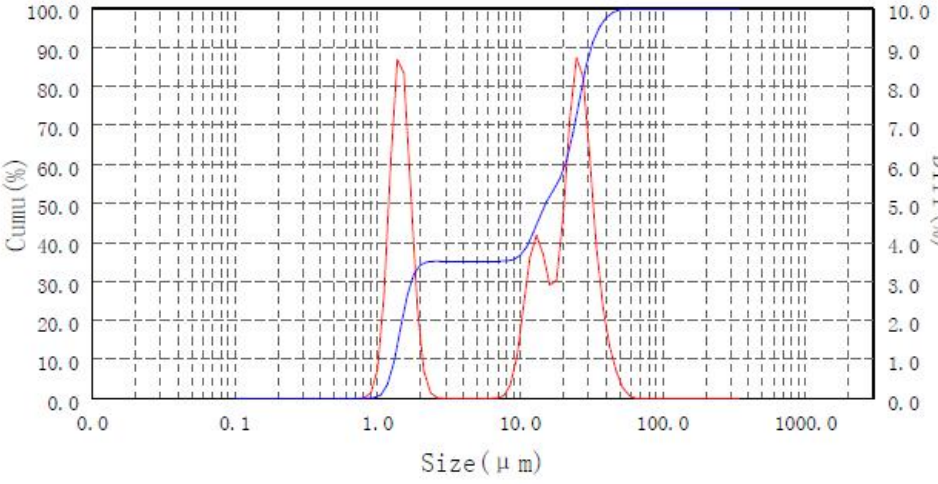
Sample:	1% Keratin + 1% Cremophore +	Sample Owner:	Anis
Medium:	Water	Measured By:	Anis
Operator:	Anis	Date:	2011-05-20
Remarks:			

Time: 15:25:29
Mode: 5.3-1

D(v,0.5): 15.13 um	D[4,3]: 15.59 um	D[3,2]: 3.57 um	Obscuration: 31
SSA: 620.73 m^2/Kg	Particle RI: 1.449+0.010	Medium RI: 1.333	Span: 2.00

D03= 1.14 um	D06= 1.22 um	D10= 1.31 um	D16= 1.41 um	D25= 1.58 um
D75= 25.57 um	D84= 28.69 um	D90= 31.68 um	D97= 39.08 um	D98= 41.46 um

Diam μm	Diff%	Cumu%	Diam μm	Diff%	Cumu%	Diam μm	Diff%	Cumu%	Diam μm	Diff%	Cumu%
0.10-0.12	0.00	0.00	0.90-1.06	0.97	1.04	8.03-9.50	0.86	36.09	71.94-85.15	0.00	100.00
0.12-0.14	0.00	0.00	1.06-1.26	6.15	7.19	9.50-11.25	3.23	39.32	85.15-100.80	0.00	100.00
0.14-0.17	0.00	0.00	1.26-1.49	12.78	19.97	11.25-13.32	6.10	45.42	100.80-119.32	0.00	100.00
0.17-0.20	0.00	0.00	1.49-1.76	10.87	30.84	13.32-15.76	5.78	51.20	119.32-141.24	0.00	100.00
0.20-0.23	0.00	0.00	1.76-2.08	3.73	34.57	15.76-18.66	4.64	55.84	141.24-167.20	0.00	100.00
0.23-0.28	0.00	0.00	2.08-2.47	0.56	35.13	18.66-22.09	8.07	63.91	167.20-197.92	0.00	100.00
0.28-0.33	0.00	0.00	2.47-2.92	0.03	35.16	22.09-26.15	12.97	76.88	197.92-234.28	0.00	100.00
0.33-0.39	0.00	0.00	2.92-3.45	0.00	35.16	26.15-30.95	11.86	88.74	234.28-277.33	0.00	100.00
0.39-0.46	0.00	0.00	3.45-4.09	0.01	35.15	30.95-36.64	6.88	95.62	277.33-328.28	0.00	100.00
0.46-0.54	0.00	0.00	4.09-4.84	0.00	35.15	36.64-43.37	2.97	98.59	328.28-340.00	0.00	100.00
0.54-0.64	0.00	0.00	4.84-5.73	0.01	35.16	43.37-51.34	1.14	99.73	340.00--319.99	0.00	100.00
0.64-0.76	0.00	0.00	5.73-6.78	0.00	35.16	51.34-60.77	0.27	100.00			
0.76-0.90	0.07	0.07	6.78-8.03	0.07	35.23	60.77-71.94	0.00	100.00			



Diam μm	Percent
0.90	0.08
1.00	0.48
2.00	34.26
4.00	35.15
6.00	35.15
9.00	35.60
15.00	49.70
24.00	69.84
38.00	96.43
62.00	100.00

Company:Dandong Bettersize Instrument Ltd Tel:0086-415-6184440 Fax:0086-415-6170645
Address:No.9 Ganquan Road Jinquan Industrial Park.Dandong Border Economic Cooperation Zone,118009 Liaoning,China

PARTICLE SIZE ANALYSIS BY BT-9300H

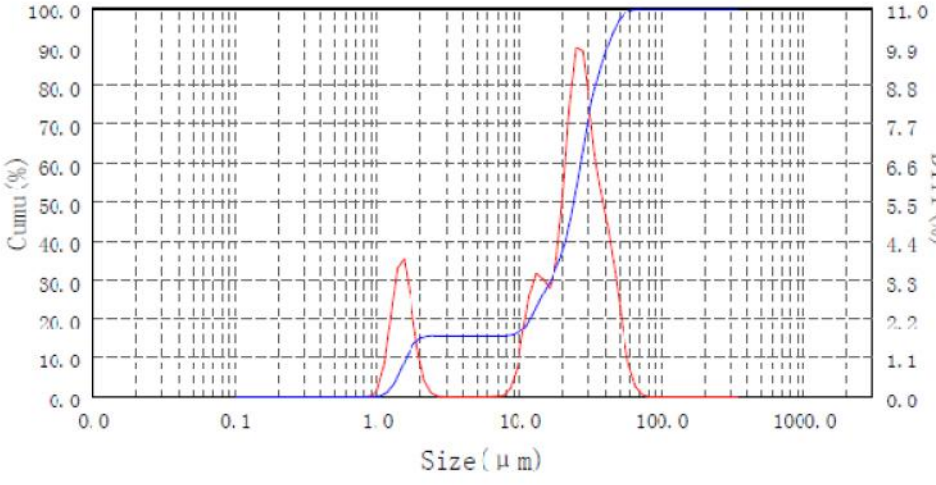
Sample:	1% Keratin + 1% Cremophore	Sample Owner:	Anis
Medium:	Water	Measured By:	Anis
Operator:	Anis	Date:	2011-08-20
Remarks:			

Time: 15:07:42
Mode: 5.3 1

D(v,0.5): 23.88 um	D[4,3]: 26.34 um	D[3,2]: 7.04 um	Obscuration: 43
SSA: 315.35 m^2/Kg	Particle RI: 1.449+0.0i0	Medium RI: 1.333	Span: 1.66

D03= 1.28 um	D06= 1.41 um	D10= 1.58 um	D16= 9.34 um	D25= 13.94 um
D75= 31.81 um	D84= 36.66 um	D90= 41.34 um	D97= 50.27 um	D98= 53.10 um

Diam μm	Diff%	Cumu%	Diam μm	Diff%	Cumu%	Diam μm	Diff%	Cumu%	Diam μm	Diff%	Cumu%
0.10-0.12	0.00	0.00	0.90-1.06	0.26	0.26	8.03-9.50	0.59	16.08	71.94-85.15	0.04	100.00
0.12-0.14	0.00	0.00	1.06-1.26	2.13	2.39	9.50-11.25	2.47	18.55	85.15-100.80	0.00	100.00
0.14-0.17	0.00	0.00	1.26-1.49	5.30	7.69	11.25-13.32	4.95	23.50	100.80-119.32	0.00	100.00
0.17-0.20	0.00	0.00	1.49-1.76	5.25	12.94	13.32-15.76	5.23	28.73	119.32-141.24	0.00	100.00
0.20-0.23	0.00	0.00	1.76-2.08	2.11	15.05	15.76-18.66	5.37	34.10	141.24-167.20	0.00	100.00
0.23-0.28	0.00	0.00	2.08-2.47	0.39	15.44	18.66-22.09	9.57	43.67	167.20-197.92	0.00	100.00
0.28-0.33	0.00	0.00	2.47-2.92	0.01	15.45	22.09-26.15	14.73	58.40	197.92-234.28	0.00	100.00
0.33-0.39	0.00	0.00	2.92-3.45	0.00	15.45	26.15-30.95	14.53	72.93	234.28-277.33	0.00	100.00
0.39 0.46	0.00	0.00	3.45 4.09	0.01	15.46	30.95 36.64	11.05	83.98	277.33 328.28	0.00	100.00
0.46-0.54	0.00	0.00	4.09-4.84	0.00	15.46	36.64-43.37	8.14	92.12	328.28-340.00	0.00	100.00
0.54-0.64	0.00	0.00	4.84-5.73	0.00	15.46	43.37-51.34	5.30	97.42	340.00--319.92	0.00	100.00
0.64-0.76	0.00	0.00	5.73-6.78	0.00	15.46	51.34-60.77	2.14	99.56			
0.76-0.90	0.00	0.00	6.78-8.03	0.03	15.49	60.77-71.94	0.40	99.96			



Diam μm	Percent
1.00	0.11
2.00	14.85
3.00	15.45
4.00	15.46
7.00	15.46
11.00	18.06
18.00	32.80
29.00	67.84
47.00	95.03
76.00	100.00

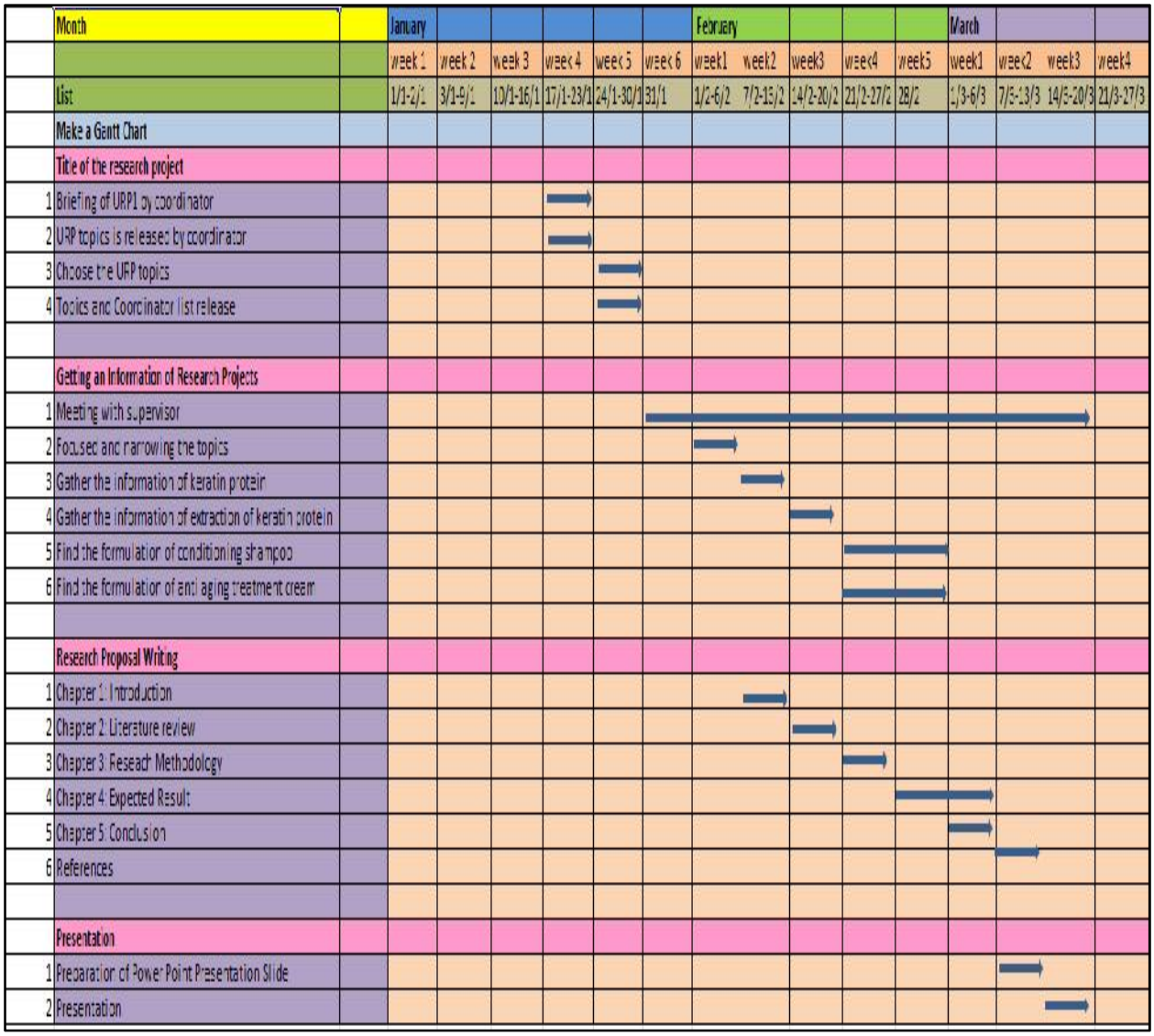
Company:Dandong Bettersize Instrument Ltd Tel:0086-415-6184440 Fax:0086-415-6170645
Address:No.9 Ganquan Road Jinquan Industrial Park.Dandong Border Economic Cooperation Zone,118009 Liaoning,China

APPENDIX D

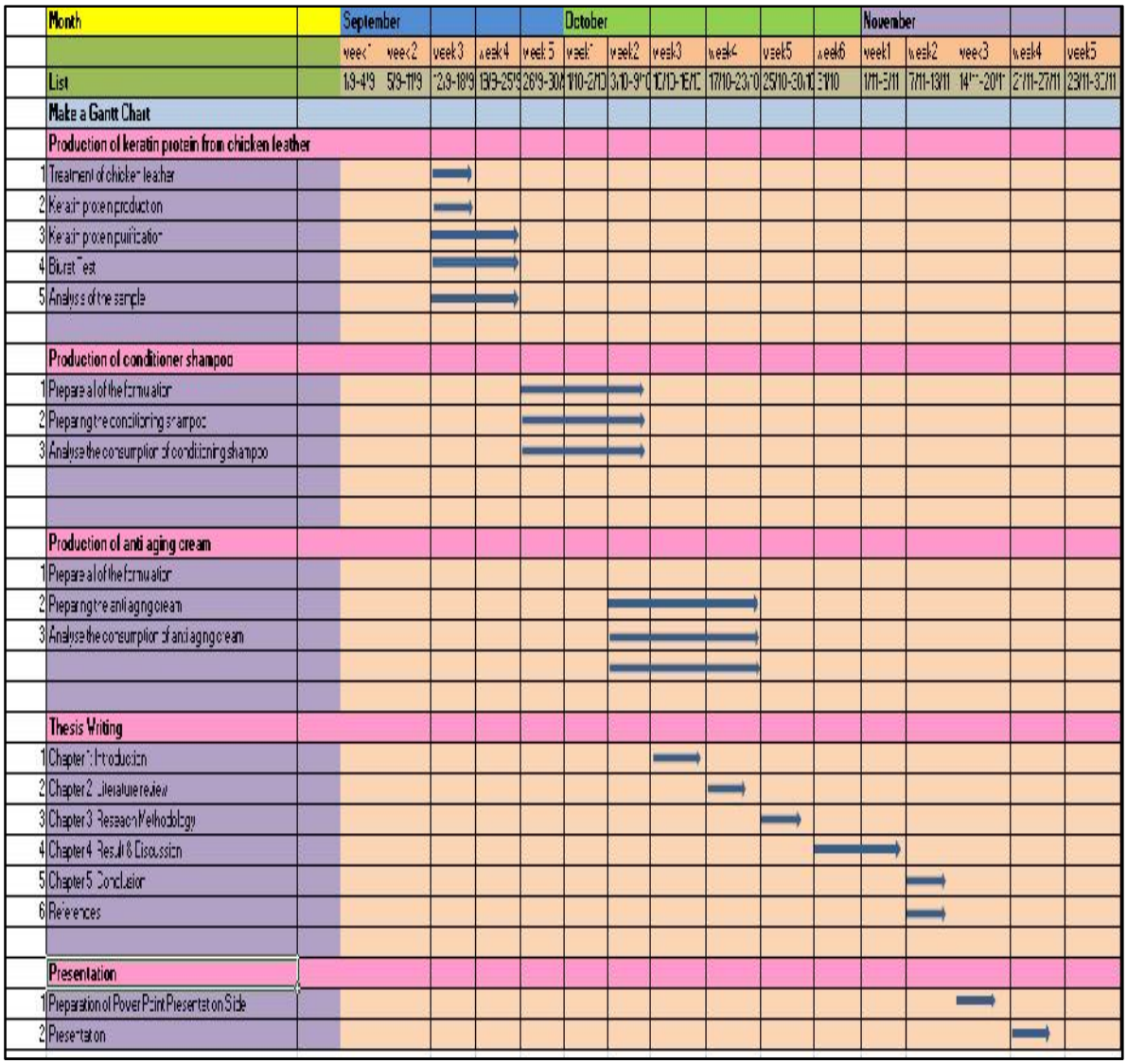
Gantt Chart

The Production of Anti Aging Cream from Chicken Feather

Semester 1


Month
January
February
March
week 1
week 2
week 3
week 4
week 5
week 6
week1
week2
week3
week4
week5
week1
week2
week3
week4
List
1/1-2/1
3/1-9/1
10/1-16/1
17/1-23/1
24/1-30/1
31/1
1/2-6/2
7/2-13/2
14/2-20/2
21/2-27/2
28/2
1/3-6/3
7/3-13/3
14/3-20/3
21/3-27/3
Make a Gantt Chart
Title of the research project
1 Briefing of URP1 by coordinator
2 URP topics is released by coordinator
3 Choose the URP topics
4 Topics and Coordinator list release
Getting an Information of Research Projects
1 Meeting with supervisor
2 Focused and narrowing the topics
3 Gather the information of keratin protein
4 Gather the information of extraction of keratin protein
5 Find the formulation of conditioning shampoo
6 Find the formulation of anti aging treatment cream
Research Proposal Writing
1 Chapter 1: Introduction
2 Chapter 2: Literature review
3 Chapter 3: Reseach Methodology
4 Chapter 4: Expected Result
5 Chapter 5: Conclusion
6 References
Presentation
1 Preparation of Power Point Presentation Slide
2 Presentation

Semester 2


Month
September
October
November
week1
week2
week3
week4
week5
week6
List
Make a Gantt Chart
Production of keratin protein from chicken leather
1 Treatment of chicken leather
2 Keratin protein production
3 Keratin protein purification
4 Biuret Test
5 Analysis of the sample
Production of conditioner shampoo
1 Prepare all of the formulation
2 Preparing the conditioning shampoo
3 Analyse the consumption of conditioning shampoo
Production of anti aging cream
1 Prepare all of the formulation
2 Preparing the anti aging cream
3 Analyse the consumption of anti aging cream
Thesis Writing
1 Chapter 1: Introduction
2 Chapter 2 Literature review
3 Chapter 3 Research Methodology
4 Chapter 4 Result & Discussion
5 Chapter 5 Conclusion
6 References
Presentation
1 Preparation of Power Point Presentation Slide
2 Presentation