Objective evaluation of foods assignment

An Overview on Food Evaluation Without food, life is impossible to sustain. People highly depend on it and make it a top priority. This has long made evident by numerous industries and businesses everywhere that concern food. Malls and shopping places cannot be complete with fast food chains and restaurants. Mealtime is always a treasured moment because it does not only bring the family members closer together, but also get a pleasure of satisfaction from delectable meals on the dining table.

In this present state of the world economy, a number of huge companies have been affected due to the entry of income that has been relatively slowed down. But among these different companies, those that concern food were less likely tormented by the devastating blows of the worldwide recession. People can live with few clothes and tattered shelters but not without food. The Importance of Evaluation and Analysis on Food Science Due to food’s tremendous importance, several studies and experiments have been conducted to analyze food to know more about its nature. Ram B.

Roy (1984) enumerated some reasons why food analysis and evaluation is conducted. This is to: 1) obtain nutritional and biochemical knowledge of food and food products; 2) ensure that food are able to meet standards of quality; 3) control food processing/manufacturing that will aim for improvement of quality of food products; 4) seek for better shelf life for processed products; 5) prevent distribution of adulterated and misbranded foods; and 6) determine nutritive value of food for scientific and dietary purposes (p. 247). Food Evaluation has two major types ? Subjective and objective evaluation.

In the laboratory exercise performed in the class, procedures and techniques were primarily concerned on objective evaluation. This type of food evaluation process involves the use of calibrated tools in measuring characteristics such as weight, color, pH, titratable acidity and concentration of soluble solids. The equipments used for the measurement of these characteristics require proper calibration to guarantee a relatively accurate data. Proper use, storage and maintenance of these equipments are also vital because inefficient tools will definitely lead to a false and useless data.

Objectives of the Laboratory Exercise Provided with the reasons why food evaluation is conducted, learning the methods and processes of objective evaluation is truly essential especially for students and researchers in the field of food science and nutrition. Therefore, this laboratory exercise was conducted to: 1) Introduce the methods and processes involved in the objective evaluation of foods 2) Educate the students about the proper techniques (handling, storage, use, calibration. etc. of the various instruments used to measure characteristics such as weight, volume, pH, acidity and soluble solids concentration 3) Provide knowledge regarding the said characteristics and be able to appreciate its relevance in the study of food science 4) Teach the students in interpreting the data/measurements gathered which resulted from calculations 5) Have a strong foundation on analysis of food characteristics and be able to apply them in food manufacturing and distribution which may hopefully benefit the people Words on Focus Titratable acidity Soluble Solids Concentration H reading standardization calibration METHODOLOGY In this laboratory exercise done in class, different samples were assigned to each group to evaluate. Using the different tools and equipments provided inside the laboratory, characteristics such as weight, volume, pH, titratable acidity and soluble solids concentration were measured and recorded. The food sample assignments are as follows: * sample assigned to our group The specific brands provided by the marketers for the group's assigned samples were Coca Cola (regular, 330 ml) and Kopiko 3-in-1 Instant Coffee (3 sachets).

Measurement of Weight/Volume of Foods The samples were weighed using a top- loading balance. Before placing the sample on the equipment, the metal plate was freed from minute particles and foreign objects that might haveStep 1Step 2 affected the reading. The " On Tare" button was pressed to achieve a 0. 00 reading. As soon as this reading have stabilized, the liquid samples which were filtered first, were placed on the metal plate and their respective weights were recorded. The volume of the samples were taken using a graduated cylinder. The equipment rovided only had a 100-ml capacity so the group had to measure several times. Step 1Step 2 The instant coffee, since it is in powder form, was diluted first with the appropriate amount of hot water as recommended on the back labels of the container. Determination of Colors of Foods In determining the color of the liquid samples, the Munsell Book of Colors was used as a tool. First, the group transferred a small amount of both samples, about 20 ml, in separate 50-ml beakers. The color measuring tool was transferred into an area in the room where the lightning is most sufficient.

As the liquid samples were placed near pages, the group made sure that the sample would not touch the color plates as much as possible since these plates are calibrated. As soon as the color chart close to the color of the sample was chosen, a small white paper was covered on the near matching color boxes surrounding the suspected shade. When the final color was already selected, recording of the values for hue, value and chroma were made. Determination of pH of Foods To get the pH of the liquid samples, a calibrated pH meter was used.

The cola and coffee samples were mixed thoroughly so that the suspended particles will become evenly distributed. Cleaning of the electrodes was done before it is emerged in the sample. It was squirted with distilled water and dried with a soft tissue paper. As soon as the electrodes were ready, it was dipped into the sample. The group waited for the pH reading on the equipment to stabilize before recording it. The temperature of the sample was also recorded. Determination of Titratable Acidity of Foods The first part in the procedure involves preparation of 0. N NaOH solution. A certain amount of NaOH pellets were weighed and added to a sufficient amount of carbon dioxide free- distilled water. This is done by boiling the water and allowing it to cool before usage. Via this equation, N NaOH = Weight of NaOH (in grams) *EW X Volume (in liters)*equivalent weights the proper amount of NaOH pellets to be added to distilled water can be determined. Supplying the known values such as N = 0. 1, EW= 39. 997 g/mol, and V= 0. 5 L to the equation, the weight of NaOH was known to be 2 grams.

After weighing the desired amount of NaOH pellets in a beaker using the top-loading balance, distilled water was prepared and then added to the solid. The solution was stirred continuously until all the particles were dissolved. After this, the resulting solution was transferred to a 500-ml volumetric flask. The beaker, wherein the NaOH pellets were dissolved, was rinsed twice with distilled water. The used water is added into the volumetric flask as well. More distilled water was added to the volumetric flask until it reached the 500-ml mark.

After preparing this new solution, the flask was shaked thoroughly and then its contents was transferred to a clean and labeled glass bottle. After preparing the 0. 1 N NaOH solution, standardization will be the next procedure. In the standardization of NaOH solution, 0. 5 g of KHP (potassium acid phthalate) was weighed (up to closest 0. 01 g) using a 250-ml Erlenmeyer flask as a container. The primary standard is then dissolved with 50 ml distilled water. After all the particles have been dissolved, 2 drops of phenolphthalein indicator was added to the solution.

The KHP solution is titrated with the previously prepared NaOH solution until a faint pink endpoint persists for 15 seconds. This method of titration was done three times by the group. To determine the titratable acidity of each samples, 10 g of each sample placed in 250-ml Erlenmeyer flasks were both added with 50 ml distilled water. Since the liquid samples Coca-Cola and diluted Kopiko Instant Coffee were dark-colored, addition of an indicator is negligible since it will be of no use. Since the endpoint for colored samples is pH 8. , the pH meter was instead used for the determination of the endpoint. NaOH was titrated with the samples of Coca-Cola and Kopiko Instant Coffee until the reading on the pH meter indicated 8. 2. Determination of Soluble Solids Concentration of Foods In the determination of soluble solids concentration of the liquid samples, refractometer was used. The first procedure involved cleaning of the prism using distilled water. It was then dried using a tissue paper. To calibrate the instrument, a drop of distilled water was placed on the prism and the reading was set to zero.

After this, a drop of the sample can now be placed on the prism of the refractometer. The prism was immediately covered to avoid further contamination. Both the soluble solids reading for Coca-Cola and Kopiko instant coffee samples were recorded. The refractometer's prism was again cleaned using distilled water after the readings were made. EXPERIMENTAL RESULTS Tabulated Results of Measured Characteristics for Coca-Cola sample Table 1. Determination of Weight, Volume and Color of Regular Coca-Cola (in can) Parameters | Values | | | | I | II | III | MEAN | SD | | WEIGHT | | | | | | | | | Net Weight | | | | | | | | Gross Weight g) | 357. 08 | 357. 10 | 357. 09 | 357. 09 | 0. 010 | | | Weight of dry container (g) | 16. 62 | 16. 60 | 16. 60 | 16. 61 | 0. 012 | | | Actual net weight (g) | 340. 46 | 340. 5 | 340. 49 | 340. 48 | 0. 021 | | | Declared net weight |? |? |? |? |? | | | Percent underweight (%) |? |? |? |? |? | | | | | | | | | VOLUME | | | | | | | | | Actual Volume (ml) | 340 | 339 | 337 | 339 | 1. 6 | | | Declared Volume (ml) | 330 | 330 | 330 | 330 | 0 | | | Percent Discrepancy (%) |-2. 4 |-2. 65 |-2. 08 |-2. 56 | 0. 19 | | | | | | | | | | COLOR | | | | | | | | |(H V/C) | 10 YR 2 /2 | 10 YR 2 /2 | 10 YR 2 /2 | ? | ? | | | Description | Very dark brown| Very dark brown| Very dark brown| ? ? | Table 2. Determination of pH, Titratable Acidity and Total Soluble Solids of Regular Coca-Cola | Parameters | Values | | | | I | II | III | MEAN | SD | | pH | | | | | | | | | pH | 2. 3 | 2. 23 | 2. 22 | 2. 23 | 0. 0071 | | | Temperature (°C) | 30. 6 | 30. 6 | 30. 6 | 30. 6 | 0 | | | | | | | | | | Titratable Acidity | | | | | | | | | Weight of the sample (g) | 10. 1 | 10. 08 | 10. 03 | 10. 04 | 0. 036 | | | Final Reading of NaOH (ml) | 1. 50 | 1. 7 |? | 1. 6 | 0. 14 | | | Initial Reading of NaOH (ml) | 0 | 0

|? | 0 | 0 | | | Volume of NaOH used (ml) | 1. 50 | 1. 7 |? | 1. 6 | 0. 14 | | | Percent titratable acidity (%) | 0. 01 | 0. 11 |? | 0. 0 | | | | | | | | | | | Total Soluble | | 87 |? |? | | | | Solids | | At 85? brx | | | | | | | |(0. 82) @ 31 ? C | | | | | Table 3. Physico-chemical properties of Regular Coca-Cola Sample | Product Form | Net Weight | Color | pH |%TA* |%TSS** | | Cola drink | liquid | 340. 48 g | 10 YR 2 /2 | 2. 23 | 0. 10 | | * represents percent titratable acid expressed in its predominant acid ** represents total soluble solids, unit is expressed in Brix or % sucrose Tabulated Results of Measured Characteristics for Kopiko 3-in-1 Instant Coffee Table 4. Determination of Weight, Volume and Color of Kopiko 3-in-1 Instant Coffee Parameters | Values | | | | I | II | III | MEAN | SD | | WEIGHT | | | | | | | | | Net Weight | | | | | | | | Gross Weight (g) | 66. 2 | 66. 31 | 66. 32 | 66. 32 | | | | Weight of dry container (g) | 4. 10 | 4. 10 | 4. 09 | 4. 10 | | | | Actual net weight (g) | 62. 22 | 62. 20 | 62. 23 | 62. 22 | | | | Declared net weight | 60 | 60 | 60 | 60 | 0 | | | Percent underweight (%) |-3. 57 |-3. 54 |-3. 58 |-3. 6 | | | | | | | | | | | VOLUME | | | | | | | | | Actual Volume (ml) | 483 | 483 | 481 | 482 | | | | Declared Volume (ml) | 450 | 450 | 450 | 450 | 0 | | | Percent Discrepancy (%) |-6. 83 |-6. 83 |-6. 44 |-6. 0 | | | | | | | | | | | COLOR | | | | | | | | | (H V/C) | 10 YR 6/6 | 10 YR 6/6 | 10 YR 6/6 | | | | | Description | Dark brown | Dark brown | Dark brown | | | Table 5. Determination of pH, Titratable Acidity and Total Soluble Solids of Kopiko 3-in-1 Instant Coffee Parameters | Values | | | | I | II | III | MEAN | SD | | pH | | | | | | | | | pH | 5. 91 | 5. 88 | 5. 91 | 5. 90 | | | | Temperature (°C) | 35. 1 | 35. 5 | 35. 1 | 35. | | | | | | | | | | | Titratable Acidity | | | | | | | | | Weight of the sample (g) | 10 | 10 | 10 | 10 | | | | Final Reading of NaOH (ml) | 1 | 1. 2 |? | 1. 1 | | | | Initial Reading of NaOH (ml) | 0 | 0 |? | 0 | | | | Volume of NaOH used (ml) | 1 | 1. 2 |? | 1. 1 | | | | Percent titratable acidity (%) | | | | | | | | | | | | | | | Total Soluble | | 86 |? |? | | | | Solids | | At 85? brx | | | | |

| | |(0. 90) @ 32? C | | | | | Table 3. Physico-chemical properties of Kopiko 3-in1 Instant Coffee | Sample | Product Form | Net Weight | Color | pH |%TA* | %TSS** | | Kopiko 3-in-1 | liquid | 62. 22 | 10 YR 6/ 6 | 5. 0 | | | | Instant Coffee | | | | | | | |(3 sachets) | | | | | | | * represents percent titratable acid expressed in its predominant acid ** represents total soluble solids, unit is expressed in Brix or % sucrose DISCUSSION OF RESULTS Weight and Volume Measurements on Foods Weight and volume measurements can be considered a standard procedure in any food evaluation process.

Food labels would always contain information about the weight or volume of their product since it serves as basis for several factors such as nutrition evaluation, storage and quality control. It is very noticeable that solid products indicate weight measurements, whether in grams or kilograms, on their labels. A solid product cannot be accurately quantified and measured in terms of volume since it accounts for the amount of space the object occupies. For example, a small block of metal will have a low value for volume but will have greater value terms of weight. Volume measurements are best used on liquid samples since liquid follows the shape of any container.

Relatively accurate measurements can be expected but still, the viscosity and nature of the liquid may directly affect the reading. Color readings Based on the Munsell Book of Colors People rely on external factors for judgment most of the time since these are more noticeable than the intrinsic properties. Especially when it comes to food, attributes such as appearance, odor and taste are the most important. According to Fergus M. Clydesdale (1984), consumers tend to judge the overall nature and characteristic of food through its color. He also noted that off-colors in foods give people the notion of unpalatabilty and unsafety of food. Therfore, color is an important aspect of food.

It has become a big concern for consumers and food industries since these people believe that color together with taste, odor, availability and nutritional factors has gained huge stand in the consumers' judgment. Color as a food trait does not only serve it sensory purposes put its scientific and analytical uses as well. Thus, color measurement can become a very reliable tool in food analysis and evaluation. Color measurements are now commonly used to approach technicalities in quality control and food researches. Because color determination had this huge significance, several tools and techniques have been devised for color specification. The most common and widely used is the Munsell Book of Colors developed by A. H. Munsell.

This book classifies color in terms of these three factors: hue, value and chroma. Hue, which simply pertains to base color, specifies an ' equally spaced scale of 100 major hues. Its notation is based on these 10 major base colors: red, yellow-red, yellow, green-yellow, green, blue-green, blue, purple-blue, purple, and red-purple (Clydesdale, 1984). Value is concerned on the level of darkness or lightness of a color. Measurement for value is based on a scale which consists absolute white (10/) at the topmost sphere, neutral gray (/5) in the middle and absolute black (/0) at the most bottom part. Chroma pertains to the degree intensity or saturation. The notation of chroma is dependent on the strength of the sample's color.

This tool for color measurement truly serves a functional purpose for measurement of color. But in spite of this, there is still a disadvantage alongside it. In using this tool, human judgment is very much a concern. Certain biases, health problems, and various psychological and external factors may affect a person's opinion for the right color shade provided that there are numerous plates to choose from. Importance of determining pH in foods pH is a measurement of the level of acidity or alkalinity of any sample using a scale with values ranging from 0 to 14, indicating a higher level of alkalinity as the value of the number also increases. According to Jean L.

Jacobson (2005), an acidic solution has lower pH due to its higher free hydrogen ion activity and a basic solution has higher pH due to its lesser hydrogen activity. pH measurement does not provide specifications the nature acidity and alkalinity. It mainly gives an overview on how intense the level of acidity and alkalinity of the certain sample. Control of pH on products most especially in foods always belong in the checklist of food manufacturers aiming for strict quality control. Since pH dictates the level of acidity and alkalinity of the product, it can be concluded that it talks about the overall condition of the product. With this premise, factors such as color, odor, texture and taste serve as the sensory signals.

Having these reasons known, it is not a surprising idea that food industries, huge or small, take pH measurements seriously. pH does not only affect the sensory characteristics of a certain food, it might alter the food's intrinsic properties as well. Inappropriate levels of pH in foods may lead to unwanted factors like decreased shelf life and growth of harmful microorganisms. It is a general rule that food must be safe for consumption, because if not, the opposite of nourishment might happen. The pH meter is a reliable tool for pH measurement. But in order to obtain a relatively accurate pH readings, the pH meter must first be calibrated using everal buffers (4 and 7 usually) before use. It has a glass electrode which is directly immersed in the sample which will then read the H+ concentration of the said sample. The tiny bulb on the bottom of the electrode must be properly cleaned using distilled water and tissue paper after every trial of pH measurement is conducted. This is to make sure that the previous sample would not contaminate the future samples to be measured. Highly reliable data depends on the efficiency of the pH meter so it is very crucial to take care of the equipment through proper use and storage. Titration Techniques and its Direct Effects on the Calculation of %TA of Liquid Samples

Titratable Acidity deals with the measure of the appropriate amount of a base that is needed to neutralize the acid in a solution. It can also be considered as the approximation of the sample's total acidity. In the laboratory exercise done in the class, the liquid samples, Coca-Cola and kopiko Instant Coffee were titrated with 0. 1 N NaOH until the desired endpoint of 8. 2 was obtained. The amount of NaOH or base used explains the level of acidity of the sample. According to Jacobson (2005), the more base used, the more acidic the sample. Therefore there is greater hydrogen activity in the sample. This indicated lower pH but greater titratable acidity. Titration techniques must be carried out properly especially in calculating for % titratable acidity.

If the sample becomes over titrated, the incorrect amount of NaOH derived by titration, will give false % titratable acidity. The terms total acidity and titratable acidity often get confused. Total acidity refers to the sum of ALL acids in the sample, including the salts. Titratable acidity, on the other hand, refers to the proton concentration of the total acidity (Jacobson, 2005). Both pH and TA talks about the acidity of the sample. But scientifically speaking, titratable acidity is a more reliable measurement since it measures the proton concentration of the total acidity whereas pH is only concerned on the FREE-hydrogen concentration in the sample. Discussion of Soluble Solids Concentration Readings using Refractometer

A refractometer is generally used to measure fluid concentrations specifically the sugar content of a sample. It operates by determining the index of refraction or the extent to which the light is bent. Refraction is dependent on factors such as the sample's temperature and the wavelength of light applied (Hanson, 2003). Dr. Ernst Abbe, the scientist who devised the refractometer, showed how concentration of sugar in solutions can be measured by using the principle of refraction. If a straw is placed inside a glass of water, the straw will appear bent. If sugar is added to water in the glass, the straw inside will appear more bent. This is based on the principle that as the density of the solution increases, its refractive index also increases.

Soluble solids concentration is identified as the total amount of solids (sugar, salts, proteins, etc.) dissolved in water. This is shown through the Brix (%). Hand-held refractometer is the one specifically used in the experiment. By placing a small amount of the sample on the prism, the measurement of refractive index will be able to take place. The calibrated prism must always be cleaned and handled very gently since it is sensitive. The refractive index of the prism is comparatively much larger than any sample to be subjected to it. If the sample is “ thin” or diluted, the angle of refraction will be large as explained in the latter premise.

However, if the sample is “ thick” or more concentrated, the refractive index will become slower since the difference between the prism and the sample is decreased. There are a lot of applications that can be devised from measuring soluble solids concentration. In the food industry, knowledge on the sugar concentration or soluble solids content of foods is very advantageous and gives many benefits. These include product standardization/quality control, possible betterment of food’s shelf life and product development. CONCLUSION Appreciation, understanding and most importantly, proper execution of objective evaluation on foods is an essential and very advantageous process for many people especially for those who are in the food industry.

Measurement of physical and physio-chemical characteristics such as weight, volume, color, pH, titratable acidity and soluble solids concentration are simple techniques used for food analysis. They may involve some tedious procedures at times due to the equipments sensitivity and complex operation methods. But in spite of this, a reliable data can still be acquired given that the methods are carried out properly and influencing factors that may contaminate the data are controlled. Objective evaluation serves a big and important role in the food industry. Their contributions to the field result in development of the quality of food as well as its distribution, processing, and nutrition.

It provides the people better quality of life in terms of ensured food safety, improved food quality and presentation of new food items that cater to more individuals. References BOOK Gruenwedel, Dieter, and Whitaker John. Food Analysis: Principles and Techniques Volume 1. New York: Elsevier Inc. , 1984. Jacobson, Jean. Introduction to Wine Laboratory Practices and Procedures. USA: Springer, 2005. Roy, Ram. Food Analysis: Principles and Techniques Volume 2. New York: Elsevier Inc. , 1984. ONLINE Essex Scientific Laboratory Supplies Ltd, 2008. Date Retrieved: December 6, 2008 from http://www. esslab. com/atagorefractometers. htm ———————– Group | Food Sample | | 1 | Condiments: Catsup (1 pack) and Vinegar (200 ml) | | 2 | Dairy Foods: Condensed milk (small can) and Cultured milk (2 bottles) | | 3 | Beverages: Cola drink (330 ml) and Instant Coffee (3-in-1, 3 sachets)* | | 4 | Fruits: Kaong/Nata (1 small bottle) and Kalamansi (1/4 kg) | | 5 | Vegetables: Fresh tomatoes (4 pcs) and cream style corn (small can) | Top-loading balance (tare, start with 0. 00) Weigh product: GROSS WEIGHT Weigh product (-) container: NET WEIGHT Graduated cylinder (100-ml capacity) Get volume of Coke: NET VOLUME Get volume of Kopiko Coffee (diluted w/ water): NET VOLUME