THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

155/3 **FOOD AND HUMAN NUTRITION 3**

(For Both School and Private Candidates)

Time : 3 Hours **Year: 2010**

Instructions

1. This paper consists of sections **three (3)** questions.
2. Answer all questions.
3. Question **one (1)** carries **twenty (20)** marks and question **two (2)** and **three (3)** carries **fifteen (15)** marks each.
4. Communication devices and any unauthorised materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

1. You are provided with food sample H, food reagents and a piece of cloth. Perform an experiment by following the given procedures (i)–(iv):

   (i) Place the wheat flour in a mixing bowl. Add little water gradually and knead for 10 minutes to make dough. Roll the dough into a ball, place it in a petri dish then press to touch it while observing. Record your observations and give explanations for the observations.

   (ii) Place the dough on a piece of cloth and wrap it tightly. Wash and squeeze the dough under running tap water. Serve about 50 ml of the first washing in a beaker and leave it to settle for 15 minutes. Record your observations and give explanations for their observations.

   (iii) Continue washing until the water coming out is clean. Scratch the substance left from the piece of cloth and place it in a petri dish. Record the characteristics of the obtained substance and compare its size with the original dough.

   (iv) Place 2 g of the substance obtained in procedure (iii) in a test tube then add concentrated nitric acid to cover it. Carefully boil the mixture while observing the colour changes. Cool the mixture under tap water and carefully add 3 ml of ammonium hydroxide solution while observing. Record your observations.

   Questions

   (a) Identify sample H.

   (b) What is the effect of discarding the top substance obtained in step (ii)?

   (c) Identify the substance obtained in step (iii).

   (d) Give the reason for the change in the size of the dough observed in step (iii).

   (e) What does step (iv) demonstrate?

   (f) Briefly explain the principle applied in separating the two components of sample H.

2. You are provided with food sample G. Peel, wash and cut four slices from the sample. Perform the experiment immediately by following the given procedure. Record your observations in colour changes after 10 minutes. Give explanations of what you have observed and then answer the questions

that follow.

Procedure:

(i) Leave one slice on a plain paper.

(ii) Put the second slice in a tap water bath.

(iii) Spray the third slice with lemon juice.

(iv) Plunge the fourth slice into boiling water for 3 minutes.

Questions

(a) Briefly explain the reaction that resulted into the development of colour change observed in the experiment. Give three points.

(b) Briefly explain the benefit of the reaction observed in this experiment in food processing.

3. You are provided with sample J, K, L, M and N. Perform the experiment by following the given procedure and then answer the questions that follow.

   Procedure:

   (i) Mix sample J thoroughly before weighing.

   (ii) Weigh accurately 8 g of sample J in a 200 ml (or 250 ml) conical flask.

   (iii) Prepare 50 ml of a mixture of K and L by mixing 25 ml of each sample. Heat the mixture in a water bath to make it hot. Add the mixture to the flask containing sample J, then shake the content.

   (iv) Add about 1.0 ml of solution M.

   (v) Heat the mixture for 10 minutes in the water bath maintained at 75–80 °C.

   (vi) Titrate the mixture while hot against solution N, shaking vigorously during titration until a permanent colour persisting for at least 10 seconds is formed in the conical flask.

   (vii) Record the titre volume and repeat the titration to obtain three readings.

   Questions

   (a) Identify samples K and L.

(b) What was the function of the mixture of sample K and L in this experiment?

(c) Calculate

(i) the acid value of sample J.

(ii) the percentage of free fatty acid (expressed on an oleic acid basis).

(d) Give the importance of;

(i) shaking the mixture in steps (iii) and (vi).

(ii) heating the mixture in procedure (v).

(e) From the literature, the acid value of the cooking oil ranges from 0.9–1.1. Compare the experimental value with the literature value and give the analytical importance of this value.

(f) Briefly explain the significance of cooking oil/fat analysis for Free Fatty Acid (FFA).