Dr. BRR. GOVERNMENT COLLEGE, JADCHERLA, MAHABUBNAGAR (Dist.)

Student Study Project

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DEPARTMENT OF CHEMISTRY

Topic

Analysis of Honey

Conducted by students

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ABSTRACT

Honey is an organic natural substance that is produced from the nectar of flowers by Apis mellifera and is a sweet, flavorful liquid. It is one of the most popular natural sweet substances. From a chemical point of view, it could be defined as a natural food mainly composed of sugars and water together with minor constituent such as Minerals, Vitamins, Amino acids, Flavonoids and other phenolic compounds and aromatic substances.

Honey is one of the oldest medicines known, its recorded use going back more than 4 millennia. It was used to treat wounds and ulcers, sunburn, and infections of the eyes, throat and gut. These uses have continued into present – day folk medicine and are increasingly becoming part of modern professional medicine.

Honey mainly consists of sugars and water. Apart from sugars, honey contains several vitamins, together with a lot of minerals such as Ca, Cu, Fe, Mg, P, K and Zn also present. The nutritional composition, minerals, antibacterial, and antioxidant properties of honey are analyzed in our laboratory.

For Analysis of Honey, we considered 3 different samples of Honey – DABUR, PATANJALI and LOCALLY PURCHASED HONEY (Natural Honey). By conducting all the tests - Test for Minerals, Test for Carbohydrates and Adulteration Test, we observed that Dabur and Patanjali are the best and non- adulterated one among the 3 samples.

KEYWORDS: Honey, Chemical Compositions, Minerals, Carbohydrates, Uses

1.1 INTRODUCTION

Honey is a natural sweetening agent used by human beings since ancient period. Honey is defined by the European Union as “The natural sweet substance produced by Apis mellifera bees from the nectar of plants or from living parts of plants i.e., flowers or excretions of plant – sucking insects or the living parts of plants. Honey is an organic, natural sugar alternative. It is made by bees and stored in wax structures called Honey combs. The bees collect, transform by combining with specific compounds of their own, deposit, dehydrate, store and leave in Honey combs to ripen and mature.

Honey is a thick golden liquid that bees make from the nectar of flowering plants. Bees performs the important service of pollinating fruits, vegetables and legumes and other types of food producing plants in the course of their business of honey production. It is a used as a sweetening agent in food materials.

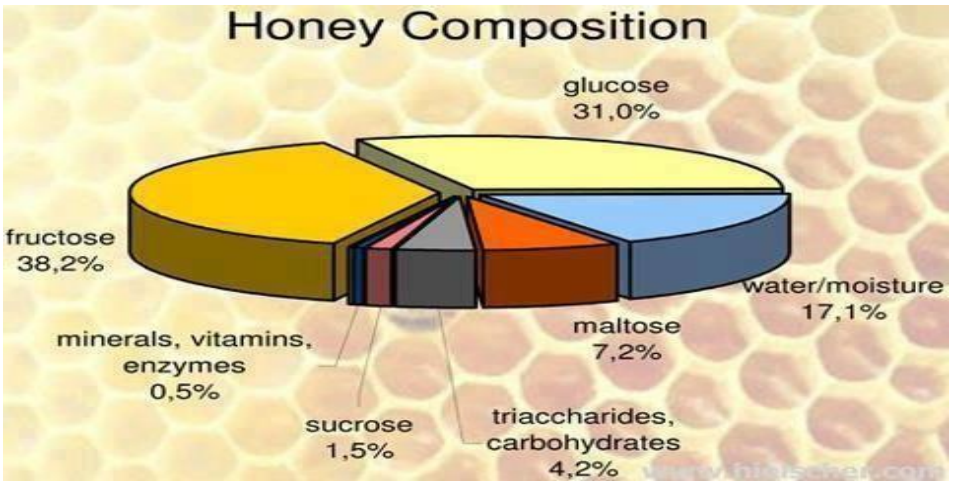
From a chemical point of view, it could be defined as a natural food mainly composed of sugars and water together with minor constituents such as minerals, vitamins, amino acids, organic acids, flavonoids and other phenolic compounds and aromatic substances.

Honey is used to feed bees during the winter. Its composition is particularly variable, depending on its botanical and geographical origins. For centuries, Honey has been used as food and as natural medicine for treating many varieties of illness.

Honey origin, it is categorized into Blossom, Honeydew, Mono floral and Multifloral Honeys.

The main composition of Honey is Sugars or Carbohydrates, which represent 95% of Honey dry weight. It is a complex mixture of concentrated sugar solution with Fructose and Glucose as main ingredients. The average ratio of Fructose and Glucose is 1:2:1. Sucrose is present in honey at about 1% of its dry weight. Honey also contains bio active compounds like organic acids, vitamins, proteins, minerals, aromatic /aroma compounds and polyphenols.

The protein content of Honey is normally less than 0.5% with a small fraction of enzymes. The quality of Honey such as taste, color and other physical properties are contributed by the non-volatile compounds like amino acids, sugars, minerals and phenolic compounds; aroma of honey is mainly contributed by the volatile compounds.



The compositional criteria prescribed in existing Honey directive requirements relating to concentrations of acidity, apparent Reducing Sugar which is calculated as invert sugar and apparent sucrose, 5-Hydroxy methyl furfural (HMF), mineral content, moisture and water insoluble solids.

Hydroxy Methyl Furfural (HMF) is formed from Reducing Sugars in Honey in acidic environment and often used to evaluate Honey quality as it is strongly correlated to ageing and overheating of Honey. Honey has various biological properties including anti-microbial, anti-viral, anti-inflammatory, wound and sunburn healing, anti-oxidant, anti-parasitic, anti-diabetic, anti-mutagenic and anti-tumoral activities.

Recent pharmacological studies have revealed that honeys have potential to reduce risk of gastric and cardio vascular diseases and have beneficial efforts on fertility and ameliorating hormones related to fertility with many beneficial properties. Honey is highly priced and also the major target of Adulteration.

1.2 FATHER OF INDIAN BEEKEEPING

The first successful attempt was made by REVEREND NEWTON in Kerala when he developed a specifically designed hive and started training rural people during 1911-1917 to harvest honey from beekeeping. The design became popularly known as “Newton hive”.

1.3 FATHER OF MODERN BEEKEEPING

Lorenzo Lorraine Langstroth (Dec 25,1810 – Oct 6,1895) was an American Apiarist, clergyman, and teacher, and considered to be the “FATHER OF AMERICAN BEEKEEPING”.

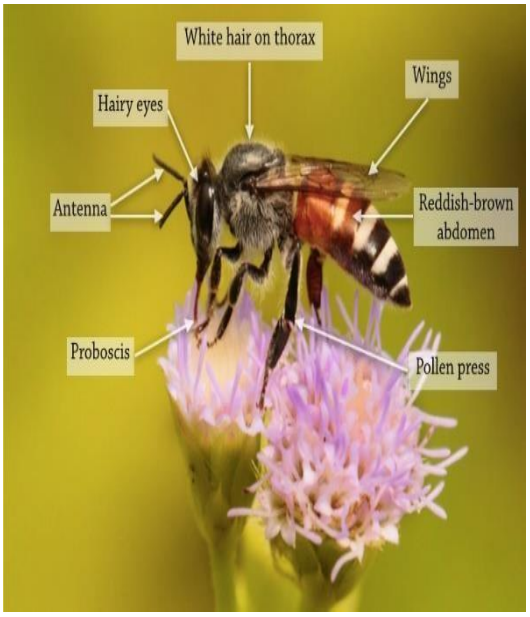
1.4 SPECIES OF HONEY BEES

Species of honey bees are classified into 2 types such as Wild Honey Bees and Domesticated Honey Bees.

1. WILD HONEY BEES
2. DOMESTICATED HONEY BEES

WILD HONEY BEES:

Apis florea:



- It is also known as Dwarf Honey Bee.
- The body length of honey bee is 7-10 mm, forewing length close to 6.8 mm.
- It builds single small combs in bushes, hedges.
- Honey yield is poor.
- Nests of Apis florea are exposed and made up of a single horizontal comb that is built around and attached to the branches or other support.
- Life span of it is about 6-41 days.

Apis dorsata:

- It is also called as the Rock Bee.
- This is the largest honey bee, can be up to 3 cm (1.2 inches) in length.
- It builds single large open comb on high branch of trees and rocks.
- They produce large quantity of Honey.
- This bee is difficult to domesticate.
- Life span of it around 2 months.

Apis andreniformis:

- It is also called as the Black Dwarf Honey Bee. It is relatively rare species.
- It was the 5th Honey bee species to be described of the seven, known species of Apis.
- It is the smallest of all species of honey bees, its length is between 6.5 mm and 9.5 – 10 mm.
- Life span of it is about 1 to 8 years.

Apis laboriosa:

- It is also known as Himalayan Giant Honey Bee.
- It is the world's largest Honey Bee.
- Each adult can measure up to 3 cm in length. Life spans up to 20 years.
- One of the important pollinators at higher altitudes of the Himalayas.

DOMESTICATED HONEY BEES :

Apis mellifera :

- It is also known as European Honey Bee .
- Generally , these are red / brown with black bands and orange yellow rings on abdomen .
- It looks a little like the Indian Bee .
- Life span of it is about 30-60 days (female workers) ; 21-32 days (male drones) .

Apis cerana :

- It is also known as easter honey bee , Asian Honey Bee.
- It is a species of honey bee native south ,south east and south Asia .
- Hive consists of several parallel combs in cavities of tree trunks , eastern parts etc .
- Life span of it is about 4 stages – Eggs , Larvae , Pupa and Adult .

1.5 CASTES OF HONEY BEES

QUEEN :

- It is the mother of the colony . There is only one queen in a hive .
- She can lay over 1500 eggs per day .
- Se will live for 2 – 8 years .

DRONES :

- These are male member of the family .
- They are present in few hundred in number in a hive .
- Their life span is 6 – 8 weeks .

WORKERS :

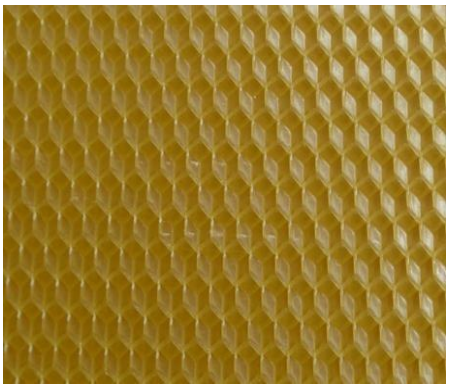
- They are sterile females and structure has flat hexagonal cells .
- The worker bee comprises the bulk of population in the colony .
- The workers usually live for about 5 – 6 weeks .

1.6 BEE HIVE PRODUCTS AND THEIR USES

ROYAL JELLY:

- It is the food fed to queen bee larvae .
- It is a creamy white color .
- It is a very rich in proteins and fatty acids .
- It produced by mouth glands in young bees .
- Each queen need only a teaspoon of Royal Jelly , so as health product it is very expensive.

BEE WAX :



- It is one of the valuable product of bee keeping industry.
- The wax is secreted by workers bees .
- The wax is discharged as a liquid later turns to properly white scales.
- The bees have to consume 10-15 kg of honey to produce 1 kg of bee wax .

BEE VENOM :

- It is a clear liquid with sharp bitter taste , aromatic odour an acidic reaction .
- It is effective against Asthma , Neurosis , Migraine .
- It increases haemoglobin content and decreases Cholesterol and Blood Pressure .

PROPOLIS:

- Propolis is a sticky, gummy resinous material gathered by bees.
- It can be used as a healing agent.
- Effective against itching.

1.7 CLASSIFYING HONEY BY ITS FLORAL SOURCE

- Classified by the Floral source of nectar from which it is made .
- Honeys can be from specific types of flower nectars , from infeterminate origins after collection .

1. BLENDED HONEY :
   - Most commercially available Honey .
   - Mix of 2 or more Honeys differing in floral source ,color , flavour , density or geographic origin .

2. PASTEURISED HONEY :
   - Reduces moisture levels , destroys yeast cells , liquefies crystals .
   - Sterilizes the honey and improves shelf life .

3. POLYFLORAL HONEY:

- Wild flower honey, it is dervied from the nectar of many types of flowers.
- Taste may vary year to year.
- Aroma and flavor can be more or less intense depending on which bloomings are prevalent.

4. MONOFLORAL HONEY:

- Made primarily from the nectar of one type of flowers.
- Typical North America Monofloral honeys are – Clover, orange blossom, Eucalyptus, Manuka, Buckwheat, Sourwood.

5. HONEYDEW HONEY :

- It is a made from the sweet selections of aphids or other plant sap – sucking insects.
- Dark in color with a rich fragance.
- Production is much more complicated and dangerous.

6. COMB HONEY :

- It is meant to be consumed still in the wax comb.
- It is collected by using standard wooden frames in Honey supers.
- The frames are collected and the comb is cut in chunks before packaging.

7. CHUNK HONEY :

- It is the honey packed in wide mouth containers consisting of one or more pieces of comb honey immersed in extacted liquid.

8. ORGANIC HONEY :

- It is processed, processed and packaged in accordance with national regulations and certified as such by some government body or an independent organic farming certification and organisation.

9. CRYSTALLISED HONEY :

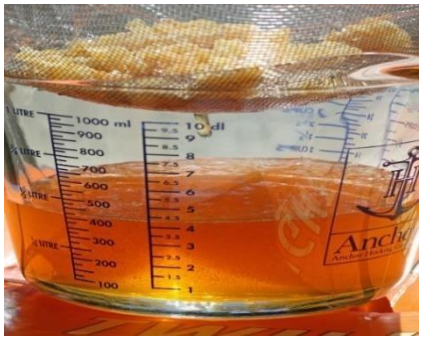
- It is also called Granulated Honey.
- Some part of the glucose content has spontaneously crystallized from solution as a monohydrate.

10. RAW HONEY :

- Honey as it exsists in the beehive or as obtained by extraction, settling or straining without adding heat above 120°F.

11. STRAINDED HONEY :

- Honey that has been passed through a strain to remove particulate material without removing pollen, minerals or valuable enzymes.



12. FILTERED HONEY :

- Honey processed by very fine filteration under high pressure.
- Removes all extraneous solids and pollen grains.
- It is very clean and has a longer shelf life.
- It is preferred by the super market trade.

13. ULTRASONICATED HONEY :

- It is processed by Ultrasonication.
- Non-thermal alternative for processing.
- Destroys most of the yeast cells and those that all not destroyed generally lose their ability to grow.

1.8 HONEY HARVEST AND EXTRACTION

This instrutable features Honey Harvest and Extraction . While it is less likely that anyone would do this on their own if they are not a beekeeper. Bees are really great and easy to keep , even in the Urban Environment .

As Novella Carpenter calls them,bees are “GATEWAY ANIMAL FOR URBAN FARMERS”. All you need is some space in the backyard / deck.

The process of Honey Harvesting and Extraction mostly likely happens on a separate days.

ANCIENT METHOD OF HONEY EXTRACTION

- In ancient period , Honey extraction was done by burning fire is brought near the hive as a result of which bees are either killed or they escape off .

- Further the hive full of honey is being removed cut into pieces and squeezed to get honey .
- Sometimes smoking is done so that the bees may escape from their hives.
- Later , Honey combs are collected into the boxes . The Honey combs are cut into pieces and squeezed to get the Honey .
- Then the honey is filtered through sieves because the honey contains bees , dust particles etc.

- Finally, after Filtration the honey is stored in the glass bottle and glass jars.

MODERN METHOD OF HONEY EXTRACTION

STEP – 1: COLLECTION OF BEES

Before we begin, let me first introduce her majesty: Apis mellifera (Honey bee in Latin). Also, here are some hard-working Worker bees, bees with pollen on their legs and one cutie stuck in the nectar with pollen. They collectively make a Honey Harvest possible.

STEP – 2: HARVEST

Light the smoker. Use dry branches, hay or newspapers. The smoke dulls the bee's receptors, and prevents them from releasing the alarm odor, a volatile pheromone. The smoke also makes bees gorge on Honey, which further pacifies them .

STEP – 3: PREPARE SUPERS

The frames with Honey combs are transported in supers have them handy. may also want to have a cloth to cover the super with frames full of Honey to prevent bees or other insects from getting to them.

STEP – 4: OPEN SESAME

Using the Hive tool, lift the hive lid and blow some smoke in the hive. Open lid slowly.

STEP – 5: HONEY FRAME INSPECTION

Pull the frames out of the super and inspect the Honey combs. Depending on how busy the bees were, how warm it was and if the hive didn't swarm, you may have anywhere between 20 – 100 pounds of Honey. inspect frames. Uncapped cells with some nectar in it are not harvested; only sealed frames are harvested.

STEP – 6: INSPECT ALL SUPERS

Depending on the Hive Configuration, there might be multiple supers to inspect. Take the super off the hive and move it to clean surface and repeat.

STEP – 7: SCRAPE ALL SUPERS

If there are any extra cells in between the supers and frames, scrape it off with a hive tool. Make sure to taste it right there – there is nothing like nectar, honey and wax freshly harvested.

STEP – 8: LET'S HARVEST SOME HONEY

Pull out the frames with honey and put them in the harvest super. All the cells should be sealed. Each frame can hold on average 6.5 lbs. of honey, so it may be heavy.

STEP – 9: HONEY, BROAD, NECTAR OR POLLEN?

The frames may have different colors of honey combs. The light one is pure honey. The light one is Pure Honey. The darker one has pollen. The capped broad (the final stage of development for a bee) is tan in color and located in the center of the Hive. The crescent shape of the cmbs indicates where a broad was before , it now is packed with pollen and honey . You can see the nectar shine at you from the open / uncapped cells .

STEP – 10: HOW MANY ARE THEY?

How many bees per hive on average?

50,000! That's a lor of bees.

STEP – 11: EXTRACTION

Take the frame of capped Honey. Mount the frame above the tub for wax and Honey. Use the heated knife to unseal the cells.

Lean the heated knife on the edges of the frame and under 30-degree angle and move “fast” don’t linger too long, it burns the Honey. Repeat for both sides of the frame. The heated knife takes off most of the caps. For the left-over ones, use the uncapping fork and gently shave off the caps.

STEP – 12: LET’S SPIN

Preheat the extractor. Place the uncapped frames in the extractor, as you uncap them. Once all the frames are secured, close the lid and start the extractor.

It should start slowly, them speed it up within 10 – 15 mins, all the honey will be out of the honey comb, stuck to the bottom and side of the extractor.

STEP – 13: POUR OUT SLOWLY

Place your food – grade bucket under the extractor spigot. Use a double sieve to catch the wax and impurities as Honey starts pouring out of the extractor. Do not leave the spigot unattended.

STEP – 14: FILL UP THAT JUG! (OPTIONAL)

You may pour Honey into a temporary jug. It needs to sit for at least 12 hours to let the air bubbles settle out.

STEP – 15: PREPARE CONTAINERS

When the jugs, jars or whatever containers in which the Honey is poured. Let it put in dry air.

STEP – 16: FILL IT UP AND SHARE:

Fill up the containers with Honey. Optional: Decorate them with labels and bows.

STORAGE

- Suitable for long term.
- Recommended to be stored for maximum 2 – 3 years.
- Main goal is to prevent Fermentation.
- Best Honey is that in the comb that has been sealed with wax by the bee.
- Honey should not be stored in metal containers. Ceramic or wood are best.
- Dark, dry place to prevent moisture absorption.

1.9 HONEY BRANDS

DABUR

DABUR is the largest Ayurvedic medicine and related products manufacturer. Dabur was founded in 1884 by S.K Burman, a physician in West Bengal to produce and dispense Ayurvedic medicines. Dr. S.K Burman started Dabur as a small pharmacy. Initially, he used to prepare Ayurvedic medicines. Dr. S.K Burman started Dabur as a small pharmacy. Initially, he used to prepare Ayurvedic medicines to treat diseases like Malaria, Plague and Cholera that had no cure during that period. He started his mission to make health care products spread to Bihar and the North – East.

The story of Dabur began with a small, but visionary endeavor by Dr. S.K Burman, a physician tucked away in Bengal. His mission was to provide effective and affordable cure for ordinary people in far-flung villages. With missionary zeal and fervor, Dr. Burman undertook the task of preparing natural cures for the killer diseases of those days, like Cholera, Malaria and Plague.

Soon the news of the medicines travelled, and he came to know as trusted doctor who came up with effective cures. And that is how his venture Dabur got its name – derived from the Devanagari rendition of Doctor Burman.

Dr. Burman set up Dabur in 1884 to produce and dispense Ayurvedic medicines. Reaching out to a wide mass of people who had no access to proper treatment. Dr. S. K. Burman's commitment and ceaseless efforts resulted in the company from fledgling medicine manufacturer in a small Calcutta house, to a household name that at once evokes trust and reliability.

COMPANY	ESTABLISHED	FOUNDER	PRODUCTS	DISTRIBUTION
DABUR	1884	S.K. BURMAN	Foods, Healthcare, Personal care And Oral care.	India, UAE, Egypt, Bangladesh, Africa, Nepal.

BEEKEEPING PROJECT BY DABUR HONEY:

- Dabur has started a great initiative of bee keeping project in Bihar and Madhya Pradesh in 1993.
- Dabur has planned the same in the Sundarbans Forest area of west Bengal as well.
- The aim of this project is to provide a new stream of income, and to alleviate poverty through the training and support of local NGOs in the practice of Bee keeping.

STEPS IN MANUFACTURING PROCESS OF DABUR HONEY

Fully honeycombs removed from hive

↓

Uncapping the honey combs

↓

Extracting the honey from the combs

↓

Processing and Bottling

↓

Quality control

↓

By Products

PATANJALI

Patanjali was founded by Ramdev and Balkrishna in 2006. It is an Ayurvedic United is an Indian FMCG company. The company has a production capacity of 350 billion and is in the process of expanding to a capacity of 600 billion through its new production units at several places, including Noida, Nagpur and Indore.

Its manufacturing units and headquarters are located in the industrial area of Haridwar while the registered office is located at Delhi.

STEPS IN MANUFACTURING PROCESS OF PATANJALI HONEY

Heat exchanger (65°-70°C)

↓

Sparkler filter (at 1-4 kg/cm² filter pressure)

↓

Filtration Tank (Mesh size – 5 µm)

↓

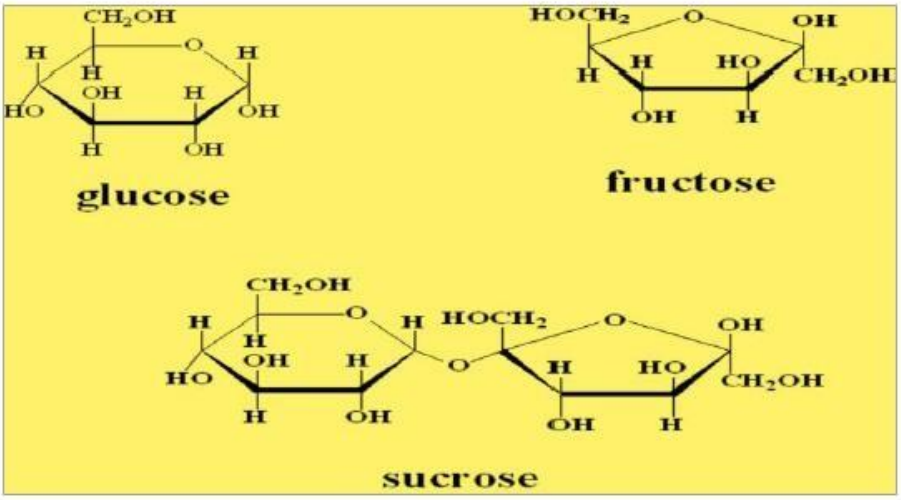
Evaporation to reach the optimum moisture range (65-70°C)

↓

QC testing and Coding tube (50-55°C)

2.1 CHEMICAL ANALYSIS

Honey is a complex mixture of concentrated sugar solution with main ingredients of Fructose and Glucose. The average ratio of Fructose to Glucose is 1:2:1. Sucrose is present in honey at about 1% of its dry weight. The extract proportion of Fructose to Glucose in any honey depends largely on the source of the nectar.



CHEMICAL COMPOSITION OF HONEY

AIM:

To analyze the presence of different Minerals and Carbohydrates present in given HONEY SAMPLES – DABUR, PATANJALI AND LOCALLY PURCHASED HONEY (Natural Honey); and also, to verify the impurities present in Honey samples by performing Adulteration Test.

MATERIALS:

- Test tubes
- Test tube stand
- Burner
- Water bath
- Test tube holder
- Measuring jars
- China dishes

CHEMICALS:

- Fehling Solution A
- Fehling Solution B
- Ammonium Chloride Solution
- Ammonium Oxalate Solution
- Ammonium hydrochloric Solution
- Concentrated Nitric Acid
- Picric Acid
- Molisch’s Reagent
- Resorcinol
- Sulfuric Acid
- Hydrochloric Acid
- Tollens Reagent
- Ether

FEHLING'S TEST:

It is a chemical test used to differentiate between Reducing and Non-Reducing Sugars. This test can also be used to distinguish Ketone functional group Carbohydrates and Water-soluble Carbohydrates.

TOLLENS TEST:

It is a very useful method to distinguish between Aldehydes and Ketones. This qualitative lab test is also referred to as Silver Mirror Test.

FIECHE'S TEST:

It is a chemical test used to detect the Adulteration of Honey with Inverted Sugars (Acid Hydrolyzed Sugar). It actually detects the presence of HMF (Hydroxy Methyl Furfural) content in honey invert sugar has highest HMF content whereas Honey has lesser HMF content (around 10 mg/kg).

MOLISCH'S TEST:

It is a chemical test used to detect the presence of Carbohydrates molecules. The principle of Molisch's test is the dehydration of Sulfuric acid into furfural.

REDUCING SUGAR TEST:

It is also known as Benedict's Test. It is a chemical test that can be used to check for the presence of Reducing Sugars.

TOLLENS REAGENT:

It is a chemical reagent used to distinguish between Aldehydes and Ketones along with some alpha – hydroxy Ketones which can tautomerize into Aldehydes. The reagent consists of a solution of Silver Nitrate, Ammonia and some Sodium hydroxide (to maintain a basic pH of the reagent solution).

MOLISCH'S REAGENT:

It is a chemical reagent with alpha naphthol dissolved in ethanol. It is used for detection of Carbohydrates.

METHODS:

TEST FOR MINERALS

1. TEST FOR POTASSIUM:

   Take a 2 ml of Honey in a test tube and Picric acid solution is added. Yellow precipitate indicates the presence of Potassium.

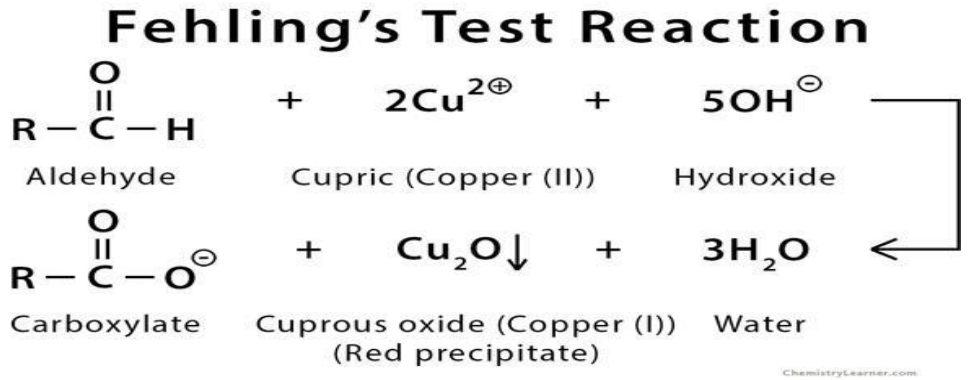
2. TEST FOR CALCIUM:

   Take a 2 ml of Honey in a test tube and Ammonium Chloride solution along with Ammonium hydroxide solution are added to it. The solution is filtered and to the filtrate 2 ml of Ammonium oxalate solution is added. White precipitate or milkiness indicates the presence of Calcium.

TEST FOR CARBOHYDRATES

1. FEHLING'S TEST:

   Take 2 ml of Honey in a test tube and 1 ml of each Fehling's solution A and Fehling's solution B are added to it and boiled. Red precipitate indicates the presence of Reducing Sugar.



2. TOLLENS TEST:

Take 2 – 3 ml of aqueous solution of Honey in a test tube. 2-3 ml of Tollens reagent is added to it. The test tube is kept in boiling water bath for about 10 minutes. A Shining Silver Mirror indicates the presence of Reducing Carbohydrates.

ADULTERATION TESTS

Adulteration of food commonly defined as "the addition or subtraction of any substance to or from food, so that the natural composition and quality of food substance is effected ".

"ADULTERANT" means any material which is or could be employed for making the food unsafe or sub-standard or containing extraneous matter.

To examine the impurities, present in the Honey. 3 types of tests have to perform such as Fiche's test, Molisch's test and Reducing Sugar test.

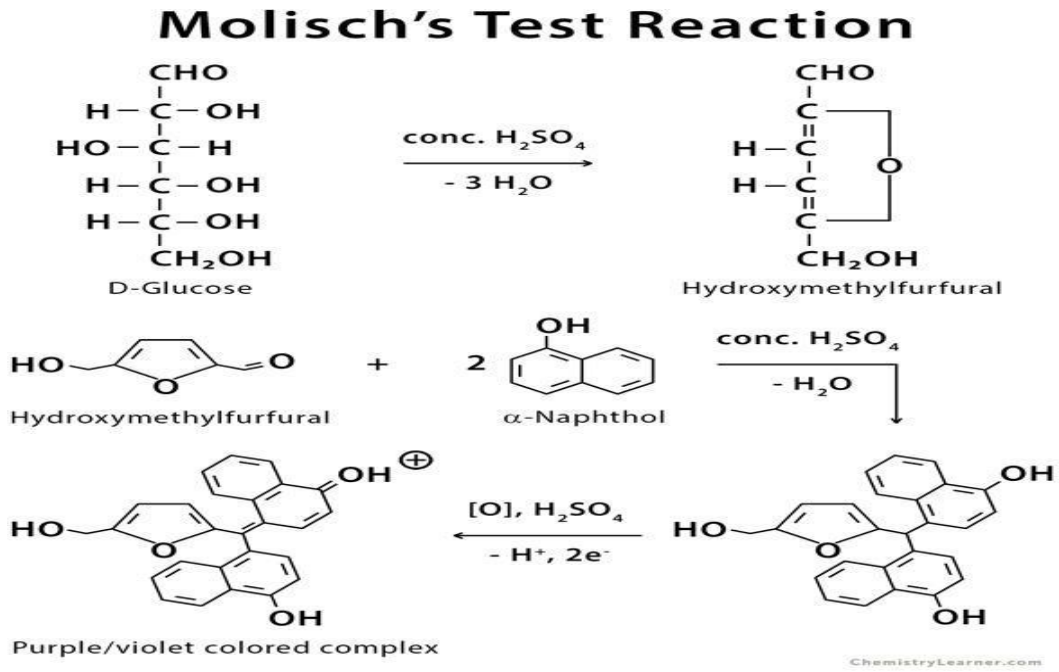
TESTS FOR ADULERATION:

1. FIECHE'S TEST:

Take about 3 ml of Honey in a test tube and 2 ml of ether and shake thoroughly and allow the 2 layers to separate and evaporate to dryness. The upper etherical layer is separated and put in a China dish and evaporate, to residue add 1% Resorcinol and Hydrochloric acid. Transient Pink color indicates the purity of Honey sample. If Permanent Red color indicates then the taken sample is Adulterated (Invert Sugar).

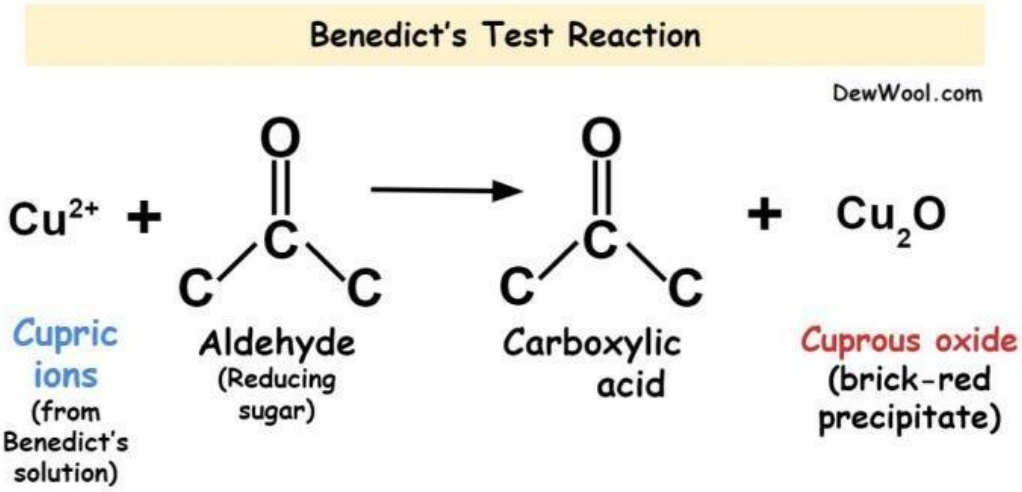
2. MOLISCH'S TEST:

Take 2 ml of Honey in a test tube and add 1 ml of Molisch's reagent (alpha naphthol) and add concentrated Sulfuric acid. Purple color indicates the presence of the Carbohydrates.



3. REDUCING SUGAR TEST:

Take 2 ml of Honey in a test tube and heat it in the water bath for 2-3 minutes, until the honey slightly gets heated. Then take the test tube from the water and add a drop of Fehling's solution A and Fehling's solution B in the test tube. Brick Red color indicates the presence of Monosaccharides.



2.2 OBSERVATION TABLE

DABUR

TEST FOR MINERALS

SL.NO	TESTS	OBSERVATION	INFERENCE
1	TEST FOR POTASSIUM: Honey + Picric acid solution	Yellow Precipitate is observed.	Potassium is present.
2	TEST FOR CALICUM: Honey + Ammonium Chloride solution + Ammonium Hydroxide filtered + Ammonium Oxalate solution	White Precipitate or Milkiness is not observed.	Calcium is absent.

TEST FOR CARBOHYDRATES

SL.NO	TESTS	OBSERVATION	INFERENCE
1	FEHLING'S TEST: Honey + 1 ml of each Fehling's solution A and Fehling's solution B.	Red Precipitate is observed.	Reducing Sugar is present.
2	TOLLENS TEST: Honey + 2 – 3 ml Tollens reagent, test tube in water bath for 10 minutes.	Shining Silver Mirror is observed.	Reducing Carbohydrates is present.

ADULTERATION TEST

SL.NO	TESTS	OBSVERAVATION	INFERENCE
1	FIECHES'S TEST: 3 ml of Honey + 2 ml of Ether + allow 2 layers to separate + the upper etherical layer is separated and put in a China dish and evaporate, to the residue add 1% of Resorcinol and Hydrochloric acid.	Transient Pink Color	Pure Honey
2	MOLISCH'S TEST: Honey + alpha Naphthol + conc. Sulfuric acid.	Purple Color	Carbohydrates are present.
3	REDUCING SUGAR TEST: Honey + a drop of Fehling's solution A and Fehling's solution B.	Brick Red Color	Monosaccharides are present.

PATANJALI

TESTS FOR MINERALS

SL.NO	TESTS	OBSERVATION	INFERENCE
1	TEST FOR POTASSIUM: Honey + Picric acid solution	Yellow Precipitate is observed.	Potassium is present.
2	TEST FOR CALICUM: Honey + Ammonium Chloride solution + Ammonium Hydroxide filtered + Ammonium Oxalate solution	White Precipitate or Milkiness is not observed.	Calcium is absent.

TEST FOR CARBOHYDRATES

SL.NO	TESTS	OBSERVATION	INFERENCE
1	FEHLING'S TEST: Honey + 1 ml of each Fehling's solution A and Fehling's solution B.	Red Precipitate is observed.	Reducing Sugar is present.
2	TOLLENS TEST: Honey + 2 – 3 ml Tollens reagent, test tube in water bath for 10 minutes.	Shining Silver Mirror is observed.	Reducing Carbohydrates is present.

ADULTERATION TEST

SL.NO	TESTS	OBSVERAVATION	INFERENCE
1	FIECHES'S TEST: 3 ml of Honey + 2 ml of Ether + allow 2 layers to separate + the upper etherical layer is separated and put in a China dish and evaporate, to the residue add 1% of Resorcinol and Hydrochloric acid.	Transient Pink Color	Pure Honey
2	MOLISCH'S TEST: Honey + alpha Naphthol + conc. Sulfuric acid.	Purple Color	Carbohydrates are present.
3	REDUCING SUGAR TEST: Honey + a drop of Fehling's solution A and Fehling's solution B.	Brick Red Color	Monosaccharides are present.

LOCALLY PURCHASED HONEY (Natural Honey)

TESTS FOR MINERALS

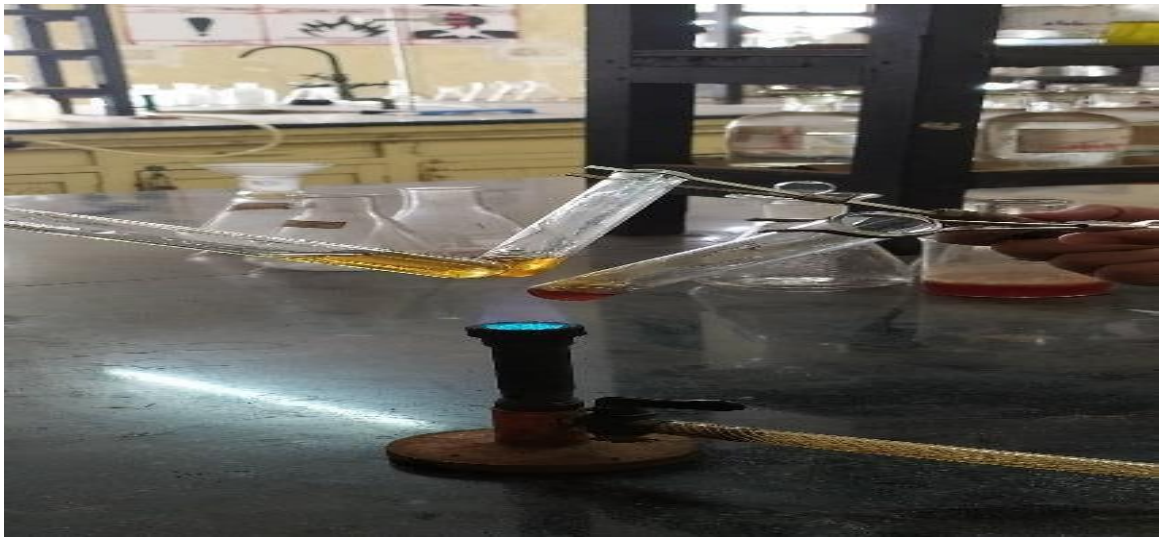
SL.NO	TESTS	OBSERVATION	INFERENCE
1	TEST FOR POTASSIUM: Honey + Picric acid solution	Yellow Precipitate is observed.	Potassium is present.
2	TEST FOR CALICUM: Honey + Ammonium Chloride solution + Ammonium Hydroxide filtered + Ammonium Oxalate solution	White Precipitate or Milkiness is not observed.	Calcium is absent.

TEST FOR CARBOHYDRATES

SL.NO	TESTS	OBSERVATION	INFERENCE
1	FEHLING'S TEST: Honey + 1 ml of each Fehling's solution A and Fehling's solution B.	Red Precipitate is observed.	Reducing Sugar is present.
2	TOLLENS TEST: Honey + 2 – 3 ml Tollens reagent, test tube in water bath for 10 minutes.	Shining Silver Mirror is observed.	Reducing Carbohydrates is present.

ADULTERATION TEST

SL.NO	TESTS	OBSVERAVATION	INFERENCE
1	FIECHES'S TEST: 3 ml of Honey + 2 ml of Ether + allow 2 layers to separate + the upper etherical layer is separated and put in a China dish and evaporate, to the residue add 1% of Resorcinol and Hydrochloric acid.	Permanent Red Color	Adulterated Honey (Inverted Sugar)
2	MOLISCH'S TEST: Honey + alpha Naphthol + conc. Sulfuric acid.	Purple Color	Carbohydrates are present.
3	REDUCING SUGAR TEST: Honey + a drop of Fehling's solution A and Fehling's solution B.	Brick Red Color	Monosaccharides are present.



3.1 RESULT

DABUR

TEST FOR MINERALS:

- Potassium is present.
- Calcium is absent.

TEST FOR CARBOHYDRATES:

- Reducing Sugars is present.
- Reducing Carbohydrates is present.

TESTS FOR ADULTERATION:

- Pure Honey.
- Carbohydrates are present.
- Monosaccharides are present.

PATANJALI

TEST FOR MINERALS:

- Potassium is present.
- Calcium is absent.

TEST FOR CARBOHYDRATES:

- Reducing Sugars is present.
- Reducing Carbohydrates is present.

TESTS FOR ADULTERATION:

- Pure Honey.
- Carbohydrates are present.
- Monosaccharides are present.

LOCALLY PURCHASED HONEY (Natural Honey)

TEST FOR MINERALS:

- Potassium is present.
- Calcium is absent.

TEST FOR CARBOHYDRATES:

- Reducing Sugar is present.
- Reducing Carbohydrates is present.

TESTS FOR ADULTERATION:

- Permanent Red Color (Invert Sugars)
- Carbohydrates are present.
- Monosaccharides are present.

DISCUSSION

In this project report we discussed about Honey and its Chemical Composition and how is it useful in our daily lives. Honey has a number of potential health benefits and plays a role in many home remedies and alternative medicine treatment.

As per our study we identified that, “The best-known Honey bee is the Western Honey Bee (Apis mellifera), which was domesticated for Honey production and crop pollination”.

The most important topic we discussed in this project is about the Test Analysis of Honey. We can identify whether the Honey contains impurities or not. For testing purposes, we considered 3 different samples of Honey i.e., Dabur, Patanjali and Locally Purchased Honey (Natural Honey).

In this report by conducting all the tests we observed that the color of the Honey samples ranges from amber to dark amber. The color of Honey depends on the various parameters such as the presence of Minerals, Carbohydrates, Calcium present in Honey.

While doing the tests, we observed that Locally Purchased Honey had given quick results when compared to Dabur and Patanjali. After the test of Chemical Analysis is done, we performed Adulteration test which is the important test in identifying whether the Honey is pure or not. While doing this test, we observed that Locally Purchased Honey had impurities in it and whereas Dabur and Patanjali had passed the Adulteration test, but when comparison is made between Dabur and Patanjali, Dabur had given quick result compared to Patanjali.

4.1 CONCLUSION

In this project report, the main aim is to find the purity of Honey samples available in local markets and for examining the purity of Honey, we considered 3 different types of Honey samples i.e., Dabur, Patanjali and Locally Purchased Honey (Natural Honey).

By conducting all the tests included in identifying of Minerals, Carbohydrates and the Adulteration test. The test results are observed as follows: While examining all the 3 honey samples, all the 3 of them had showed similar tests but there is a difference in time intervals.

The 3 samples had passed the tests for Minerals and Carbohydrates and when we performed the final test which is Adulteration test, Locally Purchased Honey turned out to be the adulterated sample whereas Patanjali and Dabur resulted as pure and non-adulterated samples.When comparison is made between Dabur and Patanjali, Dabur had given little quick results than Patanjali.

By our test's reports, we conclude that Dabur is the Best and Non-Adulterated among all the3 samples and Dabur is the only company in India to have an NMR testing equipment in theirown laboratory and the same is used to regularly test the Honey being sold in the Indian market. This ensures that "Dabur Honey is the 100% Pure Honey without any Adulteration".

5.1 REFERENCES

- www.projects.icbse.com/chemistry
- www.projectsyapa.com/chemistry
- http://silverlineservices.blogspot
- Comprehensive Practical Chemistry

Google Images