# Hygiene and technology of beverages, fruits, vegetables, mushrooms and dry fruits

**guides to practical exercises**

**structured tutorials for students**

**for every lesson, according to the topic**

# 1. Soft drinks

## Physical, chemical analyses, sensory assesment

**Beverage clearing**

- clearing is a process where a special preparation is added to the drink
- flocculates with colloidal particles
- has a stabilizing effect
- flocculation and purification phase

**Equipments and chemicals:**

Test glasses (cylindrical)
Graduated cylinder
Analytical scales
Pipette
Juice extractor
Fruit - apples and carrots
Sorbent to usage:
Silica salt
Liquid gelatine
Bentonite active
Potassium bicarbonate

**Process:**

1. Extract raw juice from the fruit, the minimum volume is 100 ml per sample
2. Add 100 ml of the juice to the 250 ml flask, mark it identically for the sample and sorbent.
3. Mix the raw juice with silica salt, liquid gelatine, bentonite, and potassium bicarbonate. One sample use as control without any sorbent addition. The sorbent concentration is according to instruction for use.
4. Transfer raw juice with sorbent to the graduated cylinder
5. Observe the sedimentation rate for one hour
6. Measure the volume of sediment and volume of the raw juice.
7. Observe the colour and clarity of raw juice against the light and with paper.

# 2. Processed fruits and vegetables

## Production of fruit or vegetable products (mixed, sterilised)

### Pumpkin and apple jam

- Preservation of fruit pulp, puree or juice by increasing the dry matter content, both by evaporating part of the water and by adding sugar.
- Jam - fruit pulp preserved essentially by the addition of sufficient sugar.
- Minimum soluble solids content (60-61 %).
- A thin jelly-like but non-melting consistency.
- Pieces - contains incompletely cooked pieces of fruit.

**Ingredients:**

1 pumpkin
5-6 apples
Spices (cinnamon, cloves, gingerbread, ginger to taste)
Lemon/lemon acid
Sugar

**Process:**

1. Peel the pumpkin. Remove the seeds, remove all the fibres and cut into cubes.
2. Peel the apples, remove the cores and cut them as well.
3. Place the apples and pumpkin in a saucepan, cover lightly with water, add the lime juice and spices (about 2 tsp of citric acid).
4. Cook the mixture on a low heat under a lid until soft.
5. Then stir in the sugar and pectin and continue until thickened, about 20 minutes.
6. Then remove the pumpkin jam from the heat.
7. Fill individual screw-top jars with the jam and seal tightly.

### Pickled beetroot

- Beetroot must be cooked before sterilising/cooking.
- Maximum amount of nutrients, minerals and other beneficial substances are preserved if the beetroot is cooked whole (not peeled)
- Depending on the size of the beetroot, this can take up to an hour. Only then should you peel and chop or grate it.
- You can cut the beetroot into any shape you like - chips, slices, cubes. However, the most common and most popular way is to cut it into roughly 1 cm cubes.

**Ingredients:**

1 kg beetroot
50 g crystal sugar
500 ml water

150 ml vinegar
1/2 tsp salt
Fennel to taste

**Process:**

1. Peel the cooked beetroot tubers and then process on a grater
2. Prepare the liquid mixture by bringing the water to the boil, then add the fennel, which is left to simmer in the water for a few minutes and then add the vinegar, sugar and salt and let everything come to the boil
3. Then all you have to do is fill the beetroot into jars, pour the brine over it and leave the closed jars at 85 °C for 15 minutes in water, steam or in the oven

# 3. Dried fruit, dried vegetables and dried nuts

## Production of dried nuts products and dried vegetable products, sensory assesment

**Peanut butter**

- peanuts contain a large amount of oil - a source of fat
- very simple to make
- popular spread

**Ingredients:**
500 g unsalted peanuts
1 tbsp sunflower or peanut oil
1 tbsp honey
1/2 tsp salt (not necessary)
**Process:**
1. You can lightly roast the peanuts (but not necessary)
2. Use high-power blender to mix for few minutes
3. Add oil to better texture
4. For better shelf life, store it in cool place

**Sensory assessment of dried fruit and vegetable products**

- Sensory evaluation is very important
- This commodity is often affected by mould
- Unsatisfactory product – from third world countries
- The risk of micro-organisms developing

**Ingredients:**
Various types of dried fruit (apricots, raisins)
Bowl
**Process:**
1. Put the fruit into the bowl
2. Evaluate:
    a) visual look
    b) aroma
    c) taste
    d) consistency

# 4. Alcoholic beverages

## Beer - hygiene and production technology, sensory assesment

### Determination of beer turbidity

- Turbidity is an optical effect.
- Turbidity of beer can be influenced by many factors: the depth of fermentation, the quality of filtration and improper storage of the beer produced (especially very low storage temperatures).
- Turbidity of beer may indicate the presence of undesirable microorganisms
- Turbidity is expressed quantitatively as a value on the conventional formalin scale (European Brewery Convention - EBC).

**Equipments and chemicals:**

Test glasses (cylindrical, flat-bottomed, 105-110 mm high, 57-62 mm inner diameter)
Black mat for side-light testing
Distilled water
Hydrazinium sulphate (concentration cm = 10 g.l-1)
Hexamethylentetramine (concentration cm = 100 g.l-1)

**Process:**

1. Before testing, the beer samples shall be kept at a temperature of 7-10 °C in their original bottles
2. Preparation of the basic suspension (EBC 1000): 25 ml of the hydrazinium solution (cm = 10 g.l-1), measured by pipette, is added successively with stirring to 25 ml of the hexamethylene tetramine solution (cm = 100 g.l-1), also measured by pipette. The mixture of the two solutions is allowed to stand at room temperature for 24 hours during which time turbidity will develop. This basic suspension is stable for two months. The turbidity of the stock suspension is 1000 on the EBC scale.
3. Preparation of the standard suspension: in the first stage, the well mixed stock suspension is pipetted and diluted to 10 times its volume in a volumetric flask with distilled water. This suspension is stable for one week and has a turbidity of 100 on the EBC scale. A further dilution prepares a suspension with a lower turbidity value, which is used on the day of preparation. Distilled water alone is used for the zero value.
4. Before the test, the beer bottle is observed against the light for the presence of sediment before opening it. If the sample contains a clear sediment, no further procedure is necessary. The sample of beer, without any obvious sediment, is brought to room temperature and poured into a glass.
5. The test sample is observed in sight against a graded contrasting background and in side lighting against a dark background. This determines the presence of macroscopic particles, clarity and turbidity of the beer according to the EBC scale.

**Results**

The following terms are used to express the results of the visual assessment of beer clarity and turbidity:

- EBC scale value over 0,4 beer clear (sparkly)
- over 0,4 to 1,0 beer almost clear, without sparkle
- over 1,0 to 2,0 beer slightly turbid
- over 2,0 beer moderately to strongly turbid

## Determination of pH

- Beer acidity is one of the indicators of beer quality.
- Acidity is determined by the content of organic acids produced during fermentation.
- According to legislative regulations, the pH of Czech beer must be between 4,0 and 4,9.

**Equipments and chemicals:**

pH meter
Basin (50 ml volume)
Buffer solution (buffer pH = 7.0 and buffer pH = 4.0)
Distilled water

**Process:**

1. Before measurement, the measuring electrode must be set to buffers pH = 7.0 and pH = 4.0.
2. The basin is pipetted with 20 ml of beer, which must be tempered to 20 °C.
3. The electrode is rinsed with the test sample and then immersed inbasin with sample.
4. The pH value is read directly from the pH meter after the values have stabilised.

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