MILK ANALYSIS

Determination of milk acidity

Task:
Determine in $mol.l^{-1}$ the accurate concentration of volumetric solution NaOH and then, determine the total sourness of milk in °SH.

Principle:
Titration acidity is caused by the consumption of alkali volumetric solution when neutralizing milk (usually, phenolphthalein is used as an indicator). Titration acidity is described in various ways, most frequently according to Soxhlet-Henkel. Lately, it is set as mass content of acids in $mmol.l^{-1}$. Acidity according to Soxhlet-Henkel (SH) gives the number of ml of a volumetric solution NaOH with c= 0.25 $mol.l^{-1}$ needed to neutralize 100 ml of milk using the phenolphthalein indicator. Acidity according to Thorner (T) presents the consumption of NaOH solution with c= 0.1 $mol.l^{-1}$ to neutralize 100 ml of milk using the phenolphthalein indicator. There is a relation between the given figures: SH= T/2.5.

Equation of standardization (determination of an accurate concentration of a volumetric solution):
$2\ NaOH + H_2C_2O_4 \rightarrow Na_2C_2O_4 + 2\ H_2O$

Tools:
Pipettes (50 ml, 10 ml), beakers, titration flasks, burette, graduated flasks 100 and 500 ml, graduated cylinder 50 ml.

Chemicals:
2% ethanol solution of phenolphthalein, NaOH, $H_2C_2O_4 . 2H_2O$.

Procedure:
Preparation and standardization of NaOH
1) Prepare 500 ml of 0.25 M solution of NaOH.
2) Prepare 100 ml of 0.125 M solution of $H_2C_2O_4 . 2\ H_2O$.
3) Pipette 10 ml of NaOH solution into a titration flask, add 20 ml of demineralized water and 3 drops of phenolphthalein.
4) Titrate by oxalic acid solution until bleached. Then, reboil the solution. If it colours to pink again, titrate until colourless.

Determination of milk acidity:
Pipette 50 ml of tested milk and 2 ml of 2% ethanol solution of phenolphthalein into a titration flask. Titrate the mixture by 0.25 M of NaOH until weak pink colouring which must last for 30 seconds.

Assessment:

°SH= V . 2 . K

V .....consumption of volumetric solution 0.25 M of NaOH (ml)

Correction coefficient **K** is calculated:

$$K = \frac{c_s}{c_t}$$

where c_s is the real concentration of NaOH in $mol.l^{-1}$
c_t is the theoretical concentration of NaOH in $mol.l^{-1}$ (0.25 $mol.l^{-1}$).

°SH ... must be between 6.2 and 8.0 according to the Czech standard ČSN 570529.
When °SH > 8, milk tends to condense (the content of milk acid grows gradually in milk).
When °SH < 6, milk can be produced by an ill cow or some alkali detergents contaminated the milk.

ANALYSIS OF SMOKED MEAT PRODUCTS

Determining NaCl via argentometry

Task:
Determine in $mol.l^{-1}$ the accurate concentration of a volumetric solution of $AgNO_3$ and then, determine in % the content of NaCl in a sample of a smoked meat product.

Principle:
The purpose of salting is to rise the preservation and to accentuate the taste, to rise the solubility of myofibril proteins and thus, to create the structure of meat products.
Determination of the content of chlorides in meat or in meat products could be performed via argentometry, where the sample is titrated by volumetric solution of $AgNO_3$ using the K_2CrO_4 indicator while red-brown colouring is created.

Equation of argentometry determination
$Cl^- + Ag^+ \rightarrow AgCl$

Tools:
Titration flasks, burette, pipette (10 ml), beaker (100 ml), graduated flask (100 ml, 200 ml, 500 ml), graduated cylinder 50 ml.

Chemicals:
Carrez I and II, $AgNO_3$, 5% K_2CrO_4, NaCl p.a.

Sample:
Smoked meat product.

Procedure:
Standardization of $AgNO_3$ (determination of the accurate concentration of volumetric solution):

1) Prepare 500 ml of 0.05 M solution of $AgNO_3$.
2) Prepare 100 ml of 0.05 M solution of NaCl p.a.
3) Pipette 10 ml of NaCl solution into a titration flask, add 20 ml of demineralized water and 10 drops of 5% K_2CrO_4.
4) Titrate by $AgNO_3$ solution until brown-red colouring.

Preparing the spare solution:
Weigh 20 g of a homogenized sample into a 200 ml graduated flask and clarify by a 10 ml solution of Carrez I and by a 10 ml solution of Carrez II. Mix and fill by distilled water up to the mark. Then, filter.

Argentometric determination of chlorides:
Pipette aliquot ratio (10 ml) of the spare sample´s filtrate into a titration flask, add 2 ml of 5% K_2CrO_4 and titrate 0.05 M of $AgNO_3$ until red-brown colouring.

Assessment:
Calculate in % the content of NaCl.

If the product contains more than 2.5 % of salt, its content must be given in the food package. The recommended content of salt in meat products is given in the Table 4.

Tab. 4: Maximal recommended content of salt in some meat products (Saláková, 2014).

Product	**NaCl (%)**
Cooked meat products	2.5
Small meat products, bologna sausages, baked meat products	2.8
Cooked dry meat products	3.5
Non-cooked dry products	4.2