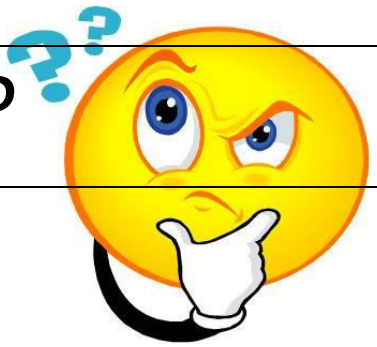
Is this milk fresh?



I) Objective :

Lactose is the main carbohydrate in milk. In presence of certain bacteria, there is a lactic fermentation: **Lactose is slowly transformed into lactic acid**.

The measurement of the acidity makes it possible to determine the quantity of lactic acid in the milk. We can deduce its state of freshness and its degree Dornic.

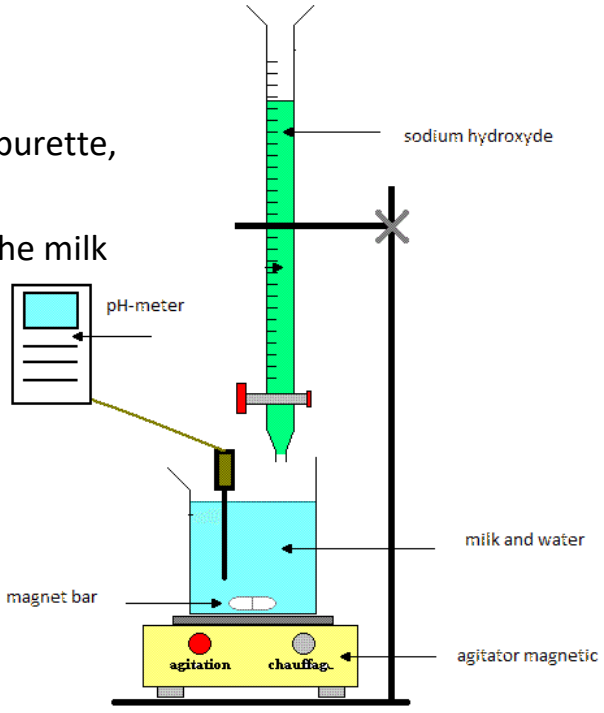
Definition: ***1°Dornic milk containing 0,1g of lactic acid per liter.***
The milk is fresh, if its °Dornic is inferior to 18°Dornic (<1,8 g per liter)

II) Principle :

The lactic acid of the milk is dosed by a sodium hydroxide solution with colored indicator (phenolphthalein).
When the quantity of soda is insufficient the phenolphtalein will be colorless.
When the quantity will be sufficient, the phenolphtalein becomes pink.

III) Manipulation :

-Put the sodium hydroxide solution in the graduated burette, ajust to zero;
-With a graduated pipette, take 20mL of milk and fil the milk in the beakerflask;
-Add 100mL of distilled water with a graduated Cylinder;
-Add 15 drops of phenolphthalein;
-Place the beakerflask on the magnetic agitator, and shake slowly. Add mL per mL the sodium hydroxide solution, note the pH values.

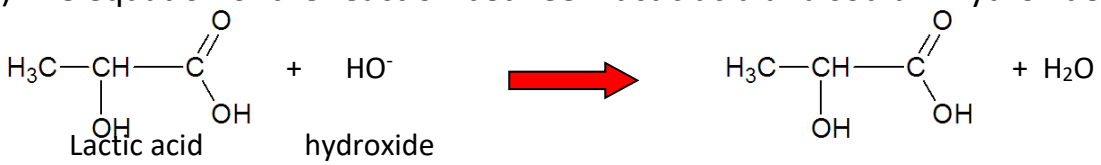


-Write the volume V_{HO^-} of sodium hydroxide poured :

V_{HO^-}= mL

IV) Results :

1) The equation of the reaction between lactic acid and sodium hydroxide is:



2) The sodium hydroxide solution is **c = 0.05 mol.L^{-1}**. The quantity of OH^- ions contained in the volume V_{OH^-} of sodium hydroxide used to dose the milk is deduced from:

$n(HO^-) = c \times v_{HO^-}$

n_{HO^-}= mol

3) The equation shows that there is as much acid as hydroxide:

n(acidelactique)= n_{OH^-} = mol ***in 20 mL of milk***

4) Determine the molar mass M of lactic acid $C_3H_6O_3$

Given values: *M(C) = 12g.mol^{-1}* *M(H) = 1g.mol^{-1}* *M(O) = 16g.mol^{-1}*

M= g.mol^{-1}

Mass of lactic acid **in the 20 mL** of milk: m = n x M = g

5) Determine the mass of lactic acid in **1liter of the milk**.

m =	20mL
m in 1 liter	1L=1000ml

m = g of lactic acid in 1L of milk

Calculate his **Dornic acidity**:

Is this milk still fit for consumption?

OR