Maryam Maheri

10/17/2013

Section A07, Thu 9-11:50 am

Partner: Sh. G

Lab 2.1-2 (measuring pH of foods we consume)

Objective:

The purpose of this lab was 2 things. 1-to identify the concentration of NaOH and 2- use the NaOH that we made in the first lab to measure the PH of the Grape, apple, orange juice and Mozzarella and cheddar cheese in the lab.

Introduction:

Many physical problems and diseases can be caused by the foods that are acid producing after digestion. They can increase the secretion of our gastric juice (gastric acid) in our stomach and cause heart burn or even more serious problems. Our diet is largely composed of acid forming foods such as proteins and sugars. Products like coffee, tea, and alcohol can also increase the acidity of our stomach. pH is a measure of the acidity of a solution . The pH of any solution is the measure of its hydrogen ion concentration. The higher the pH means the solution is more basic. The lower the pH reading, the more acidic it is. The pH range is from 0 to 14, with 7.0 being neutral. Anything above 7.0 is basic, anything below 7.0 is considered acidic. Human blood pH should be slightly basic. Anything out of the normal range makes human sick. Our body always tries to keep homeostasis and its equilibrium.

An imbalanced diet high in acidic producing foods such as animal protein, caffeine can make it difficult for our body to do its job and keep the pH in balance. At this time our body uses the minerals as buffers to help maintain the pH of the body. So it is very important for our health that we keep our diet balanced. In this lab we tried to find the pH for 3 kinds of juices and 2 kinds of cheese that we usually consume.

Procedure:

"The procedure followed for the experiment is found in "Principles of
Food Composition Laboratory Manual" (2013) Experiment 2, Acidity in Foods, pages: 11-26
Only few things were changed in Lab 2 from the manual.

First difference was that we had to add the water first and then the cheese into the blender. And second, 50 ml of the cheese mixture was added not 25ml.

Data/Result:

Table 1: (data from the entire class)

Group No.	Juice/ Cheese	Juice Vol. NaOH Added(mL)	Juice E P. PH	Juice Brix	Cheese weight	Cheese NaOH Added(ml)	Che ese start PH	Chees e E. PH	Chees e Brix	[NaOH]
1	O/M	25.10	8.14	11.90	12.20	2.70	5.73	8.14	0.50	0.1093
2	O/C	26.05	7.79	11.90	12.10	6.05	5.52	7.79	1.10	0.1048
3	O/M	24.00	7.58	11.90	12.10	2.70	5.87	7.91	0.50	0.1093
4	O/C	24.10	7.35	11.90	12.00	6.60	5.31	7.94	0.80	0.1110
5	A/M	10.02	8.05	11.70	12.10	2.05	5.79	8.69	0.70	0.1290
6	A/C	12.40	6.88	11.60	12.30	12.00	5.86	8.47	1.10	0.1227
7	A/M	15.55	9.44	11.60	12.00	3.35	5.42	8.58	0.60	0.1088
8	A/C	19.99	8.73	11.60	12.00	1.10	5.50	8.19	1.10	0.1207
9	G/M	21.58	6.04	15.50	12.00	4.99	6.41	7.97	0.90	0.1220
10	G/C	22.15	7.98	15.50	12.07	5.75	6.15	7.90	0.90	0.1234
11	G/M	20.89	6.80	15.50	12.07	3.50	5.95	8.20	0.80	0.1170
12	G/C	31.55	6.53	15.60	12.20	15.20	5.97	8.20	1.20	0.1200

Table 2 (titration)

Volume(mL)	PH
13.72	3.96
14.23	4.26
14.67	4.41
15.10	4.52
15.67	4.62
16.30	4.73
16.90	4.82

17.50	4.91
18.20	4.97
18.90	5.05
19.70	5.14
20.42	5.29
20.85	5.38
21.41	5.42
21.83	5.48
22.63	5.58
22.85	5.67
23.30	5.83
24.00	5.92
24.32	6.10
24.42	6.19
24.62	6.39
24.80	6.48
25.12	6.58
25.31	6.98
25.62	7.18
26.00	7.38
26.21	7.72
26.41	7.97
26.70	8.44
27.00	9.04
27.13	10.03

Table 3 (KAP value)

	Start Volume mL NaOH	End Volume mL NaOH	PH
KAP-1	11.40	26.51	7.16

KAP-2	26.30	40.55	9.66
KAP-3	0.00	13.70	10.12
KAP-4	13.72	22.85	3.96
Unknown# 606	27.10	39.96	6.74
Unknown # 583	28.08	41.31	7.05

Table 4

GRAPE JUICE Titration	
Volume(ml)	**pH**
0.52	3.06
1.10	3.09
1.51	3.13
2.08	3.19
2.51	3.22
3.01	3.26
3.50	3.32
4.02	3.36
4.51	3.41
5.00	3.45
5.56	3.50
6.01	3.55
6.52	3.60
7.01	3.66
7.51	3.71
8.12	3.83
8.61	3.85
9.10	3.89
9.51	3.95
10.02	4.05

10.52	4.08
11.00	4.11
11.52	4.19
12.02	4.24
12.62	4.33
13.13	4.42
13.63	4.47
14.30	4.56
14.78	4.66
15.21	4.76
15.60	4.85
16.01	4.96
16.50	5.07
17.12	5.25
17.60	5.35
18.00	5.54
18.61	5.56
19.53	5.83
19.50	6.03
19.70	6.11
19.90	6.18
20.08	6.21
20.20	6.29
20.45	6.40
20.53	6.45
20.70	6.52
20.89	6.80
21.00	6.84
21.12	6.89

21.25	6.91
21.40	7.01
21.51	7.12
21.60	7.15
21.73	7.22
21.85	7.26
21.95	7.34
22.09	7.39
22.20	7.52
22.39	7.60
22.45	7.63
22.60	7.65
22.72	7.70
22.90	7.76
23.10	7.84
23.28	7.88
23.30	7.96
23.42	8.03
23.60	8.08
23.71	8.12
23.82	8.16
24.00	8.27
24.23	8.36
24.40	8.43
24.51	8.44
24.70	8.59
24.81	8.64
25.03	8.67
25.18	8.79

25.32	8.83
25.40	8.89
25.50	8.95
25.73	9.01
27.72	9.09
29.81	9.18
31.83	9.39
33.78	9.52
35.80	9.65
37.89	9.73
39.90	9.87
41.91	10.02

Brix of cheese: 0.80

Brix of grape juice: 15.5

Table 5

Cheese Titration	
Volume (ml)	**PH**
0	5.95
0.18	5.98
0.27	5.99
0.40	6.02
0.51	6.06
0.60	6.10
0.80	6.15
0.91	6.19
1.08	6.21

1.21	6.24
1.30	6.28
1.41	6.30
1.60	6.35
1.71	6.38
1.80	6.40
2.10	6.44
2.28	6.52
2.54	6.59
2.71	6.73
2.92	6.93
3.08	7.17
3.30	7.35
3.41	7.53
3.50	8.20
3.71	8.57
3.90	9.04
5.80	9.84
7.69	10.38
9.81	10.56
11.91	10.68
13.80	10.88
15.92	11.03
17.93	11.15
19.79	11.29
21.98	11.40
23.91	11.52
25.85	11.65
27.90	11.71
29.81	11.80
31.84	11.83

33.90	11.88
35.78	11.97

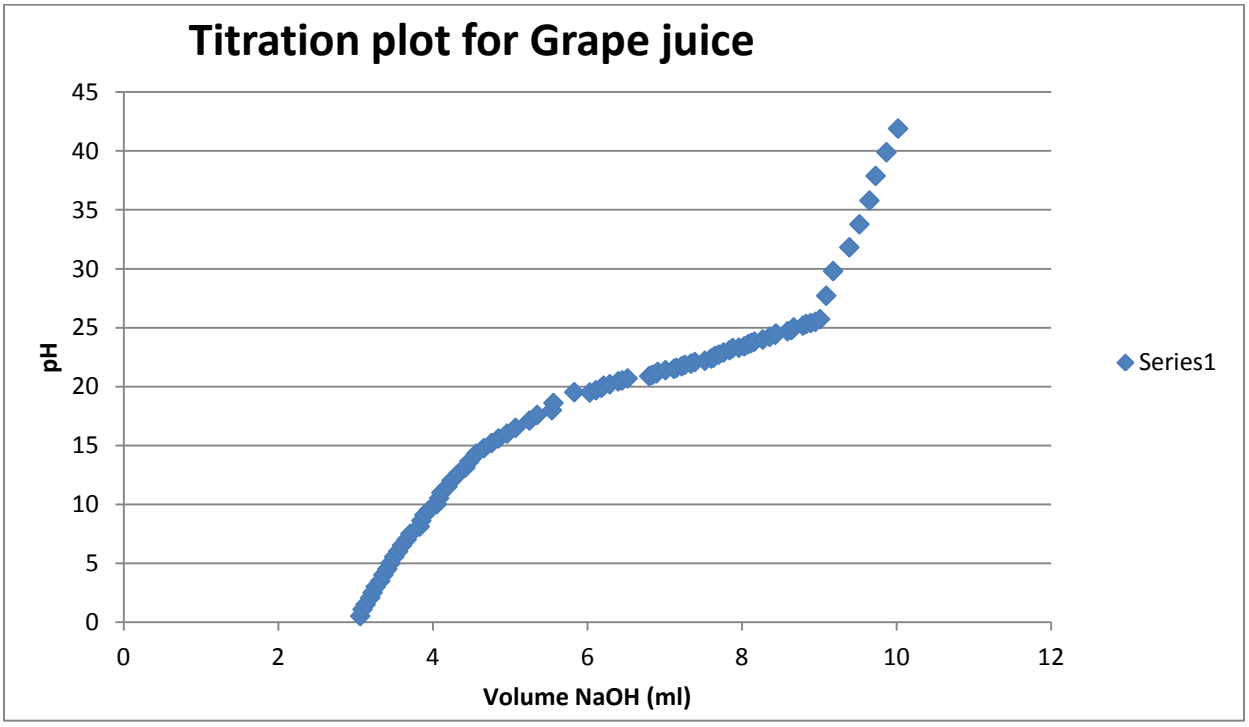
Rank of the foods based on sourness(vise versa would be the sweetness of them):

Sourness of juices: orange juice **>** grape juice**>** apple juice

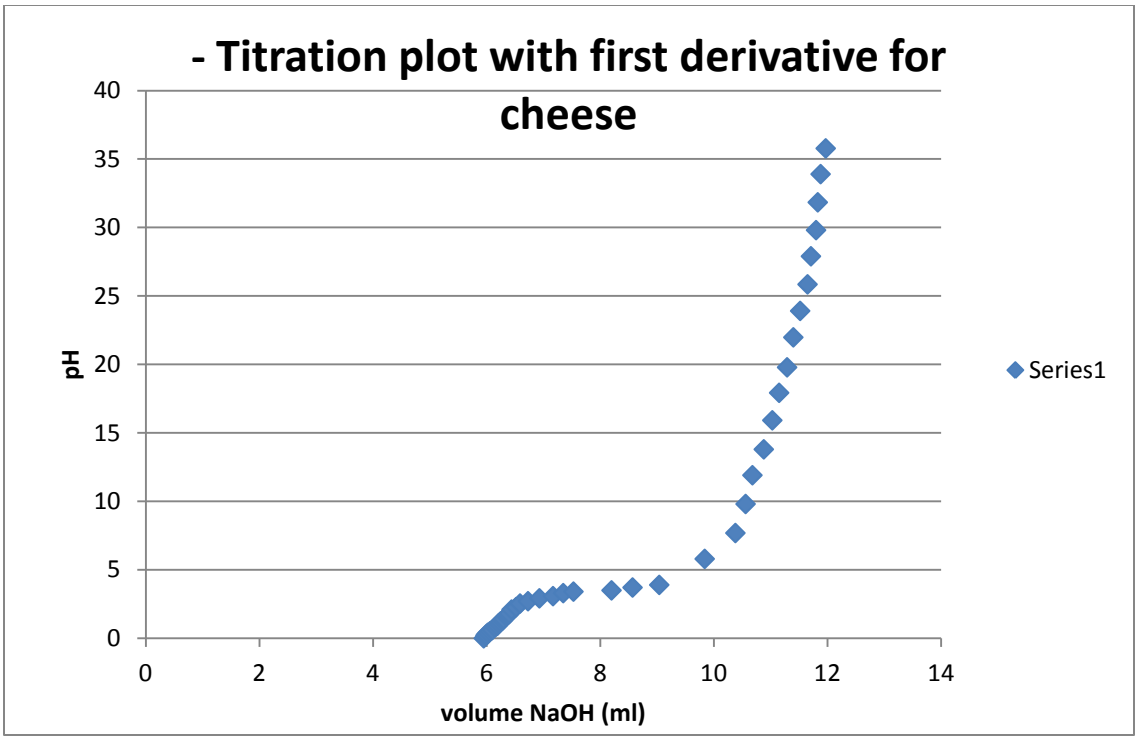
Sourness of chesses: Mozzarella **<** cheddar

Sourness of vinegar: B>S>C>D

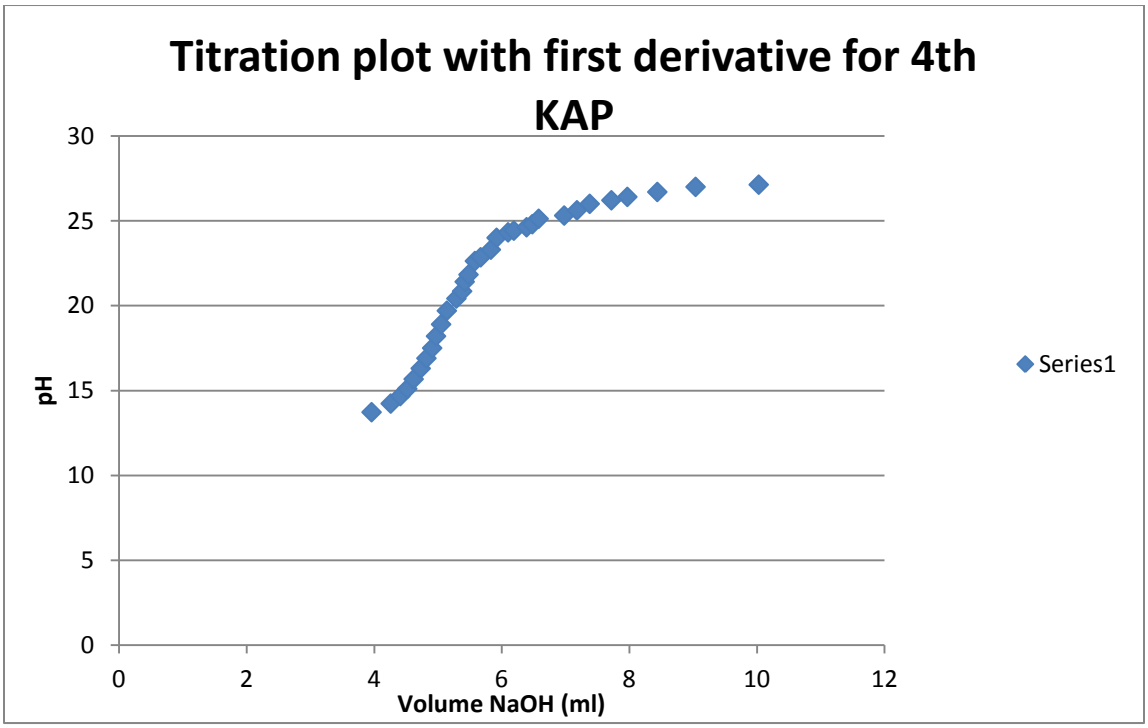
Graph 1 (Titration plot with first derivative for juice):



Graph2 (Titration plot with first derivative for cheese):



Graph 3 (Titration plot with first derivative for 4th KAP):



Calculation:

Calculation for NaOH Concentration:

N[NaOH]=((weight KAP(g))/204.22(g/mol))x1000)/Volume added(mL)

Calculation for Mass of Unknown KAP:

N[NaOH]=((weight KAP(g))/204.22(g/mol))x1000)/Volume added(mL)

Calculation for NaOH Concentration of Unknown KAO 606:

0.114= ((X(g)/204.22(g/mol))x1000)/12.86(mL))

X=(0.114)(204.22(g/mol))(12.86(mL))/1000

X=0.2994(g)

Using this mass to compute the concentration of NaOH:

X=((0.2994(g)(204.22(g/mol)x1000)/12.86(mL))

[NaOH]=0.1252

Calculation for NaOH Concentration of Unknown KAO 583:

0.114= ((X(g)/204.22(g/mol))x1000)/13.23(mL))

X=0.3080(g)

Using this mass to compute the concentration of NaOH:

X=((0.3080(g)(204.22(g/mol)x1000)/12.86(mL))

[NaOH]=.1238

%acidity= NE/10

%acid=0.117*67.05/10= 0.78

Discussion:

As it was said in the introduction, knowing the pH of the food is very important for our health. We have tasted 3 different vinegar and 3 different juices and 2 kinds of chesses in lab. We ranked them in order of their sourness and sweetness. Based on their sourness in juices we got Oj>Gj>Aj and Grape juice had the best balance of sugar to acid. Based on sourness in vinegar we got B>S>C>D and C had the best balance of sugar to acid. Cheddar cheese was the most acidic cheese and the sweetest was mozzarella cheese. We have calculated the molarity of NaOH in the first week which was 0.1170M. In part 2 of lab 2 we had to get the KAP for 4 known items and a KAP for an unknown. For the second lab we used the NaOH that we made on the first part to determine the pH of juices and cheeses that were assigned to us. The concentration of NaOH of for the whole class was close to each other. Our bench was assigned to work with mozzarella cheese and grape juice. All groups got similar data with a bit difference. For example the PH end point for group 10 was slightly higher than other group's results.

Brix number is the sugar content of an aqueous solution. The Brix for grape juice which is for all the groups was same.

Data of the class for the cheese experience were different. We all had to get 12 g of cheese but we got different amount of NaOH volume. The pH we got for this experiment was similar to the rest of class. Of course there result were not exactly the same but we know factors like different concentration of NaOH and different amount of cheese and pH start point could affect the result we got.

Conclusion:

It was a great experience to be able to taste the food that we were working with in the lab.

As it was mentioned the acidity of food is very important in food industry and our health.

We should take care of our health by keeping a balanced diet. In this lab we learned the methods of how to get the pH of foods. The method we used to get the pH of food was useful and accurate and kind of fun.

Questions:

2.1

1- NaOH reacts with CO_2 forming sodium carbonate and in order to make standard NaOH solution shouldn't have sodium carbonate.

2- pH was 5.58. The pH had the biggest fluctuation among others.

3- I didn't receive any data for this question.

2.2 questions

1- Yes. Our BX and acidity of the juice was around the accepted limit.

2- Yes. The pH value depends on the volume titrated and the pH is indictors for acidity.