Determination of Formaldehyde on Meatballs using Potentiometric and Spectrophotometric Methods

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INTRODUCTION

- Formaldehyde is very widespread covering several fields, one of which is as an additive in food
- BPOM report that food on the market include: salted fish, tofu, wet noodles, super chicken noodles, curly noodles and noodles, 70% of them contain formaldehyde in harmful levels which exceeds 3000 ppm

Quantitative analysis of formaldehyde

Standard method : spectrophotometric method (formation of a purple dibenzoxantylium cation complex with chromotropic acid) and observed at 580 nm

Disadvantage : Need a long time and the instrument is quite expensive

Alternative method is the ion selective electrode based on the potentiometric method.

Several potentiometric method for determination formaldehyde :

- Sutrisno and Dewi made formaldehyde sensor based on Ion Selective Electrode (ISE) tube type and coated wire type made from aliquat 336, the results obtained 0.1 M formaldehyde
- Bagus using chitosan as an ionofor the results obtained 2.78 ppm formaldehyde

In this research, it will be conducted to compare the spectrophotometric method and the potentiometric method (using celluloce acetate as an ionofor) in the determination of formaldehyde.

MATERIAL AND METHODS

Materials

The tools used include: glassware, magnetic stirrer, Uv.Vis spectrophotometer, potentiometer, electrode Ag/AgCl. The materials used include: formaldehyde, HCl, NaOH, H_3PO_4, $Na_2S_2O_5$, chromatophic acid, H_2SO_4, aquadest.

METHODS

Determination of formaldehyde using spectrophotometric method

Solution	Addition volume				Ppm Formaldehyde (25 ml)
	100 ppm formaldehyde	4.6% $Na_2S_2O_5$	8.8% chromic acid	96% H_2SO_4	
Blanko	0	2.5	0.1	3	0
1	0.5	2.5	0.1	3	2
2	1	2.5	0.1	3	4
3	1.5	2.5	0.1	3	6
4	2	2.5	0.1	3	8
Sample (2 ml)		2.5	0.1	3	

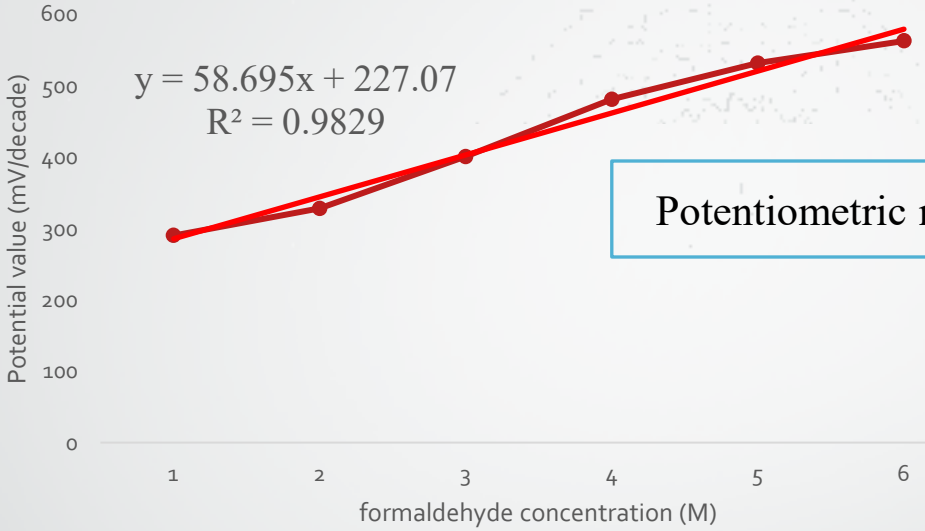
Absobance measure at 580 nm

Determination of formaldehyde using potentiometric method

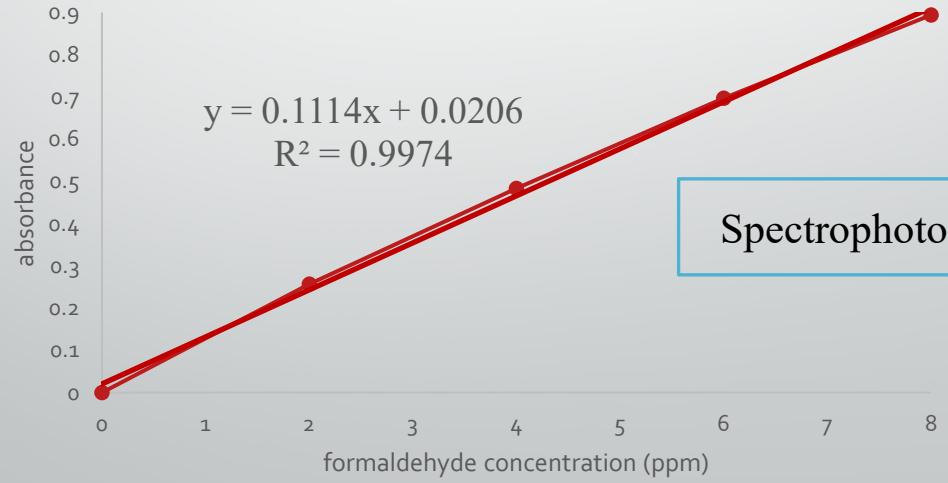
Stok solution (M)	Volume of formaldehyde taken (ml)	Standard solution of formaldehyde (M) in 25 ml
1	2,5	10^{-1}
10^{-1}	2,5	10^{-2}
10^{-2}	2,5	10^{-3}
10^{-3}	2,5	10^{-4}
10^{-4}	2,5	10^{-5}
10^{-5}	2,5	10^{-6}

Measure the potential value

RESULT AND DISCUSSION



Potentiometric methods



Spectrophotometric methods

RESULT AND DISCUSSION

Table 3. Formaldehyde measurement using spectrophotometric methods and potentiometric methods

Formaldehyde concentration	Spectrophotometric methods	Potentiometric method	T count	T table
1	$1{,}275 \pm 2{,}55.10^{-3}$	1,403±1,73	-0,141	3,182
2	$2{,}071 \pm 2{,}121.10^{-3}$	2,075±1,58		
3	$2{,}978 \pm 2{,}236.10^{-3}$	3,069±0,71		
A	1.31	1.45		
B	2.08	2.09		
C	2.98	3.10		

Based on Table 2 it can be seen that the results of formaldehyde measurement using the spectrophotometric method and potentiometric methods give results that are not much different. This indicates that the formaldehyde sensor based on potentiometric methods has a fairly good measurement accuracy.

CONCLUSION

Based on the results of this research, it can be concluded that the determination of formaldehyde content using formaldehyde sensor based on potentiometric methods provides measurement results that are not significantly different compared to the spectrophotometric method

THANK YOU FOR THE ATTENTION

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