



Capsaicin Levels In Poblano And Jalapeño Pepper Concentrate

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ABSTRACT

Recently three pepper types were extracted during a trial, green bell, Poblano, and Jalapeño. The heat in peppers comes from capsaicin which in the past has been measured by Scoville heat units (SHU) as measured by a sensory panel but has been replaced with an HPLC method. Analyzing Poblano and Jalapeño determined that their concentrates had SHU values of 2152 and 2286 compared to fresh Jalapeño which had a SHU value of 3281. It is therefore hypothesized that capsaicin was degraded during this first trial.

INTRODUCTION

Peppers which originated in the Americas, belong to the Capsicum genus and contain numerous varieties. Many cultivars contain capsaicin which is the chemical responsible for the heat associated with peppers. Bell peppers contain a recessive gene for capsaicin production and therefore contain little to no capsaicin. Poblano peppers are a mild pepper while Jalapeño peppers are considered medium. Bell, Poblano, and Jalapeño are all in the *C. annuum* species. The popular Tabasco pepper belongs to the *C. frutescens* species, while the hottest peppers belong to the *C. chinense* species. *C. chinense* contains such varieties as Habanero and the two hottest peppers, Dorset Naga and Naga Jolokia.

The method of determine the hotness of a pepper was originally an organoleptic test developed by Scoville. The Scoville method was conducted by diluting a pepper with sugar water until there was no perceived heat. The dilution factor was the Scoville Heat Unit (SHU). Since this test relied on sensory data involving humans, the ratings are fairly imprecise due to the variability in sensitivity to capsaicin by the panelists. Therefore an analytical method was prepared which measured the capsaicins directly using HPLC.

Three pepper concentrates (bell, Poblano, Jalapeño) were processed at Sensus recently. It is important to know the SHU values for the concentrates. Therefore the ASTA method was performed to determine the capsaicin levels.

MATERIALS AND METHODS

An Agilent 1200 series HPLC system (Palo Alto, CA) was used for this analysis. The system contains a mobile phase degasser, quaternary pump, autosampler, thermostated column compartment, and diode array detector with an eclipse XDB-C18 4.6x150mm column. Mobile phase was 48.4% methanol, 30.2% water, 13.3% dioxane, 7.9% acetonitrile, 0.2% of 2% perchloric acid. The flow rate was 1mL/min and the absorbance at 280nm was measured.

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Capsaicin standard was purchased from Sigma and ran at 780, 390, 195, 92, 46, and 23 to prepare a calibration curve. 10 g of sample (jalapeno and poblano concentrate and fresh jalapeno pepper (80:20 with water)) was added to 90g of sodium acetate saturated ethanol and placed in a water bath for 3 hours with occasional swirling. A calibration curve was prepared and the unknowns quantitated. The ppm of capsaicin is equal to the ASTA pungency. Scoville heat units are 15*ASTA.

RESULTS AND DISCUSSION

As can be seen in Table 1, the results for fresh Jalapeno pepper fall within the reported range. This gives an indication that the method was being properly used. This however, only highlights the very low SHU reported for Poblano and Jalapeno concentrates. These values should have been approximately ten times as high and instead were actually lower than a single strength pepper. This explains why so much of the concentrate was needed to provide heat in the sample products made in the lab.

Assuming that these results are accurate, there is the question of why the capsaicin is reduced in the concentrates. There are several possibilities. It could be the thermal heat of extract or concentration destroys the capsaicin. Another possibility is that the enzyme used to enhance flavor extraction reacts with the capsaicin.

Additionally, there seemed to be a color change during processing. Figure 1 is a photo of the concentrate and fresh jalapeno when 10g were dissolved in 90g of ethanol (saturated with sodium acetate). Notice the dramatic color difference. This is another factor that would need to be addressed during future runs.

If peppers are done again, samples must be taken of the non-volatile fraction at various points and the capsaicin measured to determine where the loss is occurring so that it can be avoided.

Figure 1. Jalapeno concentrate and fresh jalapeno in ethanol
 Jalapeno Conc. Fresh Jalapeno



Table 1. Capsaicin and SHU for peppers

Product	ASTA	SHU	Reported SHU
Poblano conc.	144	2152	1000-1500
Jalapeno conc.	152	2286	2500-8000
Fresh Jalapeno	219	3281	2500-8000

REFERENCE CITED

http://www.zarc.com/english/cap-stun/tech_info/oc/hplc.html