



**EVALUATION OF DIRECT OZONE
DEPURATION ON SHELF-LIFE OF FRESH
TROPICAL OYSTERS (*CRASSOSTREA
IREDALEI*)**

by

TEOH QI YIN

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**PUSAT PENGAJIAN TEKNOLOGI
INDUSTRI UNIVERSITI SAINS
MALAYSIA**

**BORANG PENYERAHAN DISERTASI
MUTAKHIR SATU (1) NASKAH**

Nama penyelia: Dr. Musfirah Zulkarnain

Bahagian: Teknologi Makanan

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Encik/Puan Cik Teoh Qi Yin

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Sekian, terima kasih.

(Tandatangan dan cop)

DR. MUSFIRAH ZULKURNAIN
Food Technology Division
School of Industri Technology
Universiti Sains Malaysia
11800 Penang, Malaysia
musfirah.z@usm.my

16/8/2021

Tarikh

DECLARATION OF AUTHOR

This dissertation is composed of my original work and contains no material previously published or written by another person except where due reference has been made in the text. The content of my dissertation is the result of work I have carried out since the commencement of my research project and does not include a substantial part of work that has been submitted to qualify for the award of any other degree or diploma in any university or other tertiary institution.

(TEOH QI YIN)

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LIST OF ABBREVIATIONS

| Abbreviations | Captions |
|----------------------|--|
| ANOVA | Analysis of variance |
| ASW | Artificial seawater |
| BHT | Butylated hydroxytoluene |
| BOBP | Bay of Bengal Programme |
| cfu | Colony-forming unit |
| CPF | Contact plate frozen |
| DNA | Deoxyribose nucleotide |
| FAA | Free amino acids |
| FRI | Fisheries Research Institute |
| HIV | Human immunodeficiency virus |
| IDRC | International Development Research Centre |
| IQF | Individual quick freezing |
| ISSC | Interstate Shellfish Sanitation Conference |
| MPN | Most probable number |
| NSSP | National Shellfish Sanitation Programme |
| PCR | Polymerase chain reaction |
| ppm | Part per million |
| ppt | Part per thousand |
| QMRA | Quantitative microbial risk assessment |
| rpm | Revolutions per minute |
| RSM | Response surface methodology |

| | |
|--------|--|
| TPC | Total plate count |
| TVB-N | Total volatile basic nitrogen |
| US | United State |
| US FDA | United States Food Drug Administration |
| USM | University Science Malaysia |
| UV | Ultraviolet |

LIST OF SYMBOLS

| Symbol | Captions |
|--------------------|------------------------------|
| $^{\circ}\text{C}$ | Degree Celsius |
| $>$ | More than |
| $<$ | Less than |
| \pm | Plus and minus |
| R^2 | Coefficient of determination |
| \AA | Angstrom, 10^{-10} m |

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Appendix Caption

- A Perturbation graph of TPC, total coliforms, fecal coliforms, *Vibrio cholerae*, pH value and number of survival days of treated samples with different levels of ozone concentration and depuration time.

EVALUASI DEPURASI OZON LANGSUNG KE ATAS JANGKA HAYAT TIRAM TROPIKA YANG SEGAR

ABSTRAK

Depurasi ozon langsung merupakan process rawatan yang berpotensi untuk merawat tiram tropika yang segar untuk memastikan keselamatan dan memelihara kualiti tiram tropika, terutamanya untuk tiram tropika yang akan dimakan secara mentah. Kualiti tiram tropika yang dirawat dengan depurasi ozon langsung dipengaruhi oleh kepekatan ozon dan masa depurasi yang berbeza tahap secara ketara. Kajian semasa telah berjaya membuktikan kepekatan ozon yang lebih tinggi dan masa depurasi yang lebih panjang dapat mengurangkan bilangan mikrobs dan memperlambatkan degradasi protein dengan ketara, sementara memelihara kesegaran dan mengelakkan kerosakkan tiram tropika. Spesies bakteria yang terdapat dalam tiram tropika dikurangkan pada kadar yang berlainan disebabkan bilangan microbes yang berlainan, variasi komposisi kimia tiram tropika, kepekaan spesies bacteria terhadap ozon dan perbezaan sel bakteria. Koliform fecal dan *Vibrio cholerae* menunjukkan sensitiviti yang rendah terhadap rawatan ozon berbanding dengan spesies bakteria yang lain dalam kajian ini. Walaupun begitu, kepekatan ozon yang lebih tinggi dan masa depurasi yang lebih panjang mempunyai kesan buruk terhadap kelangsungan hidup tiram tropika, iaitu jangka hayat tiram tropika yang dirawat adalah lebih pendek berbanding dengan tiram tropika yang segar.

EVALUATION OF DIRECT OZONE DEPURATION ON SHELF-LIFE OF FRESH TROPICAL OYSTERS

ABSTRACT

Direct ozone depuration is a potential post-harvest processing method used to treat fresh tropical oysters to ensure the safety and preserve the quality of tropical oysters especially those that are usually being eaten raw. The quality of the tropical oysters undergoes treatment was significantly affected by different levels of ozone concentration and depuration time. The present study successfully proved that higher ozone concentration and longer depuration time significantly reduced the microbial loads and slow down protein degradation while maintaining the freshness and preventing the spoilage of tropical oysters. The bacteria species present in tropical oysters reduced at a different rate due to the different initial microbial loads, variation of chemical composition in tropical oysters, sensitivity or persistency of bacteria species towards ozone and inherent differences in bacteria cells. Fecal coliforms and *Vibrio cholerae* showed less sensitivity towards ozone treatment than other bacteria species in this study. Despite this, higher ozone concentration and longer depuration had a detrimental effects on the survival of tropical oysters whereby the shelf-life of treated tropical oysters was shortened as compared to the fresh tropical oysters.