APPENDICES

Appendix 1

Bradford Protein Assay

Table 1 below shows amounts of solution containing bovine serum albumin (BSA), distilled water and Bradford reagent to be mixed, for the preparation of protein standard curve. Each mixture was prepared in replicate and analyzed spectrophotometrically using UV-vis spectrophotometer at the wavelength of 595 nm.

Table 1: Amounts of Bovine Serum Albumin (BSA) Solution, Distilled Water and Bradford Reagent for the Preparation of Protein Standard Curve

Mixture	Bovine Serum Albumin (µL)	Distilled water (µL)	Bradford reagent (mL)
1[a]	0	100	5
2	20	80	5
3	40	60	5
4	60	40	5
5	80	20	5
6	100	0	5

[a] Mixture 1 was considered as blank solution without protein.

On the other hand, equal amounts (50 µL) of sample (supernatant) and distilled water were mixed with Bradford reagent for the determination of protein, as shown in Table 2, below. The amount of protein in the sample was determined based on the protein standard curve constructed (Figure B).

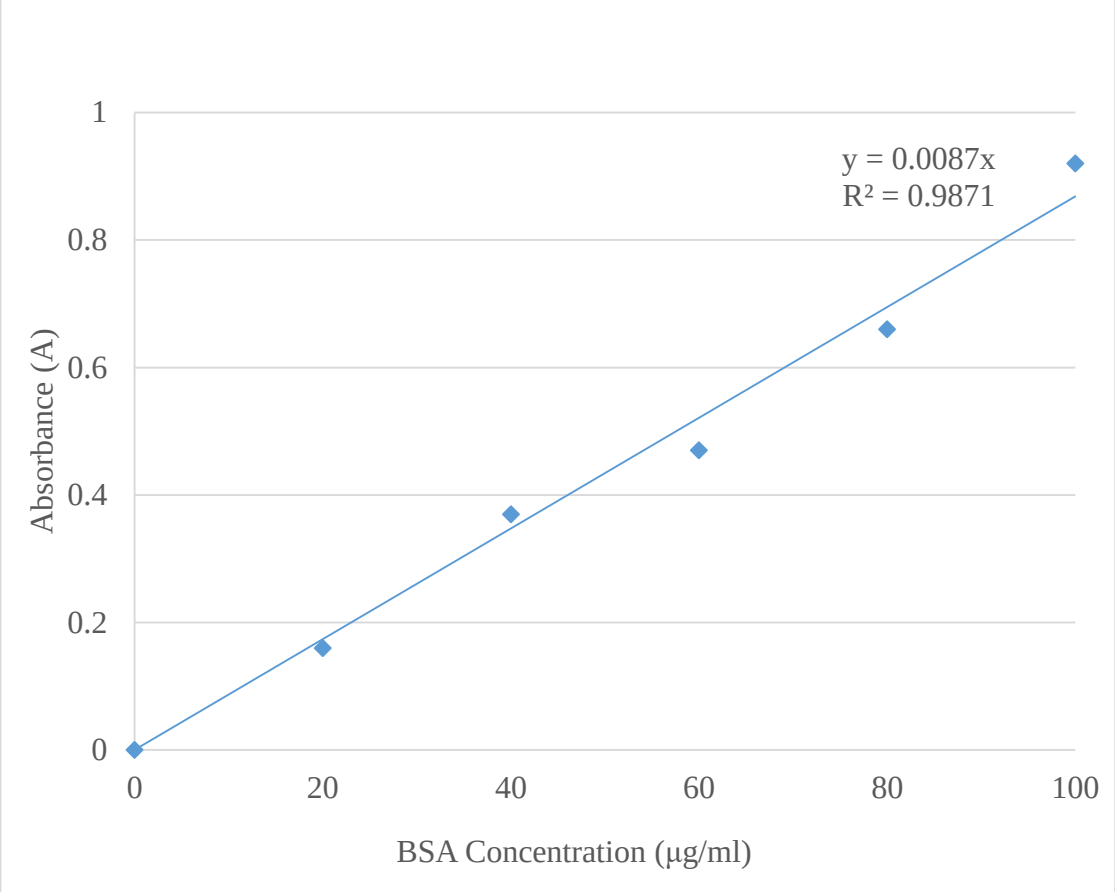
Table 2: Amounts of Sample Needed for the Protein Determination

Sample (µL)	Distilled water (µL)	Bradford reagent (mL)
50	50	5

Appendix 2

Protein Standard Curve

Figure B shows the protein standard curve which was constructed based on the data obtained in the Bradford protein assay, using BSA as standard protein.



Appendix 3

Fourier Transform Infrared Spectroscopy Absorption Peaks of Major Functional Groups

Functional Groups		Wavenumber (cm^{-1})
O-H	Aliphatic and aromatic	3600 – 3000
NH_2	Secondary and tertiary	3600 – 3100
C-H	Aromatic	3150 – 3000
C-H	Aliphatic	3000 – 2850
C=N	Nitrile	2400 – 2200
C=N-	Alkyne	2260 – 2100
COOR	Ester	1750 – 1700
COOH	Carboxylic acid	1720 – 1706
C=O	Aldehydes and ketones	1740 – 1660
$CONH_2$	Amides	1720 – 1640
C=C-	Alkene	1670 – 1610
R-O-R	Aliphatic	1160 – 1060

Appendix 4

List of Publications

1. Hana Meftah Elgubbi, Siti Salhah Othman, Farah Wahida Harun. 2017. Organo-Modified Bentonite as Potential Support for the Immobilization of *Candida rugosa* Lipase in the Synthesis of Esters. *Proceedings of the Kolokium Siswazah Sains dan Teknologi 2017*.

2. Hana Meftah Elgubbi, Siti Salhah Othman, Farah Wahida Harun. 2018. Preparation and Characterization of Organo-kaolinite Using Benzyltriethylammonium Chloride as a Surfactant. *Proceedings of the 2nd International Conference on Applied Sciences and Industrial Technology*.

3. Elgubbi, H.M., Othman, S.S. & Harun, F.W. 2020. Modification of Kaolinite Clay Using Benzyltriethylammonium Chloride as a Surfactant: Preparation and Characterization. *International Journal of Engineering and Technology* 9(4), 850 - 856.

4. Elgubbi, H.M., Othman, S.S. & Harun, F.W. 2021. Comparative Study on Lipase Immobilized onto Organo-Cation Exchanged Kaolin and Metakaolin: Surface Properties and Catalytic Activity. *Bulletin of Chemical Reaction Engineering & Catalysis* 16(2), 214 - 233.

BIODATA OF AUTHOR

Hana Meftah Elgubbi (Matric No: 4150256) was born on the 5th March, 1988. She is Libyan by Nationality. She is currently living at block A-10-02 Pearl Avenue condominium, Jalan Wan Siew, Off Jalan 7/1 in Taman Sepakat Indah, Kajang, Selangor, Malaysia. In 2010, she obtained her Bachelor of Science degree in Microbiology from Misurata University, Libya. With the aim of exploring knowledge and skills of the field, in 2015, she obtained her Master Degree in Food Biotechnology at Universiti Sains Islam Malaysia, Bandar Baru Nilai, Malaysia (USIM). In February 2017, she pursued her Doctor of Philosophy degree in Science and Technology, in the same university.