Supplementary Document - M.Sc. Project Report and M.Phil./Ph.D. Thesis

It is mandatory to consult the PGIS Handbook when writing project reports. Given below are some supplementary information.

- The entire report should have 1.5 line spacing except the abstract, table titles, figure captions, list of figures, table of contents and abbreviations, which should have single line spacing.

- Use the following guidelines for the abstract page.

Title	Upper case, bold type, centred, font size 14 Keep two line spacing.
Name	Initials followed by last name, bold type, centred, font size 12 Keep one line spacing.
Affiliation	Affiliation should run on a single line (centred) in font size 10. The PGIS affiliation must be included. The place where the research was carried may also be included as the second affiliation. There should be no line spacing between the two affiliations. Keep two line spacing before the first paragraph.
First paragraph	Justify both left and right, font size 12. Keep one line spacing between the first paragraph and the second paragraph (if applicable).
Second paragraph	Justify both left and right, font size 12.

Note: Use the format of the specimen attached as an example.
The abstract should not exceed 350 words.

- Each chapter shall be named in upper case bold type letters with Roman numerals (e.g.: **CHAPTER 2**) followed by the name of the chapter in upper case bold type with one line spacing. Both the chapter number and the name of the chapter should be centred. The text should start after two line spacing.
  Note: Please see the specimen attached.

- In the numeric system of citing references, citation numbers may be introduced in the text within brackets or as superscripts, as shown below.

Example: text [1] text [2, 3]. text [1, 3-6].

text[1] text.[2, 3] text.[1, 3-6]

INVESTIGATION OF THE VALIDITY ADSORPTION ISOTHERMS OF METHYLENE BLUE DYE

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Peat, available in Brunei Darussalam, has a negative surface charge, and is highly acidic. Peat of two sites (Keramut and Damit) have about 50% C and 2.1% N, while mixed peat-clay-sand samples of the third site (Labi) show 13% C and 1.3% N. Thermogravimetric experiments result in significant mass reductions in two temperature regions: up to 100 °C and from 50 °C to 500 °C for loss of moisture and combustion of organic compounds, respectively.

Batch experiments indicate that adsorption of methylene blue (MB) on peat fits the Langmuir adsorption model with a high regression coefficient leading to an average adsorption capacity (q_{max}) of 111 mg g^{-1}. Standard Gibbs free energy of adsorption of MB on peat is negative at all temperatures investigated with increase in the magnitude when the temperature is increased, while the average standard enthalpy change is positive. These results indicate the spontaneous and endothermic behavior of adsorption of MB on peat. Dynamic experiments demonstrate a remarkable adsorption ability of MB when sufficient time is allowed for interaction of adsorbate and adsorbent.

CHAPTER 1

INTRODUCTION

1.1 Introduction to Adsorption Isotherms

Adhesion of atoms, ions or molecules of gas, liquid or dissolved solids to a surface is called adsorption. Adsorption is different from absorption. In absorption, the molecules of a substance are uniformly distributed in the bulk of the other, whereas in adsorption molecules of one substance are present in higher concentration at the surface of the other substance.

Two substances are involved in an adsorption process. One is the solid or the liquid on which adsorption occurs and it is called the adsorbent. The second is the adsorbate, which is the gas or liquid or the solute from a solution which gets adsorbed on the surface. Therefore, film of the adsorbate, the molecules or atoms being accumulated on the surface of the adsorbent, is created during adsorption.

1.1.1 Langmuir adsorption isotherm

The Langmuir adsorption model is the most common model used to quantify the amount of adsorbate adsorbed on an adsorbent as a function of partial pressure (p) or concentration (C) at a given temperature, T. It considers adsorption of an ideal gas onto an idealized surface. The gas is presumed to bind at a series of distinct sites on the surface of the solid as indicated in Figure 1. The adsorption process can be treated as a reaction where a gas molecule A^- (g) reacts with an empty site to yield an adsorbed complex A^- (ad).