CHAPTER 1
INTRODUCTION

Nowadays, serious environmental problems owing to discharge many pollutants from the combustion of various substances in forms of solids, liquid, and gas, have been reported as major global warming problems involving not only pollutants such as NO_x, SO_x and soot, but also greenhouse gases like carbon dioxide. The gas released from the combustion in the petrochemical industries is generally called flue gas. The composition of flue gas depends on what is being burned, but it will usually consist of mostly nitrogen and the next largest part of the flue gas is carbon dioxide (CO_2). Carbon dioxide is considered to be the primary greenhouse gas that is produced by combustion of coal or hydrocarbons leading to the warming of the earth's atmosphere and the environmental problem observed over the past 50 years (Zhi-hong et al., (2013). During the last decade, the development of new technologies and materials for CO_2 capture and storage has been gaining increasing attention.

Nanoporous carbon is one of the selected materials that has many uses in various fields especially, CO_2 capture or adsorption because of their much efficiency to adsorb and interact with atoms, ions and molecules on their large interior surfaces and in the nanometer sized pore space. Nanoporous materials as a subset of nanostructured materials have been a focus of nanoscience and nanotechnology that possess unique porosity, surface area, stable pore structural, high thermal stability and light weight (Tominaka et al., (2010). Chen et al., (2012) recently, studied the CO_2 capture from flue gas and discussed the effect of a nitrogen-functionalized porous material was obtained through pyrolysis of a porous polymer that prepared from terephthalaldehyde and melamine. This nitrogen-rich porous carbon exhibited more adsorption capacities.

Polybenzoxazine are relatively novel classes of thermosetting phenolic resin that possess various advantageous characteristics such as excellent dimension stability, high thermal stability, low viscosity which can assist the film fabrication, no by-product released upon polymerization, high char yield and also rich molecular design flexilbility (S. Rimdusit, 2012). Moreover, polybenzoxazine have the unique

properties are low water absorption despite having many hydrophilic groups and near zero shrinkage after processing. (Dueramae et al., 2014) Polybenzoxazine precursors have been synthesized from various aromatic/aliphatic amines, mono/diphenols, and formaldehyde (Ghosh et al., 2007). In this work, we studied pyrolyzed polybenzoxazine precursor in inert atmosphere which synthesized by Bisphenol A, Formaldehyde and Tetraethylenepentamine (TEPA) via sol-gel process (Ishida et al., 1996). In order to increase the storage capacities by hard template synthesis method that could be controlled by varying the ratio of Silica and Hexadecyltrimethylammonium bromide (CTAB) used as a surfactant were varied to obtain nanoporous carbon with high surface area containing both micro and mesoporous structure. Moreover, the effect of varying pyrolysis temperatures to obtained nitrogen-rich nanoporous carbon was also investigated.