CHAPTER 1

INTRODUCTION

Steel is one of the basic materials used in today's civil engineering industry such as offshore platforms, construction materials, infrastructure, mechanical equipment, automotive aerospace, and other transportation sectors, due to its proven high strength and durability (Tracton, 2006). Steel structures are very reliable and offer many advantages over traditional methods of construction, including high strength, durability, reduced weight, increased safety, sustainability, and cost effectiveness in the long term (Zhan and Ye, 2022). Nonetheless, they have one significant drawback where in the event of a fire the temperature of unprotected steel quickly increases to a point where the steel softens to approximately 600°C or lower (Amir et al.). During a fire event, they lose half of their strength and will pose a risk of failing (depending on the load it bears) (Banovic and Foecke, 2005). From a safety perspective, determining the flammability of a polymer is crucial, especially if the substance is prone to easily spreading the fire.

The use of plastics for electronic and electric applications, as well as building and construction materials leads to stronger demand for FRs. The increasing demand for polymers with growing public awareness of their potential as fire hazards has resurrected the old problem of polymer flammability, making it an urgent challenge for modern technology (Pearce, 2012). Upon investigating many methods for attaining this goal, a set of guidelines has been produced. The ideal FR polymer system has (1) high resistance to ignitions and propagation, (2) a low rate of combustions, (3) a low rate and amount of smoke generation, (4) low