

Effect of LOHC on HDPE and POK under different temperature conditions



LOHC uptake (wt%) w.r.t temp & time

△- POK 25°C

POK 60°C

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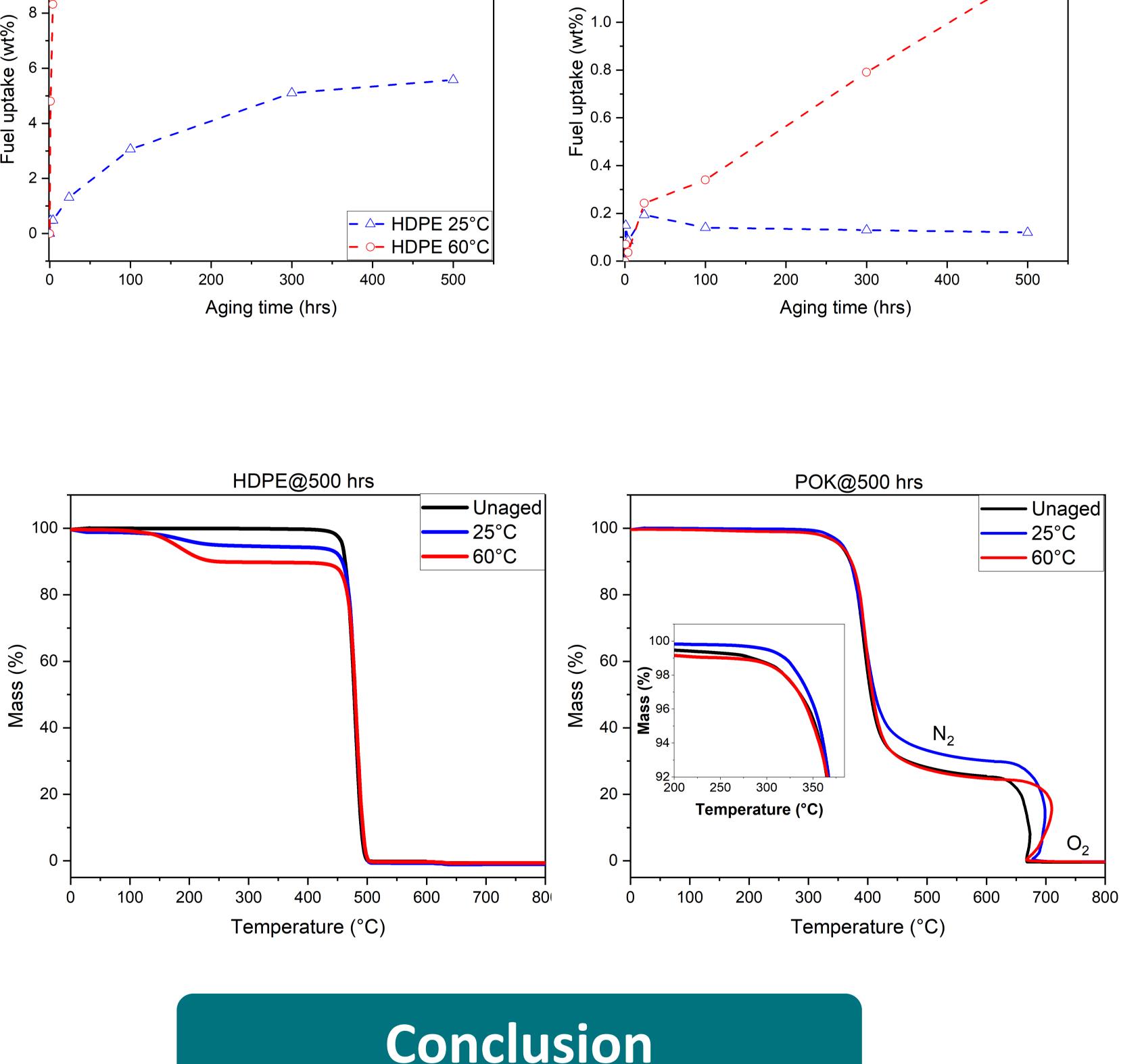
Introduction

Perhydro-benzyl toluene (H12-BT) is recognized as a good LOHC system which is available in the form of heat transfer oil. In recent times it is a promising novel solution for safe and efficient hydrogen storage under ambient conditions and is possible to store in regular polymer tanks. But storing hydrogen in liquid form for a longer time in polymer tanks affects the physical and chemical properties of the linear & resulting loss of mechanical properties. Therefore, alternative material is searched for hydrogen storage applications.

Materials & Methods LOHC uptake (wt%) w.r.t temp & time Step 1 Injection molded dog bone HDPE (left) & POK (right) HDPE 25°C & rectangular specimens HDPE 60°C 500 Aging time (hrs) Step 2 HDPE@500 hrs **-**25°C Step 3 -60°C 80 -Immersion in LOHC solution Heating at 25°C & 60°C in oven Mass (%) Step 4 Results: mass uptake, 500 700 200 300 400 After aging: sent to Temperature (°C) mechanical & thermal immediate evaluation Step 5 properties

Results

HDPE & POK samples were aged and measured frequently from time to time. Fuel uptake in HDPE is higher than in POK due to polar and non-polar groups



1.2

The aging behavior of HDPE & POK that are exposed to LOHC showed a greater fuel uptake in HDPE than POK. The thermal stability of POK is less than HDPE but did not influence the tensile properties.