Decomposition of peroxides by accelerating rate calorimetry

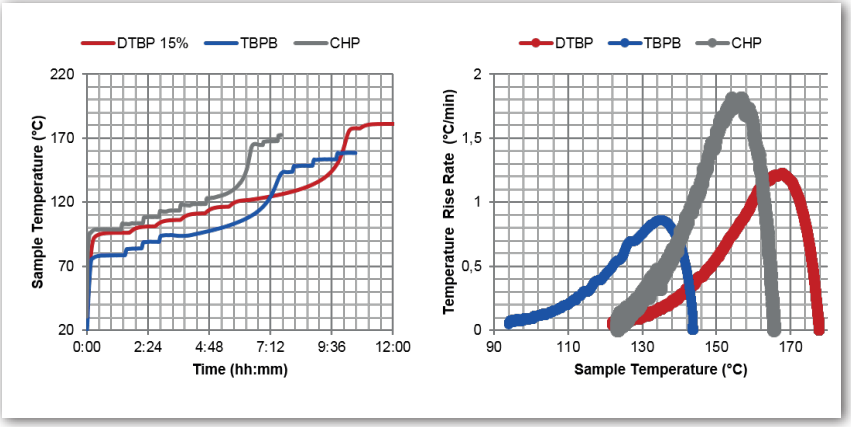
INTRODUCTION

Peroxides are typically unstable chemicals that require careful safety studies before being involved in industrial processes. They are widely used as radical initiators in polymerization reactions.

EXPERIMENT

The following samples were heated in 8 mL cells using the Heat-Wait-Search mode:

- 5 g of 15 wt% DTBP solution in toluene (titanium cell)
- 0.25 g of Cumene Hydroperoxide (CHP) (titanium cell)
- 0.4 g of Ter-Butyl Peroxybenzoate (TBPB) (steel cell)



The main Heat-Wait Search parameters were:

- Start temperature: 97 °C or 80 °C (TBPB) with 5 °C temperature steps
- Soak time: 30 min, wait: 15 min, search: 15 min
- Detection threshold: 0.03 (TBPB and CHP) or 0.02 °C/min

RESULTS AND CONCLUSION

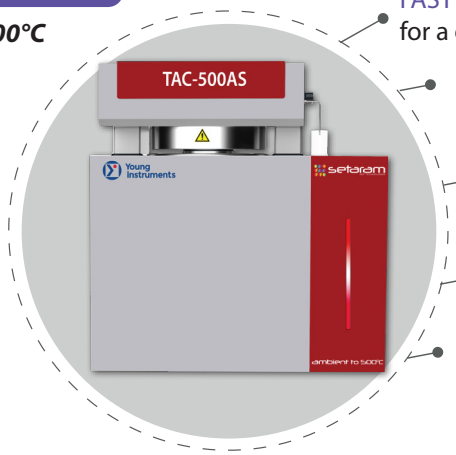
The analysis of experimental data allows for the determination of the onset temperature of decomposition, the adiabatic temperature rise (raw and phi-factor corrected), and the temperature at maximum temperature rise rate. Accelerating Rate Calorimetry with TAC-500 AS provides the necessary data to evaluate thermal risks.

	T_{onset} (°C)	$\Delta T_{ad,\ raw}$ (°C)	$\Delta T_{ad,\ corrected}$ (°C)	ΔT at max T rate (°C)
DTBP 15%	121.56	56.17	104.50	169.16
TBPB	94.27	50.15	473.29	133.94
CHP	123.15	42.56	374.53	156.47

INSTRUMENT

TAC 500 AS

Ambient to 500°C



FAST TRACK RATE
for a good measurement accuracy even at lower phi factors

LOW ONSET TEMPERATURE
detection threshold

PRACTICAL BENCH TOP INSTRUMENT
with a compact design for lab space saving and easier maintenance

CONVENIENT TO USE
with good usage to maintenance time ratio

ACCESSIBLY PRICED
instrument and replacement parts

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