Study the thermal stability of nitrogen doped reduced graphite oxide supported copper catalyst

ABSTRACT

The thermal stability of the as-synthesized Nitrogen-doped reduced graphite oxide supported copper catalyst was investigated by a thermogravimetric analyzer (TGA) at a temperature range 273–1173 K under purified N2 atmosphere using three different heating rates (15, 20 and 25 K min−1). Firstly, to obtained nitrogen-doped reduced graphite oxide (N-rGO), the functionalized graphite oxide was synthesized using Staudenmaier's method reduced by continuously stirring in an ammonia solution subsequently. The rGO was doped with nitrogen and impregnated with Cu-precursor to obtain Cu/N-rGO. The as-synthesized GO; N-rGO and Cu/N-rGO were characterized by FESEM, EDX, TEM, XRD and XPS. All these analyses were resulted in successfully samples synthesized. The TGA kinetic data were fitted into Kissinger and Flynn–Wall–Ozawa model free expressions to obtain apparent activation energies of 83.34 and 102.59 J mol−1 and pre-exponential factors of 2.40 × 107 and 5.01 × 1011 s−1. The high R2 values of 0.9999 and 0.9666 obtained from fitting TGA kinetic data using the Kissinger and Flynn–Wall–Ozawa model free expressions show that the data were well fitted to the expressions. This implies that the thermal behavior of nitrogen doped reduced graphite oxide supported Cu catalyst can be investigated using Kissinger and Flynn–Wall–Ozawa model free expressions.

Keyword: Copper catalyst; Nitrogen-doped reduced graphite oxide; Thermogravimetric analysis; Kissinger model; Flynn–Wall–Ozawa model