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# Electrocatalytic activity of Ni/Co<sub>3</sub>O<sub>4</sub> obtained by span-60 sol-gel route for oxygen evolution in 1M KOH at 25°C

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Spinel-type cobalt oxide (Co<sub>3</sub>O<sub>4</sub>) was prepared by the span-60 sol-gel (SSG) method by using cobalt nitrates and span-60 and characterized by FT-IR, XRD and SEM techniques and its catalytic performance for electrochemical formation of oxygen in a basic medium is investigated. For electrochemical studies, cyclic voltammetry and Tafel polarisation techniques were employed and the observed results of investigation showed that the Co<sub>3</sub>O<sub>4</sub> electrode possessed higher value of oxide roughness factor and hence have improved electrocatalytic activity for the oxygen evolution process (OER) in basic solution. The Tafel slope at low over potential and order of reaction with regards to the variation of [OH<sup>-</sup>] concentration were found to be 73 mVdec<sup>-1</sup> and (~1), respectively. The thermodynamic parameters such as standard electrochemical activation energy estimated from the Arrhenius plot and entropy of reaction were 35 kJmol<sup>-1</sup> and 259 Jdeg<sup>-1</sup>mol<sup>-1</sup> for the OER. Highly negative value of entropy of the reaction indicated that electrocatalytic oxygen evolution by splitting water occurs *via* the mechanism involving the adsorption of reaction intermediate at the electrode surface.

**Keywords:** Sol-gel combustion synthesis, Span-60, Tafel polarisation, OER, Cyclic voltammetry