1) Hydrothermal Synthesis of NiO

10 mmol of $Ni(NO_3)_2 \cdot 6H_2O$ are initially dissolved in 100 ml of d-H_2O under stirring. The pH is then adjusted to around 10.5 via the addition of aqueous NH_3. The volume is then increased to 200 ml (pH remaining around 10.5), via the further addition of d-H_2O and some NH_3. The final mixture is stirred for 5 min before being transferred to a 300 ml stainless-steel autoclave. The temperature is then increased to 200 ^oC and remains for 20 h. After that, the mixture is centrifuged, the recovered solid then washed many times with d-H_2O and ethanol, then dried at 60 ^oC overnight and finally calcined at 400 ^oC for 4 h under static air.

2) Wet impregnation synthesis of 10% Ni/Al_2O_3

A calculated amount of $Ni(NO_3)_2 \cdot 6H_2O$ (10 wt% Ni in the final catalyst) is initially dissolved in 100 ml of d-H_2O under stirring in a round flask, followed by the dispersion of 1 g of Al_2O_3 support. The mixture is then stirred for 5 min and then transferred to a rotary evaporator system. The slow water removal takes place at 72 ^oC temperature, 50 cmHg pressure and 60 rpm rotation speed for about 4-5 h. The solid is then removed from the round flask, dried at 60 ^oC overnight and finally calcined at 400 ^oC for 4 h under static air.

$Mr_{Ni(NO3)2 \cdot 6H2O} = 290,81$ g/mol

$Ar_{Ni} = 58,7$ g/mol