Extraction of phenolic compounds from fenugreek seeds using liquefied dimethyl ether (DME)

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Abstract: Fenugreek (Trigonella foenum-graecum) is a plant originated in Eastern Europe, Northern Africa and Central Asia. Fenugreek seeds were found to be a rich source of phenolic compounds which show beneficial health effects to human body. The phenolic compounds and other active substances found in the seeds were apigenin, kaempferol and quercitin glycosides as well as the flavonoids; vitexin, tricin, naringenin, quercetin and tricin 7-O-β-D-glucopyranoside. The extraction of the total phenolic compounds from fenugreek seeds was therefore investigated in this work. Liquefied dimethyl ether (DME), the safe solvent, which is easily removed from an extract product was employed in this work. The response surface methodology (RSM) using spherical central composite design (CCD) was employed for the experimental design and optimization of extraction condition. The three parameters including water adding as co-solvent, the solvent to seeds weight ratio and extraction temperature were optimized. From the results, the RSM gave the well-predicted quadratic regression model which showed 0.94 of R². The optimal extraction conditions suggested by the model were at 22.65% wt of co-solvent, 5.60 of the solvent to seeds weight ratio (g/g) and 30.89 ºC which gave 233.83 µg of total phenolic compounds/g of seeds.

Keywords: Solvent extraction; Fenugreek; Liquefied dimethyl ether; Phenolic compounds