

# SCREENING OF FACTORS AFFECTING THE VITAMIN B12 EXTRACTION FROM *ULVA LACTUCA* BY 2-LEVEL FACTORIAL DESIGN

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## Abstract

**Introduction:** *Ulva lactuca* was reported to possess many biological properties such as antimicrobial, antioxidant and antiviral due to the presence of bioactive compounds, like vitamins, polysaccharides and lipids. This study focuses on *U. lactuca* as it is believed to be an alternative source for vitamin B12 for those who are on a special diet or strict vegetarians. Human bodies cannot synthesise vitamins and hence these vitamins should be obtained from the daily diet as they are essential substances. **Methods:** The extraction of vitamin B12 was performed using boiling extraction method from freeze-dried (FDB), air-dried (ADB), oven-dried (ODB) and sun-dried (SDB) *U. lactuca* sample. Also, the effect of solvent:solvent, solute:solvent ratios and pH on total vitamin B12 content extracted from the different dried samples were investigated and analysed using 2-Level Factorial design from RSM. The quantitative and qualitative analysis of vitamin B12 (methylcobalamin, hydroxocobalamin, adenosylcobalamin and cyanocobalamin) were accomplished using HPLC analysis. **Results:** The retention time (RT) of all samples corresponded to the RT of standard cyanocobalamin (CNCbl), which was 1.9 min. CNCbl was found in the extract with the highest concentration of 0.0210 mg/mL, yielded from ODB sample, extracted at 25:75 % methanol:water, 3 g:60 mL solute:solvent ratios and at pH 3, respectively. Moreover, the significance of the factors was scrutinized by ANOVA at a p-value significance level of 0.05. The overall model and interaction effect between solvent:solvent ratios and pH, as well as between solvent:solvent and solute:solvent ratios were significant for ODB sample at p-value less than 0.05. **Conclusion:** Different methods of drying, solvent:solvent ratios, pH and solute:solvent ratios have different effect on the CNCbl content extracted from *U. lactuca*. Future research might include other extraction methods, providing a new optimisation design to extract higher yield and quality of CNCbl from dried *U. lactuca*.

**Keywords:** *U. lactuca*, vitamin B12, 2-Level Factorial Design