

## EXTRACTION OF THE TOTAL ALKALOIDS FROM *Aconitum soongoricum* TUBERS

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Tubers of the plant *Aconitum soongoricum* contain a considerable amount of alkaloids possessing a high pharmacological activity (aconitine, songorine, aconifine, napelline, etc.) [1-3]. In order to find the optimum conditions for their extraction from this plant, we have studied extraction by aqueous solutions of alcohol with various concentrations at the first contact of the phases, using the Box-Wilson method [4, 5] for the mathematical planning of experimentation.

The factors affecting this process to the greatest degree were chosen:  $X_1$  - the extraction time, h;  $X_2$  - the alcohol concentration, %;  $X_3$  - the temperature of the process, °C;  $X_4$  - the degree of comminution of the raw material, mm;  $X_5$  - the concentration of acid in the extract, %. As the optimization parameter we chose the yield of total alkaloids on first contact as a proportion of their total amount in the raw material. In the planning of the experiments we used a 1/4 replica of a complete factorial experiment of the  $Y = 2^5$  type with the following generating relations:  $X_3 = X_1 \cdot X_2$ ;  $X_4 = X_1 \cdot X_2 \cdot X_3$ ;  $X_5 = X_1 \cdot X_3$ . The following levels of the factors and intervals of their variation were selected:  $X_1 - 5 \text{ h} \pm 3$ ;  $X_2 - 40\% \pm 20$ ;  $X_3 - 50^\circ\text{C} \pm 25$ ;  $X_4 - 5 \text{ mm} \pm 4$ ;  $X_5 - 0.5\% \pm 0.5$ .

After the processing of the results obtained we derived the following mathematical model of the process:

$$Y = 40.61 + 5.06X_1 + 3.93X_2 + 6.17X_3 + 0.64X_4 + 3.32X_5.$$

From the regression coefficients of the equation after the calculation of the confidence interval ( $b = \pm 3.64$ ) we established that the main factors affecting this process are the steeping time, the concentration of alcohol in the extractant, and the temperature. The statistical analysis ( $F_{\text{calc}} = 3.96 < F_{\text{tabl}} = 4.50$ ) of the results obtained showed that the model adequately describes a linear approach to the optimum. The yield of total alkaloids at the extraction stage on first contact of the phases after the performance of a steepest ascent program had increased by 8% and was 44% of the amount in the raw material. In a study of the kinetics of the extraction process it was found that phase equilibrium set in on first contact after 12 h, on second contact after 8 h, on third and fourth contacts after 6 h, on fifth and sixth after 4 h and on seventh and eight after 3 h. Repeated extraction permitted the isolation of about 91% of the total alkaloids present in the raw material.

## REFERENCES

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