**Process optimization and effect of different extraction methods on the characteristics and activities of Herba *Patriniae* polysaccharides: a correlation analysis**

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**CONTENT**

S1: The results of variance analysis of WP, WC, and WPC.

S2: The results of variance analysis of PU and CU.

S3: Physicochemical characteristics of *Patriniae* polysaccharides extracted by different extraction methods

S4: Molecular weight of *Patriniae* polysaccharides extracted by different extraction methods

S1: The results of variance analysis of WP, WC, and WPC

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Source | Class III sum of squares |  | Freedom |  | Mean square |  | F |  | Significance |
| WP | WC | WPC |  |  | WP | WC | WPC |  | WP | WC | WPC |  |
| Enzyme addition | 21.022 | 81.335 | 10.437 |  | 2 | 10.511 | 40.667 | 5.219 | 1013.581 | 4066.743 | 521.863 | remarkable |
| Solid-liquid ratio | 248.007 | 134.92 | 212.074 |  | 2 | 124.003 | 67.460 | 106.037 | 11957.469 | 6746.013 | 10603.723 | remarkable |
| Temperature | 33.502 | 7.517 | 72.291 |  | 2 | 16.751 | 3.759 | 36.145 | 1615.293 | 375.853 | 3614.543 | remarkable |
| Time | 22.226 | 52.815 | 7.485 |  | 2 | 11.113 | 26.408 | 3.742 | 1071.619 | 2640.763 | 374.243 | remarkable |
| Error | 0.187 | 0.18 | 0.18 |  | 18 | 0.01 | 0.01 | 0.01 |  |  |  |  |

S2: The results of variance analysis of PU and CU

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Source | Class III sum of squares | Freedom |  Mean square  |  |  F |  | Significance |
| PU | CU | PU |  CU |  | PU | CU |  |
| Enzyme addition | 259.958 | 241.719 | 2 | 129.979 | 120.86 | 12997.9 | 11654.3 | remarkable |
| Solid-liquid ratio | 72.45 | 157.009 | 2 | 36.225 | 78.504 | 3622.5 | 7570.06 | remarkable |
| Temperature | 77.933 | 44.219 | 2 | 38.967 | 22.11 | 3896.66 | 2132 | remarkable |
| Time | 198.112 | 43.841 | 2 | 99.056 | 21.921 | 9905.61 | 2133.77 | remarkable |
| Error | 0.18 | 0.187 | 18 | 0.01 | 0.01 |  |  |  |

S3: Physicochemical characteristics of *Patriniae* polysaccharides extracted by different extraction methods

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PCU | HW | PU | CU | WPC | WP | WC | WU |
| Reducing polysaccharides content / % | 8.8 | 0.3 | 4.6 | 8.2 | 3.1 | 7.9 | 5.7 | 2.4 |
| Total polysaccharides content / % | 10.7 | 10.3 | 10.9 | 10.7 | 10 | 11.3 | 10.4 | 10.7 |
| Protein content / % | 3.15 | 6.6 | 6.8 | 15 | 11.6 | 11.6 | 5.3 | 7.2 |

S4: Molecular weight of *Patriniae* polysaccharides extracted by different extraction methods

|  |  |  |
| --- | --- | --- |
|  | Mw (KDa) | Mw/Mn (DR) |
| PU-1 | 110 | 1.05 |
| PU-2 | 36 | 1.23 |
| PU-3 | 11 | 1.02 |
| WP-1 | 15409 | 20.2 |
| WP-2 | 1263 | 1.11 |
| WP-3 | 727 | 1 |
| CU-1 | 77749 | 1.41 |
| CU-2 | 15151 | 1.37 |
| CU-3 | 4369 | 1 |
| WC-1 | 31413 | 1.08 |
| WC-2 | 8037 | 1.47 |
| WC-3 | 2830 | 1 |
| WPC-1 | 45111 | 1.02 |
| WPC-2 | 10890 | 1.14 |
| WPC-3 | 5565 | 1.01 |
| PCU-1 | 99553 | 1.08 |
| PCU-2 | 26794 | 1.04 |
| PCU-3 | 20892 | 1 |
| HW-1 | 8856 | 1.21 |
| HW-2 | 4733 | 1.01 |
| HW-3 | 4056 | 1 |
| WU-1 | 2630 | 1 |
| WU-2 | 1236 | 1.05 |
| WU-3 | 899 | 1 |

1. *Abbreviations:* WP, papain assisted hot water extraction; WC, cellulase assisted hot water extraction; WPC, papain mixed cellulase assisted hot water extraction; PU, ultrasonic assisted papain extraction; CU, ultrasonic assisted cellulase extraction; PCU, ultrasonic assisted papain mixed cellulase extraction; WU, ultrasonic assisted hot water extraction; HW, hot water extraction; HPs, *Patriniae* polysaccharides.

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