Study data

Extractives-Toluene-ethanol- Red Oak bark

|  |  |  |  |
| --- | --- | --- | --- |
| Unextracted sawdust | Empty flask | Flask with sawdust | Mass of extractives |
| M0 | M1 | M2 | Mext=M2-M1 |
| 7,1621 | 112,159 | 112,6237 | 0,4647 |
| 7,8639 | 109,124 | 109,6435 | 0,5195 |
| 7,9831 | 105,322 | 105,8615 | 0,5395 |

Extractives-Hot-Water- Red Oak bark

|  |  |  |  |
| --- | --- | --- | --- |
| Unextracted sawdust | Empty flask | Flask with sawdust | Mass of extractives |
| M0 | M1 | M2 | Mext=M2-M1 |
| 2,0021 | 42,2685 | 43,9194 | 1,6509 |
| 2,0125 | 34,2907 | 36,0001 | 1,7094 |
| 2,0134 | 42,9617 | 44,599 | 1,6373 |

Extractives-Toluene-ethanol- Sugar Maple bark

|  |  |  |  |
| --- | --- | --- | --- |
| Unextracted sawdust | Empty flask | Flask with sawdust | Mass of extractives |
| M0 | M1 | M2 | Mext=M2-M1 |
| 8,4298 | 112,165 | 112,4125 | 0,2475 |
| 8,9778 | 110,987 | 111,2476 | 0,2606 |
| 8,0045 | 111,9462 | 112,1951 | 0,2489 |

Extractives-Hot-Water- Sugar Maple bark

|  |  |  |  |
| --- | --- | --- | --- |
| Unextracted sawdust | Empty flask | Flask with sawdust | Mass of extractives |
| M0 | M1 | M2 | Mext=M2-M1 |
| 2,0053 | 42,9618 | 44,7599 | 1,7981 |
| 2,0082 | 45,0544 | 46,8479 | 1,7935 |
| 2,0081 | 43,1094 | 44,909 | 1,7996 |

Klason lignin- Red Oak bark

|  |  |  |  |
| --- | --- | --- | --- |
| Lignin mass Anhydrous | Crucible mass | Crucible + lignin mass | Lignin mass |
| M0 | M1 | M2 | M2-M1 |
| 0,2131 | 30,9541 | 31,0110 | 0,0569 |
| 0,2119 | 45,3301 | 45,3909 | 0,0608 |
| 0,2114 | 46,1245 | 46,1841 | 0,0596 |

Acid-soluble lignin of Klason filtrate-Red Oakbark

|  |  |  |  |
| --- | --- | --- | --- |
| Lignin mass Anhydrous | Absorption1 | Absorption2 | Absorption3 |
| 0,2131 | 0,5900 | 0,6112 | 0,5703 |
| 0,2119 | 0,6874 | 0,6748 | 0,6501 |
| 0,2114 | 0,6853 | 0,6811 | 0,6723 |

Klason lignin- Sugar Maple bark

|  |  |  |  |
| --- | --- | --- | --- |
| Lignin mass Anhydrous | Crucible mass | Crucible + lignin mass | Lignin mass |
| M0 | M1 | M2 | M2-M1 |
| 0,2114 | 31,9856 | 32,0578 | 0,0722 |
| 0,2105 | 36,719 | 36,7916 | 0,0726 |
| 0,2093 | 46,4695 | 46,539 | 0,0695 |

Acid-soluble lignin of Klason filtrate- Sugar Maple bark

|  |  |  |  |
| --- | --- | --- | --- |
| Lignin mass Anhydrous | Absorption1 | Absorption2 | Absorption3 |
| 0,2114 | 0,5705 | 0,5701 | 0,5688 |
| 0,2105 | 0,5256 | 0,5311 | 0,5198 |
| 0,2093 | 0,5635 | 0,5681 | 0,571 |

Ash-Red Oak bark

|  |  |  |  |
| --- | --- | --- | --- |
| Mass anhydrous sawdust | Crucible mass | Crucible mass after 600°C | Ash mass |
| 1,9776 | 15,996 | 16,0925 | 0,0965 |
| 1,9040 | 15,9984 | 16,0673 | 0,0689 |
| 1,9673 | 19,2149 | 19,2871 | 0,0722 |

Ash-Sugar Maple bark

|  |  |  |  |
| --- | --- | --- | --- |
| Mass anhydrous sawdust | Crucible mass | Crucible mass after 600°C | Ash mass |
| 1,7248 | 19,1845 | 19,2665 | 0,082 |
| 2,0333 | 18,2115 | 18,2872 | 0,0757 |
| 2,0424 | 18,8804 | 18,9545 | 0,0741 |

Klason lignin- Organosolv lignin from Red Oak bark

|  |  |  |  |
| --- | --- | --- | --- |
| Lignin mass Anhydrous | Crucible mass | Crucible + lignin mass | Lignin mass |
| M0 | M1 | M2 | M2-M1 |
| 0,2852 | 45,8237 | 46,0954 | 0,2717 |
| 0,2811 | 45,8115 | 46,0831 | 0,2716 |
| 0,2851 | 45,5347 | 45,8051 | 0,2704 |

Acid-soluble lignin of Klason filtrate-Organosolv lignin from Red Oak bark

|  |  |  |  |
| --- | --- | --- | --- |
| Lignin mass Anhydrous | Absorption1 | Absorption2 | Absorption3 |
| 0,2852 | 0,7280 | 0,7287 | 0,7303 |
| 0,2811 | 0,8031 | 0,8045 | 0,8047 |
| 0,2851 | 0,8100 | 0,8096 | 0,8098 |

Klason lignin- Organosolv lignin from Sugar Maple

|  |  |  |  |
| --- | --- | --- | --- |
| Lignin mass Anhydrous | Crucible mass | Crucible + lignin mass | Lignin mass |
| M0 | M1 | M2 | M2-M1 |
| 0,2672 | 45,8680 | 46,1240 | 0,2559 |
| 0,2613 | 45,6859 | 45,9223 | 0,2364 |
| 0,2594 | 45,9687 | 46,2116 | 0,2429 |

Acid-soluble lignin of Klason filtrate-Organosolv lignin from Sugar Maple bark

|  |  |  |  |
| --- | --- | --- | --- |
| Lignin mass Anhydrous | Absorption1 | Absorption2 | Absorption3 |
| 0,2672 | 0,9836 | 0,9811 | 1,0000 |
| 0,2613 | 0,9900 | 0,9900 | 0,9899 |
| 0,2594 | 0,9812 | 1,0010 | 0,9956 |

Ash-Organosolv lignin from Red Oak bark

|  |  |  |  |
| --- | --- | --- | --- |
| Mass anhydrous lignin | Crucible mass | Crucible mass after 600°C | Ash mass |
| 0,4463 | 19,5359 | 19,5403 | 0,0044 |
| 0,4713 | 18,7045 | 18,7093 | 0,0048 |
| 0,5287 | 17,2865 | 17,2916 | 0,0051 |

Ash-Organosolv lignin from Sugar Maple bark

|  |  |  |  |
| --- | --- | --- | --- |
| Mass anhydrous lignin | Crucible mass | Crucible mass after 600°C | Ash mass |
| 0,4684 | 18,8486 | 18,8503 | 0,0017 |
| 0,5371 | 19,6542 | 19,6561 | 0,0019 |
| 0,5089 | 19,8625 | 19,8643 | 0,0018 |

Klason lignin- Dioxane lignin from Red Oak

|  |  |  |  |
| --- | --- | --- | --- |
| Lignin mass Anhydrous | Crucible mass | Crucible + lignin mass | Lignin mass |
| M0 | M1 | M2 | M2-M1 |
| 0,2172 | 45,7856 | 45,9536 | 0,1680 |
| 0,2256 | 45,8124 | 45,9738 | 0,1614 |
| 0,2197 | 45,8716 | 46,0550 | 0,1834 |

Acid-soluble lignin of Klason filtrate-Dioxane lignin from Red Oak bark

|  |  |  |  |
| --- | --- | --- | --- |
| Lignin mass Anhydrous | Absorption1 | Absorption2 | Absorption3 |
| 0,2172 | 0,3919 | 0,3897 | 0,3997 |
| 0,2256 | 0,4086 | 0,3902 | 0,4197 |
| 0,2197 | 0,4010 | 0,4032 | 0,4056 |

Klason lignin- Dioxane lignin from Sugar Maple

|  |  |  |  |
| --- | --- | --- | --- |
| Lignin mass Anhydrous | Crucible mass | Crucible + lignin mass | Lignin mass |
| M0 | M1 | M2 | M2-M1 |
| 0,2241 | 45,6909 | 45,8788 | 0,1879 |
| 0,2218 | 45,9770 | 46,1594 | 0,1823 |
| 0,2199 | 45,6931 | 45,8753 | 0,1822 |

Acid-soluble lignin of Klason filtrate-Dioxane lignin from Sugar Maple bark

|  |  |  |  |
| --- | --- | --- | --- |
| Lignin mass Anhydrous | Absorption1 | Absorption2 | Absorption3 |
| 0,2241 | 0,2631 | 0,2570 | 0,2498 |
| 0,2218 | 0,3388 | 0,3370 | 0,3381 |
| 0,2199 | 0,2811 | 0,2955 | 0,2840 |

Organosolv lignin yield and recovery with selected parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Sawdust anhydrous mass | Organosolv lignin mass | Klason lignin | Yield | Recovery |
| Species | M0 | M1 | M2 | M3=(M1/M0)\*100 | (M3/M2)\*100 |
| SM1 | 92,81 | 15,33 | 32,00 | 16,52 | 51,61 |
| SM2 | 92,09 | 14,45 | 32,00 | 15,69 | 49,03 |
| SM3 | 93,47 | 15,02 | 32,00 | 16,06 | 50,21 |
| RO1 | 92,81 | 19,38 | 23,20 | 20,88 | 90,00 |
| RO2 | 92,76 | 16,90 | 23,20 | 18,21 | 78,53 |
| RO3 | 94,60 | 19,54 | 23,20 | 20,65 | 89,03 |

Yield and recovery for Dioxane lignins

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Sawdust anhydrous mass | Organosolv lignin mass | Klason lignin | Yield | Recovery |
| Species | M0 | M1 | M2 | M3=(M1/M0)\*100 | (M3/M2)\*100 |
| SM1 | 3,3736 | 0,5034 | 32,000 | 14,9217 | 46,6304 |
| SM2 | 3,4281 | 0,5096 | 32,00 | 14,8653 | 46,4543 |
| SM3 | 3,1030 | 0,4223 | 32,00 | 13,6094 | 42,5294 |
| RO1 | 3,2953 | 0,6000 | 23,20 | 18,2077 | 78,4816 |
| RO2 | 3,3279 | 0,5975 | 23,20 | 17,9542 | 77,3890 |
| RO3 | 3,342 | 0,5847 | 23,20 | 17,4955 | 75,4116 |

The different quantities of catalyst and ethanol/water ratio tested for the Organosolv

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Sawdust anhydrous mass | Organosolv lignin mass | Klason lignin | Yield | Recovery |
| Species | M0 | M1 | M2 | M3=(M1/M0)\*100 | (M3/M2)\*100 |
| SM  50:50  2,5g | 100 | 10,33 | 32,00 | 10,32 | 32,28 |
| SM  50:50  5g | 56,48 | 7,39 | 32,00 | 13,08 | 40,90 |
| SM  60:40  5g | 92,81 | 15,33 | 32,00 | 16,52 | 51,61 |
| OR  50:50  2,5g | 100 | 11,23 | 23,20 | 11,23 | 48,42 |
| RO  50:50  5g | 56,74 | 9,15 | 23,20 | 16,12 | 69,50 |
| RO  60:40  5g | 92,81 | 19,38 | 23,20 | 20,88 | 90,00 |