Table S1

|  |  |  |  |
| --- | --- | --- | --- |
| **Band** | **cm-1** | **Physical origin** | **Ref.** |
| 1 | 482 | Glucose ring vibrations(Cellulose, glucans) | [S1] |
| 2 | 490 | C-C backbone stretching in polysaccharides | [S1] |
| 3 | 500 | D(+)-mannose | [S2] |
| Glycine | [S1] |
| 4 | 510 | Cellulose | [S1] |
| 5 | 535 | Ring deformation in trehalose  | [S1] |
| N1-C6-C5 and C2-N3-C4 in-plane ring deformation in adenine | [S3] |
| D-arabitol | [S4] |
| 6 | 544 | D(+)-trehalose (exocyclic deformation) | [S1] |
| N3=C4-N4 and C-C=C bending in cytosine | [S5] |
| D-(-)-ribose | [S6] |
| Glycerol | [S7] |
| 7 | 558 | β-D-glucose in cellulose | [S1] |
| In-phase N3-C2=O and N1C2=O bending in cytosine | [S5] |
| Cholesterol | [S7] |
| 8 | 570 | 6-ring deformation in guanine | [S8] |
| β-D-glucose in cellulose | [S1] |
| 9 | 583 | C-C-O bending + C-O torsion in cellulose | [S1] |
| 10 | 594 | C2=O bending in cytosine | [S9] |
| Trilinolenin | [S1] |
| Glycerol | [S7] |
| 11 | 603 | Trehalose | [S1] |
| N3-C2=O and N1-C2=O in-phase bending in cytosine | [S5] |
| 11\* | 613 | Histidine | [S10] |
| 12 | 623 | C4-C5-N7 – C4-N9-C8 in-plane ring deformation of adenine | [S3] |
| D-arabitol | [S1] |
| N-C-C bending in thymine | [S11] |
| 13 | 632 | Out-of-plane C-O-H bend glycerol  | [S7] |
| 14 | 643 | Purine ring breathing mode in guanine | [S8] |
| β-D-glucose in cellulose | [S1] |
| D-arabitol | [S4] |
| 15 | 649 | β-D-glucose in cellulose | [S1] |
| 15\* | 654 | Histidine | [S10] |
| 16 | 669 | C-S stretching | [S12] |
| Glycerol | [S7] |
| 17 | 681 | Ring breathing in DNA guanine | [S8] |
| O=CN + CCO bending in ceramides | [S13] |
| 18 | 692 | β-(1,3)-glucan | [S14] |
| Trehalose | [S1] |
| 19 | 710 | =C-H bending in cellulose | [S1][S15] |
| Trilinolenin | [S1] |
| Ring breathing in DNA cytosine | [S5] |
| D-arabitol | [S4] |
| 20 | 715 | D-arabitol | [S4] |
| Lecithin | [S1] |
| C-N stretching in lecithin | [S1] |
| 21 | 731 | Imidazole ring breathing in DNA adenine | [S3] |
| Trehalose | [S1] |
| Phosphatidylserine | [S7] |
| 22 | 746 | Ring breathing in DNA thymine | [S11] |
| 23 | 753 | C5-CH3 stretching in thymine | [S11] |
| 24 | 764 | Deoxythymidine triphosphate | [S16] |
| Trehalose | [S1] |
| O-P-O symmetric stretching in lecithin | [S1] |
| 25 | 782 | *C’*5-O-P-O-*C’*3 phosphodiester symmetric stretching in DNA | [S17] |
| 26 | 795 | Ring breathing in cytosine | [S5] |
| 27 | 807 | 2-deoxy-D-ribose (glucan) | [S6] |
| Glycerol | [S7] |
| In-plane ring breathing in uracil | [S9] |
| 28 | 816 | Trioleate | [S1] |
| 29 | 827 | Lecithin | [S1] |
| O-P-O antisymmetric stretching in lecithin | [S1] |
| *C’*5-O-P-O-*C’*3 phosphodiester antisymmetric stretching in DNA | [S17] |
| 30 | 837 | Trilinoleate | [S1] |
| D-dextrose | [S1] |
| C1-H bending in trehalose | [S1] |
| β-D-glucose | [S1] |
| D-arabitol | [S6] |
| 31 | 846 | C4-N9-C8 + N1-C2-N3 and N2-C2-N3 in plane deformation in guanine ring | [S18] |
| L-(+)-arabinose (glucan) | [S6] |
| D-(+)-glucose | [S6] |
| Glycerol | [S7] |
| C-O, C-C, and C-H bending in trehalose | [S1] |
| 32 | 861 | C-O vibrations in alpha-linolenic acid | [S19] |
| 32\* | 872 | Histidine | [S10] |
| 33 | 893 | C-H ring stretching in cellulose | [S1][S15] |
| Lecithin | [S1] |
| Trioleate | [S1] |
| Equatorial C-H bending in β-(1,3)-glucans | [S20] |
| D-arabitol | [S4] |
| 34 | 906 | D-dextrose | [S1] |
| Trehalose | [S1] |
| β-D-glucose | [S1] |
| D-arabitol | [S4] |
| 35 | 931 | Histidine | [S10] |
| β-D-glucose | [S1] |
| D-arabitol | [S4] |
| C-H bending in arachidonic acid | [S19] |
| 36 | 942 | In-plane ring deformation, N-H vibrations in adenine | [S3] |
| Trilinolenin | [S1] |
| D-arabitol | [S4] |
| Trilinolein | [S1] |
| 37 | 955 | Deoxyadenosine triphosphate | [S16] |
| Lecithin | [S1] |
| D-arabitol | [S4] |
| Glycerol | [S7] |

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