

Table 4 Total Dissolved H₂O, H₂O(m), and OH⁻ Concentrations in Fe-free Glasses Based on Infrared Absorbance

| Sample | Thickness (cm) | Abs.3570 [□] | Abs.4500 [†] | Abs.5200 [‡] | Abs.1630 [§] | H ₂ O _{total} 3570 | OH ⁻ [#] 4500 | H ₂ O(m) ^{□□} 5200 | H ₂ O(m) ^{††} 1630 | H ₂ O _{total} ^{‡‡} 4500+5200 |
|--------------|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|---|--------------------------------------|---|---|--|
| run58a-1s1 | 0.0024 | 1.284 | 0.0071 | 0.0166 | 0.542 | 5.73 | 2.46 | 3.51 | 3.22 | 5.97 |
| run58a-1s2 | 0.0024 | 1.298 | 0.0097 | 0.0153 | 0.552 | 5.79 | 2.40 | 3.24 | 3.28 | 5.64 |
| run58a-1s3 | 0.0024 | 1.312 | 0.0079 | 0.0150 | 0.559 | 5.86 | 2.74 | 3.17 | 3.32 | 5.91 |
| run58a-1s5 | 0.0024 | 1.097 | 0.0050 | 0.0170 | 0.462 | 4.90 | 1.74 | 3.60 | 2.75 | 5.34 |
| run58a-1s6 | 0.0024 | 1.019 | 0.0052 | 0.0181 | 0.431 | 4.55 | 1.80 | 3.83 | 2.56 | 5.63 |
| run58a-1s7 | 0.0024 | 1.250 | 0.0050 | 0.0160 | 0.534 | 5.58 | 1.74 | 3.38 | 3.16 | 5.12 |
| run58a-1s8 | 0.0024 | 1.090 | 0.0060 | 0.0140 | 0.467 | 4.87 | 2.08 | 2.96 | 2.73 | 5.04 |
| run58a-1s9 | 0.0024 | 1.185 | 0.0050 | 0.0140 | 0.504 | 5.29 | 1.74 | 2.96 | 3.00 | 4.70 |
| r58a-1s1319 | 0.0024 | 1.130 | 0.0050 | 0.0110 | 0.479 | 5.04 | 1.74 | 2.33 | 2.84 | 4.07 |
| r58a-1s2319 | 0.0024 | 1.321 | 0.0060 | 0.0110 | 0.545 | 5.90 | 2.08 | 2.33 | 3.23 | 4.41 |
| r58a-1s3319 | 0.0024 | 1.284 | 0.0060 | 0.0110 | 0.530 | 5.73 | 2.08 | 2.33 | 3.14 | 4.41 |
| run58a-2s2 | 0.0044 | 2.242 | 0.0127 | 0.0279 | 1.061 | 5.46 | 2.40 | 3.22 | 3.43 | 5.62 |
| run58a-2s3 | 0.0044 | 2.252 | 0.0134 | 0.0269 | 1.072 | 5.48 | 2.54 | 3.10 | 3.47 | 5.64 |
| run58a-2s4 | 0.0044 | 2.267 | 0.0132 | 0.0294 | 1.080 | 5.52 | 2.50 | 3.39 | 3.50 | 5.89 |
| run58a-3s1 | 0.0031 | 1.681 | 0.0093 | 0.0259 | 0.733 | 5.81 | 2.50 | 4.24 | 3.37 | 6.74 |
| run58a-3s2 | 0.0031 | 1.797 | 0.0087 | 0.0244 | 0.779 | 6.21 | 2.34 | 4.00 | 3.58 | 6.34 |
| run58a-3s3 | 0.0031 | 1.835 | 0.0095 | 0.0213 | 0.796 | 6.34 | 2.55 | 3.49 | 3.66 | 6.04 |
| run58a-3s4 | 0.0031 | 1.892 | 0.0092 | 0.0241 | 0.815 | 6.54 | 2.47 | 3.95 | 3.74 | 6.42 |
| run58a-4s1 | 0.0015 | 0.841 | 0.0047 | 0.0088 | 0.361 | 6.00 | 2.61 | 2.98 | 3.43 | 5.59 |
| run58a-4s2 | 0.0015 | 0.860 | 0.0047 | 0.0085 | 0.373 | 6.14 | 2.61 | 2.88 | 3.54 | 5.49 |
| run58a-5s1 | 0.0029 | 1.556 | 0.0086 | 0.0176 | 0.664 | 6.67 | 2.86 | 3.57 | 3.78 | 6.43 |
| run58a-5s2 | 0.0029 | 1.586 | - | 0.0188 | 0.684 | 6.79 | - | 3.82 | 3.90 | - |
| run58a-5s3 | 0.0029 | 1.378 | 0.0074 | 0.0185 | 0.591 | 5.90 | 2.46 | 3.76 | 3.37 | 6.22 |
| run58a-6s1 | 0.0020 | 1.185 | - | - | 0.514 | 6.35 | - | - | 3.66 | - |
| run58a-6s2 | 0.0020 | 1.136 | 0.0065 | 0.0162 | 0.485 | 6.08 | 2.71 | 4.11 | 3.45 | 6.82 |
| run58a-6s3 | 0.0020 | 1.179 | - | 0.0151 | 0.506 | 6.31 | - | 3.83 | 3.60 | - |
| r58a-6s1319 | 0.0020 | 1.175 | 0.0086 | 0.0100 | 0.483 | 6.29 | 3.58 | 2.54 | 3.44 | 6.12 |
| r58a-6s2319 | 0.0020 | 1.201 | 0.0060 | 0.0160 | 0.494 | 6.43 | 2.50 | 4.06 | 3.52 | 6.56 |
| r58a-6s3320 | 0.0020 | 1.173 | 0.0080 | 0.0110 | 0.481 | 6.28 | 3.33 | 2.79 | 3.42 | 6.12 |
| run58a-7s1 | 0.0041 | 2.172 | 0.0125 | 0.0270 | 1.020 | 5.67 | 2.54 | 3.34 | 3.54 | 5.88 |
| run58a-7s2 | 0.0041 | 2.197 | 0.0116 | 0.0307 | 1.010 | 5.74 | 2.36 | 3.80 | 3.51 | 6.16 |
| run58a-7s3 | 0.0041 | 2.157 | 0.0122 | 0.0309 | 0.997 | 5.64 | 2.48 | 3.83 | 3.46 | 6.31 |
| run58a-8s1 | 0.0129 | - | 0.0360 | 0.0830 | - | - | 2.32 | 3.27 | - | 5.59 |
| run58a-8s2 | 0.0129 | - | 0.0360 | 0.0850 | - | - | 2.32 | 3.34 | - | 5.66 |
| run58a-8s3 | 0.0129 | - | 0.0360 | 0.0800 | - | - | 2.32 | 3.15 | - | 5.47 |
| run58a-9s1 | 0.0048 | 2.391 | 0.0153 | 0.0330 | 1.294 | 5.34 | 2.66 | 3.49 | 3.84 | 6.15 |
| run58a-9s2 | 0.0048 | 2.384 | 0.0149 | 0.0308 | 1.250 | 5.32 | 2.58 | 3.26 | 3.71 | 5.84 |
| run58a-9s3 | 0.0048 | 2.419 | 0.0150 | 0.0331 | 1.282 | 5.40 | 2.60 | 3.50 | 3.80 | 6.10 |
| r58a-92s1320 | 0.0048 | 2.585 | 0.0130 | 0.0320 | 1.270 | 5.77 | 2.26 | 3.38 | 3.77 | 5.64 |
| r58a-92s2320 | 0.0048 | 2.550 | 0.0150 | 0.0310 | 1.256 | 5.69 | 2.60 | 3.28 | 3.73 | 5.88 |
| r58a-91s2320 | 0.0048 | 2.587 | 0.0150 | 0.0320 | 1.267 | 5.77 | 2.60 | 3.38 | 3.76 | 5.98 |
| r58a-91s3320 | 0.0048 | 2.493 | 0.0160 | 0.0320 | 1.306 | 5.56 | 2.78 | 3.38 | 3.88 | 6.16 |
| r58a-10s1 | 0.0046 | 2.216 | 0.0111 | 0.0300 | 1.011 | 5.27 | 2.05 | 3.38 | 3.20 | 5.43 |
| r58a-10s2 | 0.0046 | 2.275 | 0.0137 | 0.0314 | 1.115 | 5.42 | 2.54 | 3.54 | 3.53 | 6.08 |
| r58a-10s3 | 0.0046 | 2.260 | 0.0127 | 0.0302 | 1.087 | 5.38 | 2.35 | 3.41 | 3.44 | 5.76 |
| r58a-12s1sh | 0.0039 | 2.239 | 0.0110 | 0.0250 | 1.066 | 6.14 | 2.35 | 3.26 | 3.89 | 5.61 |
| r58a-12s2sh | 0.0039 | 2.361 | 0.0120 | 0.0260 | 1.038 | 6.48 | 2.56 | 3.38 | 3.79 | 5.94 |
| r58a-12s3sh | 0.0039 | 2.156 | 0.0110 | 0.0220 | 0.946 | 5.92 | 2.35 | 2.86 | 3.45 | 5.21 |
| r58a-12s4sh | 0.0039 | 2.252 | 0.0100 | 0.0250 | 1.010 | 6.18 | 2.14 | 3.26 | 3.69 | 5.40 |
| r58a-12s5sh | 0.0039 | 2.275 | 0.0110 | 0.0250 | 1.039 | 6.25 | 2.35 | 3.26 | 3.79 | 5.61 |
| r58a-12s6sh | 0.0039 | 2.264 | 0.0120 | 0.0250 | 0.986 | 6.22 | 2.56 | 3.26 | 3.60 | 5.82 |
| r58a-13s1 | 0.0048 | 2.538 | 0.0130 | 0.0360 | 1.194 | 5.66 | 2.26 | 3.81 | 3.54 | 6.07 |
| r58a-13s2 | 0.0048 | 2.426 | 0.0130 | 0.0310 | 1.154 | 5.41 | 2.26 | 3.28 | 3.42 | 5.54 |
| r58a-13s3 | 0.0048 | 2.467 | 0.0120 | 0.0330 | 1.126 | 5.50 | 2.08 | 3.49 | 3.34 | 5.57 |
| r58a-13s4 | 0.0048 | 2.478 | 0.0120 | 0.0320 | 1.202 | 5.53 | 2.08 | 3.38 | 3.57 | 5.46 |
| r58a-13s6 | 0.0048 | 2.500 | 0.0140 | 0.0300 | 1.195 | 5.58 | 2.43 | 3.17 | 3.55 | 5.60 |
| r58a-13s7 | 0.0048 | 2.492 | 0.0150 | 0.0330 | 1.253 | 5.56 | 2.60 | 3.49 | 3.72 | 6.09 |
| r58a-14s1 | 0.0031 | 1.563 | 0.0080 | 0.0270 | 0.690 | 5.40 | 2.15 | 4.42 | 3.17 | 6.57 |
| r58a-14s2 | 0.0037 | 1.949 | 0.0100 | 0.0250 | 0.858 | 5.64 | 2.25 | 3.43 | 3.30 | 5.68 |
| r58a-14s3 | 0.0037 | 1.925 | 0.0100 | 0.0260 | 0.840 | 5.57 | 2.25 | 3.57 | 3.23 | 5.82 |
| r58a-14s4 | 0.0037 | 1.995 | 0.0110 | 0.0230 | 0.860 | 5.78 | 2.48 | 3.16 | 3.31 | 5.64 |
| r58a-14s5 | 0.0037 | 1.922 | 0.0100 | - | 0.879 | 5.56 | 2.25 | - | 3.38 | - |
| r58a-14s6 | 0.0037 | 1.923 | 0.0100 | 0.0240 | 0.860 | 5.57 | 2.25 | 3.29 | 3.31 | 5.54 |
| r12c3shs1 | 0.0068 | - | 0.0230 | 0.0310 | 1.073 | - | 2.81 | 2.31 | 2.24 | 5.12 |
| r12c3sh2s1 | 0.0024 | 1.078 | - | - | 0.377 | 4.80 | - | - | 2.23 | - |
| r12c3sh2s2 | 0.0024 | 1.002 | - | - | 0.358 | 4.47 | - | - | 2.12 | - |
| r12c3sh2s3 | 0.0024 | 1.068 | - | - | 0.378 | 4.76 | - | - | 2.24 | - |
| r12c3sh2s4 | 0.0024 | 1.018 | - | - | 0.360 | 4.54 | - | - | 2.13 | - |
| r12c3sh2s5 | 0.0024 | 1.010 | - | - | 0.404 | 4.50 | - | - | 2.39 | - |
| r12c3sh2s6 | 0.0024 | 1.056 | - | - | 0.403 | 4.71 | - | - | 2.39 | - |
| r12c3sh2s7 | 0.0024 | 1.038 | - | - | 0.399 | 4.63 | - | - | 2.36 | - |
| r12c3sh2s8 | 0.0024 | 1.041 | - | - | 0.389 | 4.64 | - | - | 2.30 | - |
| r12c1s1119 | 0.0124 | - | 0.0290 | 0.0450 | 1.874 | - | 1.94 | 1.84 | 2.15 | 3.79 |
| r12c1s2119 | 0.0124 | - | 0.0340 | 0.0450 | 1.870 | - | 2.28 | 1.84 | 2.14 | 4.12 |
| r12c1s3119 | 0.0124 | - | 0.0310 | 0.0450 | 1.898 | - | 2.08 | 1.84 | 2.18 | 3.92 |
| r12c1s4119 | 0.0124 | - | 0.0320 | 0.0470 | 1.913 | - | 2.14 | 1.92 | 2.19 | 4.07 |

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|-------------|--------|-------|--------|--------|-------|------|------|------|------|------|
| r68c1s1 | 0.0089 | 1.678 | 0.0160 | 0.0140 | 0.359 | 1.99 | 1.48 | 0.79 | 0.57 | 2.27 |
| r68c1s2 | 0.0089 | 1.712 | 0.0170 | 0.0110 | 0.376 | 2.03 | 1.57 | 0.62 | 0.59 | 2.19 |
| r68c1s3 | 0.0089 | 1.678 | 0.0160 | 0.0110 | 0.366 | 1.99 | 1.48 | 0.62 | 0.58 | 2.10 |
| r68c1s1324 | 0.0089 | 1.720 | 0.0170 | 0.0100 | 0.356 | 2.04 | 1.57 | 0.56 | 0.56 | 2.13 |
| r68c1s2324 | 0.0089 | 1.769 | 0.0168 | 0.0081 | 0.361 | 2.10 | 1.55 | 0.46 | 0.57 | 2.01 |
| r68c1s3324 | 0.0089 | 1.764 | 0.0171 | 0.0092 | 0.370 | 2.10 | 1.58 | 0.52 | 0.58 | 2.10 |
| r68c1s4324 | 0.0089 | 1.778 | 0.0160 | 0.0110 | 0.372 | 2.11 | 1.48 | 0.62 | 0.59 | 2.10 |
| r68c1s1119 | 0.0089 | 1.788 | 0.0150 | 0.0083 | 0.379 | 2.12 | 1.38 | 0.47 | 0.60 | 1.85 |
| r68c1s2119 | 0.0089 | 1.687 | 0.0183 | 0.0072 | 0.354 | 2.00 | 1.69 | 0.40 | 0.56 | 2.09 |
| r68c1s3119 | 0.0089 | 1.754 | 0.0169 | 0.0084 | 0.358 | 2.08 | 1.56 | 0.47 | 0.56 | 2.03 |
| r68c1s4119 | 0.0089 | 1.715 | 0.0163 | 0.0088 | 0.357 | 2.04 | 1.50 | 0.50 | 0.56 | 2.00 |
| run106c1s1 | 0.0077 | 0.931 | 0.0100 | 0.0020 | 0.132 | 1.27 | 1.10 | 0.20 | 0.24 | 1.30 |
| run106c1s2 | 0.0077 | 0.941 | 0.0110 | 0.0030 | 0.125 | 1.28 | 1.17 | 0.19 | 0.23 | 1.36 |
| run106c2s1 | 0.0082 | 0.862 | 0.0100 | 0.0020 | 0.120 | 1.10 | 1.06 | 0.18 | 0.20 | 1.24 |
| run106c2s2 | 0.0082 | 0.970 | 0.0110 | 0.0020 | 0.131 | 1.24 | 1.09 | 0.19 | 0.22 | 1.28 |
| run106c2s3 | 0.0082 | 0.969 | 0.0110 | 0.0030 | 0.137 | 1.24 | 1.09 | 0.18 | 0.23 | 1.27 |
| r106c1s1119 | 0.0077 | 0.916 | 0.0109 | 0.0033 | 0.118 | 1.25 | 1.16 | 0.21 | 0.21 | 1.37 |
| r106c1s2119 | 0.0077 | 0.893 | 0.0086 | 0.0029 | 0.111 | 1.22 | 0.91 | 0.19 | 0.20 | 1.10 |
| r106c1s3119 | 0.0077 | 0.937 | 0.0090 | - | 0.119 | 1.28 | 0.95 | - | 0.22 | - |
| r106c2s1119 | 0.0082 | 0.873 | 0.0123 | 0.0029 | 0.120 | 1.12 | 1.22 | 0.18 | 0.20 | 1.40 |
| r106c2s2119 | 0.0082 | 0.953 | 0.0110 | 0.0037 | 0.133 | 1.22 | 1.09 | 0.22 | 0.23 | 1.31 |
| r106c2s3119 | 0.0082 | 0.892 | 0.0113 | - | 0.126 | 1.14 | 1.12 | - | 0.21 | - |

Notes: □ Background corrected absorbance at $3570 \pm 20 \text{ cm}^{-1}$; † Background corrected absorbance at $4500 \pm 10 \text{ cm}^{-1}$

‡ Background corrected absorbance at $5200 \pm 10 \text{ cm}^{-1}$; § Background corrected absorbance at $1630 \pm 10 \text{ cm}^{-1}$;

|| Concentration (weight %) of total dissolved H_2O based on 3570 cm^{-1} absorbance and $\square_{3570} = 69.21 \text{ L/mol cm}$;

#Concentration of dissolved H_2O as OH^{-1} based on 4500 cm^{-1} absorbance and $\square_{4500} = 0.89 \text{ L/mol cm}$;

□□Concentration (weight %) of dissolved H_2O as molecular H_2O based on 5200 cm^{-1} absorbance and $\square_{5200} = 1.46 \text{ L/mol cm}$;

††Concentration (weight %) of dissolved H_2O as molecular H_2O based on 1630 cm^{-1} absorbance and $\square_{1630} = 52.05 \text{ L/mol cm}$;

‡‡ Concentration (weight %) of total dissolved H_2O based on summation of OH^{-1} (#) and molecular H_2O (□□).