

American Mineralogist: November 2023 Online Materials AM-23-118674
London: Macusani obsidian

EMPA of glass, MAC-247: 08/08/17
15 kV, 2&20 nA, 20 µm

| Weight Percent | | | | | | | | | | | | | | | | | Atoms per 8 Oxygen (sum excludes F) | | | | | | | | | | | | | | | | | Ratios | | |
|-----------------|-----|------------------|-------------------------------|--------------------------------|-------|------|------|------|-------------------|------------------|-------------------|-------------------|-------------------------------|------|------|-------|-------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--|--|
| SAMPLE | Pt# | SiO ₂ | B ₂ O ₃ | Al ₂ O ₃ | FeO | MnO | MgO | CaO | Na ₂ O | K ₂ O | Rb ₂ O | Cs ₂ O | P ₂ O ₅ | F | O | TOTAL | Si | B | Al | Fe | Mn | Mg | Ca | Na | K | Rb | Cs | P | F | Sum | ASI | K* | Rb/K | | | |
| Segment 6 (Hot) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M247-Seg1 | 1 | 0 | 69.75 | 0.97 | 15.06 | 0.44 | 0.06 | 0.00 | 0.22 | 4.17 | 3.32 | 0.27 | 0.00 | 0.55 | 1.62 | -0.68 | 95.76 | 3.056 | 0.076 | 0.778 | 0.016 | 0.002 | 0.000 | 0.010 | 0.354 | 0.186 | 0.008 | 0.000 | 0.020 | 0.225 | 4.506 | 1.389 | 0.344 | 0.041 | | |
| M247-Seg1 | 2 | 1 | 69.77 | 0.69 | 15.14 | 0.42 | 0.06 | 0.00 | 0.21 | 4.09 | 3.31 | 0.27 | 0.07 | 0.55 | 1.64 | -0.69 | 95.53 | 3.067 | 0.070 | 0.785 | 0.016 | 0.002 | 0.000 | 0.010 | 0.348 | 0.186 | 0.008 | 0.001 | 0.020 | 0.229 | 4.513 | 1.416 | 0.348 | 0.041 | | |
| M247-Seg1 | 3 | 2 | 69.80 | 0.94 | 15.24 | 0.44 | 0.05 | 0.00 | 0.20 | 4.27 | 3.32 | 0.24 | 0.06 | 0.54 | 1.78 | -0.75 | 96.12 | 3.052 | 0.075 | 0.785 | 0.016 | 0.002 | 0.000 | 0.009 | 0.362 | 0.185 | 0.007 | 0.001 | 0.020 | 0.245 | 4.514 | 1.390 | 0.338 | 0.036 | | |
| M247-Seg1 | 4 | 3 | 69.86 | 0.98 | 15.68 | 0.49 | 0.06 | 0.00 | 0.22 | 4.24 | 3.48 | 0.27 | 0.07 | 0.58 | 1.71 | -0.72 | 96.93 | 3.033 | 0.075 | 0.802 | 0.018 | 0.002 | 0.000 | 0.010 | 0.357 | 0.193 | 0.008 | 0.001 | 0.021 | 0.235 | 4.521 | 1.409 | 0.351 | 0.039 | | |
| M247-Seg1 | 5 | 4 | 69.14 | 1.65 | 15.29 | 0.41 | 0.04 | 0.01 | 0.21 | 4.29 | 3.41 | 0.25 | 0.06 | 0.55 | 1.58 | -0.67 | 96.23 | 3.011 | 0.091 | 0.785 | 0.015 | 0.002 | 0.000 | 0.010 | 0.362 | 0.189 | 0.007 | 0.001 | 0.020 | 0.218 | 4.494 | 1.373 | 0.343 | 0.037 | | |
| M247-Seg1 | 6 | 5 | 69.61 | 1.41 | 15.27 | 0.40 | 0.07 | 0.00 | 0.22 | 4.16 | 3.42 | 0.22 | 0.06 | 0.58 | 1.57 | -0.66 | 96.32 | 3.028 | 0.086 | 0.783 | 0.015 | 0.003 | 0.000 | 0.010 | 0.351 | 0.190 | 0.006 | 0.001 | 0.021 | 0.216 | 4.493 | 1.394 | 0.351 | 0.032 | | |
| M247-Seg1 | 7 | 6 | 69.31 | 1.06 | 15.50 | 0.43 | 0.06 | 0.01 | 0.19 | 4.01 | 3.22 | 0.30 | 0.06 | 0.56 | 1.67 | -0.70 | 95.68 | 3.037 | 0.078 | 0.800 | 0.016 | 0.002 | 0.001 | 0.009 | 0.341 | 0.180 | 0.008 | 0.001 | 0.021 | 0.231 | 4.495 | 1.485 | 0.346 | 0.047 | | |
| M247-Seg1 | 8 | 7 | 70.07 | 1.05 | 15.65 | 0.45 | 0.06 | 0.00 | 0.23 | 4.29 | 3.41 | 0.31 | 0.06 | 0.55 | 1.51 | -0.64 | 97.01 | 3.035 | 0.077 | 0.799 | 0.016 | 0.002 | 0.000 | 0.011 | 0.360 | 0.189 | 0.009 | 0.001 | 0.020 | 0.207 | 4.518 | 1.402 | 0.344 | 0.046 | | |
| M247-Seg1 | 9 | 8 | 69.27 | 0.89 | 15.66 | 0.44 | 0.04 | 0.01 | 0.21 | 4.31 | 3.50 | 0.27 | 0.07 | 0.55 | 1.53 | -0.64 | 96.12 | 3.032 | 0.074 | 0.808 | 0.016 | 0.002 | 0.001 | 0.010 | 0.366 | 0.196 | 0.008 | 0.001 | 0.020 | 0.211 | 4.534 | 1.389 | 0.348 | 0.039 | | |
| M247-Seg1 | 10 | 9 | 68.73 | 0.81 | 15.33 | 0.45 | 0.08 | 0.01 | 0.21 | 4.11 | 3.36 | 0.25 | 0.06 | 0.55 | 1.63 | -0.68 | 94.88 | 3.044 | 0.073 | 0.800 | 0.017 | 0.003 | 0.000 | 0.010 | 0.353 | 0.190 | 0.007 | 0.001 | 0.021 | 0.228 | 4.519 | 1.424 | 0.350 | 0.038 | | |
| Average | | | 69.53 | 1.04 | 15.38 | 0.44 | 0.06 | 0.00 | 0.21 | 4.19 | 3.38 | 0.27 | 0.06 | 0.56 | 1.62 | -0.68 | 96.06 | 3.040 | 0.078 | 0.793 | 0.016 | 0.002 | 0.000 | 0.010 | 0.355 | 0.188 | 0.007 | 0.001 | 0.021 | 0.225 | 4.511 | 1.407 | 0.346 | 0.040 | | |
| Std Dev | | | 0.39 | 0.27 | 0.21 | 0.02 | 0.01 | 0.00 | 0.01 | 0.10 | 0.08 | 0.03 | 0.02 | 0.01 | 0.08 | 0.03 | 0.61 | 0.015 | 0.006 | 0.010 | 0.001 | 0.000 | 0.000 | 0.001 | 0.007 | 0.004 | 0.001 | 0.000 | 0.000 | 0.011 | 0.013 | 0.030 | 0.004 | 0.004 | | |
| Segment 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M247-Seg2 | 1 | 10 | 70.39 | 0.98 | 15.35 | 0.47 | 0.05 | 0.00 | 0.21 | 3.88 | 3.61 | 0.29 | 0.06 | 0.57 | 1.71 | -0.72 | 96.84 | 3.054 | 0.075 | 0.785 | 0.017 | 0.002 | 0.000 | 0.010 | 0.326 | 0.200 | 0.008 | 0.001 | 0.021 | 0.234 | 4.499 | 1.441 | 0.380 | 0.041 | | |
| M247-Seg2 | 2 | 11 | 70.43 | 0.70 | 15.61 | 0.46 | 0.06 | 0.01 | 0.23 | 4.35 | 3.74 | 0.24 | 0.06 | 0.56 | 1.58 | -0.67 | 97.37 | 3.050 | 0.069 | 0.797 | 0.017 | 0.002 | 0.000 | 0.011 | 0.365 | 0.206 | 0.007 | 0.001 | 0.021 | 0.217 | 4.545 | 1.345 | 0.361 | 0.032 | | |
| M247-Seg2 | 3 | 12 | 69.73 | 1.23 | 15.51 | 0.50 | 0.04 | 0.01 | 0.23 | 4.39 | 3.52 | 0.28 | 0.06 | 0.54 | 1.75 | -0.73 | 97.05 | 3.025 | 0.081 | 0.793 | 0.018 | 0.002 | 0.000 | 0.011 | 0.369 | 0.195 | 0.008 | 0.001 | 0.020 | 0.239 | 4.523 | 1.353 | 0.345 | 0.040 | | |
| M247-Seg2 | 4 | 13 | 69.24 | 0.81 | 15.16 | 0.54 | 0.08 | 0.00 | 0.24 | 4.47 | 3.54 | 0.27 | 0.06 | 0.57 | 1.68 | -0.71 | 95.95 | 3.044 | 0.072 | 0.785 | 0.020 | 0.003 | 0.000 | 0.011 | 0.381 | 0.199 | 0.008 | 0.001 | 0.021 | 0.233 | 4.546 | 1.304 | 0.343 | 0.038 | | |
| Average | | | 69.95 | 0.93 | 15.41 | 0.50 | 0.06 | 0.00 | 0.23 | 4.27 | 3.60 | 0.27 | 0.06 | 0.56 | 1.68 | -0.71 | 96.80 | 3.043 | 0.074 | 0.790 | 0.018 | 0.002 | 0.000 | 0.011 | 0.360 | 0.200 | 0.008 | 0.001 | 0.021 | 0.231 | 4.528 | 1.361 | 0.357 | 0.038 | | |
| Std Dev | | | 0.49 | 0.20 | 0.17 | 0.03 | 0.02 | 0.00 | 0.01 | 0.23 | 0.08 | 0.02 | 0.00 | 0.01 | 0.06 | 0.03 | 0.52 | 0.011 | 0.005 | 0.005 | 0.001 | 0.001 | 0.000 | 0.001 | 0.021 | 0.004 | 0.001 | 0.000 | 0.001 | 0.009 | 0.020 | 0.050 | 0.015 | 0.003 | | |
| Segment 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M247-Seg3 | 1 | 13 | 70.81 | 1.15 | 15.57 | 0.51 | 0.05 | 0.01 | 0.21 | 4.23 | 3.70 | 0.23 | 0.08 | 0.55 | 1.71 | -0.72 | 98.09 | 3.038 | 0.079 | 0.787 | 0.018 | 0.002 | 0.001 | 0.010 | 0.352 | 0.202 | 0.006 | 0.001 | 0.020 | 0.232 | 4.517 | 1.371 | 0.365 | 0.032 | | |
| M247-Seg3 | 2 | 14 | 70.90 | 1.00 | 15.95 | 0.48 | 0.05 | 0.01 | 0.20 | 4.53 | 3.72 | 0.22 | 0.08 | 0.56 | 1.64 | -0.69 | 98.65 | 3.030 | 0.075 | 0.804 | 0.017 | 0.002 | 0.000 | 0.009 | 0.376 | 0.203 | 0.006 | 0.001 | 0.020 | 0.222 | 4.543 | 1.347 | 0.350 | 0.030 | | |
| M247-Seg3 | 3 | 15 | 70.57 | 0.93 | 15.73 | 0.53 | 0.06 | 0.01 | 0.19 | 4.21 | 3.74 | 0.31 | 0.06 | 0.55 | 1.71 | -0.72 | 97.89 | 3.040 | 0.074 | 0.799 | 0.019 | 0.002 | 0.000 | 0.009 | 0.352 | 0.205 | 0.009 | 0.001 | 0.020 | 0.233 | 4.530 | 1.389 | 0.368 | 0.042 | | |
| M247-Seg3 | 4 | 16 | 71.20 | 0.77 | 16.35 | 0.52 | 0.07 | 0.00 | 0.19 | 4.19 | 3.77 | 0.28 | 0.06 | 0.58 | 1.70 | -0.72 | 98.98 | 3.034 | 0.069 | 0.821 | 0.019 | 0.002 | 0.000 | 0.009 | 0.347 | 0.205 | 0.008 | 0.001 | 0.021 | 0.229 | 4.536 | 1.442 | 0.372 | 0.037 | | |
| M247-Seg3 | 5 | 17 | 70.63 | 0.84 | 15.61 | 0.48 | 0.06 | 0.00 | 0.20 | 4.05 | 3.59 | 0.23 | 0.08 | 0.59 | 1.67 | -0.70 | 97.32 | 3.052 | 0.072 | 0.795 | 0.017 | 0.002 | 0.000 | 0.009 | 0.339 | 0.198 | 0.006 | 0.002 | 0.022 | 0.228 | 4.514 | 1.430 | 0.368 | 0.032 | | |
| Average | | | 70.82 | 0.94 | 15.84 | 0.50 | 0.06 | 0.01 | 0.20 | 4.25 | 3.70 | 0.26 | 0.07 | 0.57 | 1.69 | -0.71 | 98.19 | 3.039 | 0.074 | 0.801 | 0.018 | 0.002 | 0.000 | 0.009 | 0.353 | 0.203 | 0.007 | 0.001 | 0.021 | 0.229 | 4.528 | 1.396 | 0.365 | 0.035 | | |
| Std Dev | | | 0.22 | 0.13 | 0.29 | 0.02 | 0.01 | 0.00 | 0.01 | 0.16 | 0.06 | 0.04 | 0.01 | 0.02 | 0.03 | 0.01 | 0.58 | 0.007 | 0.003 | 0.011 | 0.001 | 0.000 | 0.000 | 0.000 | 0.012 | 0.003 | 0.001 | 0.000 | 0.001 | 0.004 | 0.011 | 0.035 | 0.008 | 0.005 | | |
| Segment 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M247-Seg4 | 1 | 18 | 69.70 | 0.73 | 15.64 | 0.50 | 0.03 | 0.01 | 0.21 | 4.16 | 3.78 | 0.27 | 0.06 | 0.58 | 1.61 | -0.68 | 96.60 | 3.042 | 0.070 | 0.805 | 0.018 | 0.001 | 0.000 | 0.010 | 0.352 | 0.210 | 0.008 | 0.001 | 0.021 | 0.222 | 4.539 | 1.384 | 0.374 | 0.036 | | |
| M247-Seg4 | 2 | 19 | 70.30 | 1.72 | 16.27 | 0.48 | 0.05 | 0.00 | 0.21 | 3.82 | 3.88 | 0.25 | 0.04 | 0.54 | 1.57 | -0.66 | 98.48 | 2.995 | 0.091 | 0.817 | 0.017 | 0.002 | 0.000 | 0.010 | 0.316 | 0.211 | 0.007 | 0.001 | 0.019 | 0.211 | 4.484 | 1.497 | 0.400 | 0.032 | | |
| M247-Seg4 | 3 | 20 | 70.72 | 0.64 | 16.33 | 0.48 | 0.05 | 0.00 | 0.22 | 3.99 | 3.73 | 0.28 | 0.06 | 0.56 | 1.76 | -0.74 | 98.06 | 3.040 | 0.067 | 0.828 | 0.017 | 0.002 | 0.000 | 0.010 | 0.333 | 0.204 | 0.008 | 0.001 | 0.020 | 0.239 | 4.530 | 1.485 | 0.381 | 0.038 | | |
| M247-Seg4 | 4 | 21 | 70.36 | 1.16 | 16.11 | 0.47 | 0.06 | 0.01 | 0.23 | 4.06 | 3.74 | 0.26 | 0.07 | 0.57 | 1.70 | -0.71 | 98.08 | 3.019 | 0.079 | 0.815 | 0.017 | 0.002 | 0.001 | 0.010 | 0.337 | 0.204 | 0.007 | 0.001 | 0.021 | 0.230 | 4.514 | 1.448 | 0.377 | 0.034 | | |
| M247-Seg4 | 5 | 22 | 68.30 | 0.99 | 16.06 | 0.51 | 0.04 | 0.01 | 0.24 | 4.04 | 3.86 | 0.25 | 0.07 | 0.58 | 1.61 | -0.68 | 95.87 | 3.004 | 0.077 | 0.833 | 0.019 | 0.002 | 0.000 | 0.011 | 0.344 | 0.216 | 0.007 | 0.001 | 0.022 | 0.224 | 4.536 | 1.428 | 0.386 | 0.032 | | |
| Average | | | 69.88 | 1.05 | 16.08 | 0.49 | 0.05 | 0.00 | 0.22 | 4.01 | 3.80 | 0.26 | 0.06 | 0.57 | 1.65 | -0.69 | 97.42 | 3.020 | 0.077 | 0.819 | 0.018 | 0.002 | 0.000 | 0.010 | 0.336 | 0.209 | 0.007 | 0.001 | 0.021 | 0.225 | 4.521 | 1.448 | 0.384 | 0.035 | | |
| Std Dev | | | 0.85 | 0.38 | 0.24 | 0.02 | 0.01 | 0.00 | 0.01 | 0.11 | 0.06 | 0.01 | 0.01 | 0.01 | 0.07 | 0.03 | 1.00 | 0.019 | 0.008 | 0.010 | 0.001 | 0.000 | 0.000 | 0.001 | 0.012 | 0.004 | 0.000 | 0.000 | 0.001 | 0.009 | 0.020 | 0.041 | 0.009 | 0.002 | | |
| Segment 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M247-Seg5 | 1 | 23 | 69.31 | 0.76 | 15.29 | 0.43 | 0.07 | 0.00 | 0.20 | 4.26 | 3.08 | 0.25 | 0.06 | 0.55 | 1.60 | -0.67 | 95.20 | 3.055 | 0.071 | 0.794 | 0.016 | 0.003 | 0.000 | 0.010 | 0.364 | 0.173 | 0.007 | 0. | | | | | | | | |