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| **Table S1: Report on XRF results of the main elements (wt%) that act as glass former, stabilizer and flux in some K2, Mapungubwe, Zimbawe and Khami series from van Riet Lowe Collection** | | | | |
| Bead type/N | Elements | Min. | Max. | Mean |
| K2/2 | Mg | 0 | 0 | 0 |
|  | Ca | 0.7 | 1.2 | 0.9 |
|  | K | 3.6 | 3.9 | 3.8 |
|  | Al | 5.4 | 6.2 | 5.8 |
|  | Fe | 1.2 | 1.6 | 1.4 |
|  | Si | 40.4 | 45.1 | 42.8 |
|  | Others/Na, O | 39.8 | 44.2 | 42.0 |
| Map oblate/4 | Mg | 1.9 | 2.3 | 2.1 |
|  | Ca | 2.4 | 2.8 | 2.7 |
|  | K | 2.7 | 3.5 | 3.2 |
|  | Al | 3.6 | 6.5 | 4.8 |
|  | Fe | 1.0 | 1.3 | 1.2 |
|  | Si | 35.4 | 48.2 | 39.9 |
|  | Others/Na, O | 30.2 | 44.8 | 36.4 |
| Zimbabwe/6 | Mg | 1.3 | 3.1 | 2.3 |
|  | Ca | 3.4 | 3.8 | 3.6 |
|  | K | 2.9 | 3.8 | 3.4 |
|  | Al | 4.2 | 7.1 | 5.5 |
|  | Fe | 0.9 | 1.2 | 1.1 |
|  | Si | 36.2 | 43.3 | 40.0 |
|  | Others/Na, O | 34.2 | 46.3 | 38.9 |
| Khami/8 | Mg | 0 | 1.4 | 0.4 |
|  | Ca | 1.9 | 6.3 | 2.9 |
|  | K | 2 | 2.7 | 2.3 |
|  | Al | 4.3 | 6.6 | 5.4 |
|  | Fe | 1.7 | 5.4 | 2.6 |
|  | Si | 34.4 | 48.3 | 40.3 |
|  | Others/Na, O | 40.8 | 49.6 | 43.7 |

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| **Table S2: Average composition of some glass bead series from southern Africa (oxides wt%) [23]** | | | | | | | |
| **Bead series** | **Na2O** | **MgO** | **Al2O3** | **SiO2** | **K2O** | **CaO** | **Fe2O3** |
| Zhizo | 10.17-16.38 | 2.5-7.17 | 2.29-4.01 | 65.56-75.94 | 1.69-1.49 | 3.39-9.3 | 0.42-2.79 |
| K2-IP | 10.91-22.37 | 0.16-0.83 | 6.40-17.66 | 57.89-73.58 | 1.98-5.11 | 1.53-3.37 | 0.55-3.46 |
| EC-IP | 11.26-20.23 | 0.24-1.78 | 4.21-21.09 | 55.26-71.96 | 1.90-5.5 | 1.73-4.84 | 0.64-5.84 |
| Map Oblate | 10.38-19.51 | 2.68-10.16 | 5.01-11.93 | 51.34-70.06 | 2.02-5.31 | 3.35-12.41 | 0.52-2.54 |
| Zimbabwe | 10.31-20.89 | 2.97-6.02 | 2.98-9.77 | 51.21-67.26 | 2.21-5.13 | 4.27-11.30 | 0.64-3.26 |
| K-IP | 10.42-31.76 | 0.47-2.73 | 5.39-16.22 | 48.65-74.95 | 1.45-9.2 | 1.71-6.61 | 0.76-7.30 |

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| **Table S3: Reclassification of the beads from Table 2** | | | |
| **SAMPLE** | **XRF data** | **New series allocated** | **Remark** |
| **East Coast-Indo Pacific series (EC-IP)** | | | |
| Mag-ecip-b1 | 🗸 | Khami | XRF data and morphology |
| Mag-ecip-b2 | 🗸 | - | XRF data and morphology |
| Mag-ecip-b3 | 🗴 | European | Jacobsite (R) |
| **K2-Indo Pacific series (K2-IP)** | | | |
| Mag-k2-lb1 | 🗸 | - | Soda glass (R), Al high (XRF), U (XRF) |
| Mag-k2-lb2 | 🗸 | European | Soda/lime (R), calcium antimoniate (R),  Ca High (XRF), Al low (XRF), Sb (XRF), Absence U (XRF) |
| Mag-k2-lb3 | 🗴 | European | Soda/lime (R) , calcium antimoniate (R) |
| Mag-k2-lb4 | 🗴 | European | Soda/lime (R) |
| Mag-k2-lb5 | 🗴 | European | Soda/lime, calcium antimoniate (R) |
| Mag-k2-lb6 | 🗸 | European | Soda/lime, calcium antimoniate (R),  Ca High (XRF), Al low (XRF), Sb (XRF), Absence U (XRF) |
| **Khami-Indo Pacific series (K-IP)** | | | |
| Mag-k-w1 | 🗸 | European | calcium antimoniate (R), Absence U (XRF) |
| Mag-k-w2 | 🗸 | - | Soda glass (R), Al high (XRF), U (XRF) |
| Mag-k-y1 | 🗸 | - | Lead tin yellow type (II) (R), Al high (XRF), U (XRF) |
| Mag-k-y2 | 🗸 | - | Lead tin yellow type (II) (R) , Al high (XRF), U (XRF) |
| Mag-k-y3 | 🗴 | ? | Lead tin yellow type (II) (R) |
| Mag-k-y4 | 🗴 | ? | Lead tin yellow type (II) (R) |
| Mag-k-y5 | EDS | Recycled | Inhomogeneous glass |
| Mag-k-db6 | 🗴 | - | Soda/lime (R), morphology |
| Mag-k-db7 | 🗸 | Unknown | Calcium antimoniate (R), Al high (XRF), Sb low (XRF), U (XRF), Co/As~2 (XRF), |
| Mag-k-db8 | 🗸 | - | Al high (XRF), U (XRF), absence of Co, Cu(XRF) |
| Mag-k-lb9 | 🗴 | - | Soda/lime (R), morphology |
| Mag-k-lb10 | 🗴 | - | Soda/lime (R), morphology |
| Mag-k-lb11 | 🗸 | - | Soda/lime (R), Al high (XRF), U (XRF) |
| Mag-k-g12 | 🗸 | Map or Zim | Soda/lime (R), Al high (XRF), Mg high (XRF), Absence U (XRF) |
| Mag-k-g13 | 🗸 | - | Soda/lime (R), Al high (XRF), U (XRF) |
| Mag-k-g14 | 🗸 | European | Lead arsenate (R), high Pb (XRF), As (XRF), |
| Mag-k-lb15 | 🗴 | - | Soda/lime (R), morphology |
| Mag-k-r16 | 🗸 | European | Low Al (XRF), Sb (XRF), Absence U (XRF) |

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| **Table S4: Re-classification of the beads from Table 3** | | | |
| **SAMPLE** | **XRF data** | **New series allocated** | **Rationale** |
| **Zhizo series** | | | |
| Mag-z-db1 | 🗸 | European | Absence Mg (XRF), Co/As (XRF), low Al (XRF), Co/As~0.4 |
| Mag-z-db2 | 🗸 | European | High Pb (XRF), Co/As <0.1 (XRF), |
| Mag-z-db3 | 🗴 | European | Soda/lime (R) |
| Mag-z-db4 | 🗸 | IP (Far East Asia) | Absence Mg and U(XRF), High Al (XRF), high Mn (XRF), Malayite (R) |
| Mag-z-lb1 | 🗸 | European | Absence Mg (XRF), low Al (XRF) |
| Mag-z-lb2 | 🗴 | European | Soda/lime (R) |
| Mag-z-lb3 | 🗸 | European | Absence Mg (XRF), low Al (XRF), high Ca (XRF) |
| Mag-z-lb4 | 🗸 | IP | High Al (XRF), low Ca (XRF), U (XRF), Mg>1% |
| Mag-z-lb5 | 🗴 | European | Soda/lime (R) |
| **Mapungubwe Oblates** | | | |
| Mag-map-b1 | 🗸 | European | Absence Mg (XRF), Jacobsite (XRF R) |
| Mag-map-b2 | 🗸 | European | Absence Mg (XRF), Jacobsite (XRF, R) |
| Mag-map-b3 | 🗸 | Khami | Absence Mg (XRF), U (XRF), FeS chromophore (R) |
| Mag-map-db1 | 🗴 | Khami | Soda/lime (R), the same spectrum as db2 |
| Mag-map-db2 | 🗸 | Khami | High Al (XRF), low Ca (XRF), Absence Mg (XRF), U (XRF), Co/As~2 (XRF) |
| Mag-map-db3 | 🗴 | Khami | Soda/lime (R), the same spectrum as db2 |
| Mag-map-lb4 | 🗸 | Khami | High Al (XRF), low Ca (XRF), Absence Mg (XRF), U (XRF) |
| Mag-map-lb5 | 🗸 | Khami | Soda glass(R), High Al (XRF), low Ca (XRF), Absence Mg (XRF), U (XRF) |
| Mag-map-lb6 | 🗴 | Khami | Absence SnO2 (R), morphology |
| Mag-map-lb7 | 🗴 | Khami | Absence SnO2 (R), morphology |
| Mag-map-bg8 | 🗸 | Unknown | Lead tin yellow (R), Cu (XRF), High Al (XRF), low Ca (XRF), Mg (XRF), Absence U (XRF), plant ash |
| Mag-map-bg9 | 🗸 | Unknown | Lead tin yellow (R), Cu (XRF), High Al (XRF), low Ca (XRF), Mg (XRF), Absence U (XRF), plant ash |
| Mag-map-bg10 | 🗴 | Unknown | Soda/lime (R), the same spectrum and morphology as bg8 and 9 |
| Mag-map-g11 | 🗸 | Khami | High Al (XRF), low Ca (XRF), U (XRF) |
| Mag-map-y4 | 🗸 | IP, South Asia  Sri Lanka? | Soda glass (R), High Al (XRF), low Ca (XRF), high Ba (XRF), Absence Mg and U (XRF) |
| Mag-map-y5 | 🗸 | European | High Pb (XRF), high As (XRF), Pb-Sn-Sb triple oxide (R) |
| **Zimbabwe series** | | | |
| Mag-zim-y1 | 🗸 | European | High Pb (XRF), high As (XRF), Pb-Sn-Sb triple oxide (R) |
| Mag-zim-y2 | 🗸 | - | High Al (XRF), low Ca (XRF), Mg (XRF), Absence U (XRF), plant ash |
| Mag-zim-y3 | 🗴 | IP | Soda glass (R), the same spectrum as Mag-map-y4 |
| Mag-zim-db1 | 🗴 | Khami | Soda/lime (R), the same spectrum as db2 |
| Mag-zim-db2 | 🗸 | Khami | High Al (XRF), low Ca (XRF), Absence Mg (XRF), U (XRF), Co/As~2 |
| Mag-zim-db3 | 🗸 | European | Low Al (XRF), high Ca (XRF), Absence Mg (XRF), Co/As~0.4 |
| Mag-zim-g4 | 🗸 | European | Lead arsenate (R), High Pb (XRF), high As (XRF) |
| Mag-zim-db5 | 🗴 | European | Soda/lime (R), the same spectrum as db3 |
| Mag-zim-db6 | 🗴 | European | Soda/lime (R), the same spectrum as db3 |
| Mag-zim-db7 | 🗴 | European | Soda/lime (R), the same spectrum as db3 |
| Mag-zim-lb8 | 🗴 | European | Soda/lime (R), the same spectrum as db3 |
| Mag-zim-lb9 | 🗸 | Khami | High Al (XRF), low Ca (XRF), Absence Mg (XRF), U (XRF) |
| Mag-zim-lb10 | 🗴 | European | Soda/lime (R), the same spectrum as db3 |
| Mag-zim-lb11 | 🗸 | European | Calcium antimoniate (R), Sb (XRF), Absence Mg (XRF) |
| **European** | | | |
| Mag-Eu-g29 | 🗸 | Khami | High Al (XRF), low Ca (XRF), Absence Mg (XRF), U (XRF) |