

The Department of Laboratory Medicine and Pathology at Mayo Clinic initiated a study to determine stability of analytes under different preservative conditions. This reference chart, built from that study, will enable you to select either temperature conditions or preservatives to maximize the number of tests that can be performed on a single 24-hour collection.

**Note:** See the Test Catalog for test-specific collection requirements.

**Protect from light.\***

|   |         | Preservative Options |             |        |            |                 |           |                                 |        |                     |        | Transport Temperature         |   |            |          |
|---|---------|----------------------|-------------|--------|------------|-----------------|-----------|---------------------------------|--------|---------------------|--------|-------------------------------|---|------------|----------|
| Published Test Name                               | Test ID | External Only        |             |        | Boric Acid | 50% Acetic Acid | Toluene   | Na <sub>2</sub> CO <sub>3</sub> | 6N HCl | 6N HNO <sub>3</sub> | Thymol | Ambient (Plain) Internal Only |   | External   | Internal |
|   |         | Ambient              | Refrigerate | Frozen |            |                 |           |                                 |        |                     |        |                               |   |            |          |
| Aldosterone, 24 Hour, Urine                       | ALDU    | OK                   | OK          | OK     | OK         | Preferred       | OK        | No                              | No     | No                  | No     | No                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 28 days<br>Ambient with preservative OK ≤ 14 days | Ambient OK |          |
| Aldosterone with Sodium, 24 Hour, Urine           | ALDNA   | OK                   | OK          | OK     | OK         | Preferred       | OK        | No                              | No     | No                  | No     | No                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 14 days<br>Ambient with preservative OK ≤ 7 days  | Ambient OK |          |
| Alpha-1-Microglobulin, 24 Hour, Urine             | A1M24   | OK                   | Preferred   | OK     | OK         | OK              | OK        | No                              | No     | No                  | OK     | OK                            | Refrig preferred ≤ 7 days<br>Ambient OK ≤ 7 days<br>Frozen OK ≤ 7 days                      | Ambient OK |          |
| Aluminum, 24 Hour, Urine                          | ALU     | OK                   | Preferred   | OK     | No         | OK              | OK        | No                              | OK     | OK                  | No     | OK                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 28 days<br>Ambient OK ≤ 28 days                   | Ambient OK |          |
| Ammonium, 24 Hour, Urine                          | AMMO    | No                   | OK          | OK     | No         | No              | Preferred | No                              | No     | No                  | No     | No                            | Refrig preferred ≤ 14 days<br>Ambient OK ≤ 72 hours<br>Frozen OK ≤ 14 days                  | Ambient NO |          |
| Arsenic with Reflex, 24 Hour, Urine               | ASU24   | OK                   | Preferred   | OK     | No         | OK              | OK        | No                              | OK     | No                  | No     | OK                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 28 days<br>Ambient OK ≤ 72 hours                  | Ambient OK |          |
| Arsenic Fractionation, 24 Hour, Urine             | ASFR    | OK                   | Preferred   | OK     | No         | OK              | OK        | No                              | OK     | No                  | No     | OK                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 28 days<br>Ambient OK ≤ 72 hours                  | Ambient OK |          |
| Arylsulfatase A, 24 Hour, Urine                   | ARSU    | No                   | Required    | No     | No         | No              | No        | No                              | No     | No                  | No     | No                            | Refrig preferred ≤ 14 days A<br>Ambient NO<br>Frozen NO                                     | Ambient OK |          |
| Cadmium, 24 Hour, Urine                           | CDU     | OK                   | Preferred   | OK     | No         | OK              | OK        | No                              | OK     | OK                  | No     | OK                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 28 days<br>Ambient OK ≤ 28 days                   | Ambient OK |          |
| Calcium, 24 Hour, Urine                           | CALU    | OK                   | Preferred   | OK     | OK         | OK              | OK        | No                              | OK     | OK                  | OK     | OK                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 14 days<br>Ambient OK ≤ 72 hours                  | Ambient OK |          |
| Catecholamine Fractionation, Free, 24 Hour, Urine | CATU    | No                   | OK          | OK     | OK         | Preferred       | No        | No                              | OK     | OK                  | No     | No                            | Refrig preferred ≤ 7 days<br>Ambient with preservative OK ≤ 7 days<br>Frozen OK ≤ 14 days   | Ambient OK |          |
| Chloride, 24 Hour, Urine                          | CLU     | OK                   | Preferred   | OK     | OK         | OK              | OK        | No                              | No     | No                  | OK     | OK                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 14 days<br>Ambient NO                             | Ambient OK |          |
| Chromium, 24 Hour, Urine                          | CRU     | OK                   | Preferred   | OK     | No         | No              | No        | No                              | No     | No                  | No     | OK                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 28 days<br>Ambient OK ≤ 28 days                   | Ambient OK |          |

**Urine Preservatives—Collection and Transportation for 24-Hour Urine Specimens** (continued)

|   |         | Preservative Options |             |        |            |                 |           |                                 |        |                     |        | Transport Temperature         |  |            |
|---|---------|----------------------|-------------|--------|------------|-----------------|-----------|---------------------------------|--------|---------------------|--------|-------------------------------|--|------------|
| Published Test Name   | Test ID | External Only        |             |        | Boric Acid | 50% Acetic Acid | Toluene   | Na <sub>2</sub> CO <sub>3</sub> | 6N HCl | 6N HNO <sub>3</sub> | Thymol | Ambient (Plain) Internal Only | External   | Internal   |
|   |         | Ambient              | Refrigerate | Frozen |            |                 |           |                                 |        |                     |        |                               |  |            |
| Citrate Excretion, 24 Hour, Urine                             | CITR    | No                   | OK          | OK     | OK         | No              | Preferred | No                              | No     | No                  | OK     | No                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 14 days<br>Ambient NO                              | Ambient OK |
| Cobalt, 24 Hour, Urine  | COU     | OK                   | Preferred   | OK     | No         | OK              | OK        | No                              | OK     | OK                  | No     | OK                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 28 days<br>Ambient OK ≤ 28 days                    | Ambient OK |
| Copper, 24 Hour, Urine  | CUU     | OK                   | Preferred   | OK     | No         | OK              | OK        | No                              | OK     | OK                  | No     | No                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 28 days<br>Ambient OK ≤ 28 days                    | Ambient OK |
| Cortisol/Cortisone, Free, 24 Hour, Urine                      | COCOU   | No                   | OK          | OK     | Preferred  | OK              | OK        | No                              | No     | No                  | No     | No                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 28 days<br>Ambient with preservative OK ≤ 72 hours | Ambient OK |
| Cortisol, Free, 24 Hour, Urine                                | CORTU   | No                   | OK          | OK     | Preferred  | OK              | OK        | No                              | No     | No                  | No     | No                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 28 days<br>Ambient with preservative OK ≤ 7 days   | Ambient OK |
| Creatinine, 24 Hour, Urine                                    | CTU     | OK                   | Preferred   | OK     | OK         | OK              | OK        | OK                              | OK     | OK                  | OK     | Preferred                     | Refrig preferred ≤ 30 days<br>Ambient OK ≤ 30 days<br>Frozen OK ≤ 30 days                    | Ambient OK |
| Creatinine Clearance, Serum and 24 Hour Urine                 | CRCL    | Preferred            | OK          | OK     | OK         | OK              | OK        | OK                              | OK     | OK                  | OK     | Preferred                     | Refrig preferred<br>Frozen OK<br>Ambient OK  | Ambient OK |
| Cystinuria Profile, Quantitative, 24 Hour, Urine              | CYSQN   | No                   | OK          | OK     | No         | No              | Preferred | No                              | No     | No                  | No     | No                            | Frozen preferred ≤ 70 days<br>Refrig ≤ 14 days<br>Ambient NO                                 | Ambient OK |
| 2, 3-Dinor-11 Beta-Prostaglandin F2 Alpha, Urine              | 23BPG   | No                   | Preferred   | OK     | OK         | OK              | OK        | OK                              | No     | No                  | No     | No                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 30 days<br>Ambient OK ≤ 8 hours                    | Ambient OK |
| Electrophoresis, Protein, 24 Hour, Urine                      | EPU     | OK                   | Preferred   | OK     | No         | No              | OK        | No                              | No     | No                  | OK     | OK                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 5 days<br>Ambient OK ≤ 72 hours                    | Ambient OK |
| Electrophoresis, Protein, 24 Hour, Urine <b>INTERNAL ONLY</b> | PEU     | OK                   | Preferred   | OK     | No         | No              | OK        | No                              | No     | No                  | OK     | OK                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 5 days<br>Ambient OK ≤ 72 hours                    | Ambient OK |
| Gadolinium, 24 Hour, Urine                                    | GDU     | OK                   | Preferred   | OK     | No         | No              | OK        | No                              | OK     | OK                  | No     | OK                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 28 days<br>Ambient OK ≤ 28 days                    | Ambient OK |
| Glucose, 24 Hour, Urine                                       | GLUR    | No                   | OK          | OK     | Preferred  | OK              | OK        | No                              | OK     | OK                  | OK     | No                            | Refrig preferred ≤ 7 days<br>Frozen OK ≤ 7 days<br>Ambient NO                                | Ambient OK |
| Heavy Metals Screen, with Reflex, 24 Hour, Urine              | HMU24   | No                   | Preferred   | OK     | No         | OK              | OK        | No                              | OK     | No                  | No     | No                            | Refrig preferred ≤ 7 days<br>Frozen OK ≤ 7 days<br>Ambient NO                                | Ambient OK |
| Homovanillic Acid (HVA), 24 Hour, Urine                       | HVA     | No                   | No          | No     | No         | Preferred       | No        | No                              | OK     | No                  | No     | No                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 180 days<br>Ambient NO                             | Ambient OK |
| 5-Hydroxyindoleacetic Acid (5-HIAA), 24 Hour, Urine           | HIAA    | No                   | OK          | OK     | OK         | Preferred       | OK        | OK                              | OK     | OK                  | OK     | No                            | Refrig preferred ≤ 56 days<br>Frozen OK ≤ 365 days<br>Ambient NO                             | Ambient OK |

*Urine Preservatives—Collection and Transportation for 24-Hour Urine Specimens* (continued)

|   |         | Preservative Options |             |           |            |                 |           |                                 |        |                     |        | Transport Temperature         |  |            |
|---|---------|----------------------|-------------|-----------|------------|-----------------|-----------|---------------------------------|--------|---------------------|--------|-------------------------------|--|------------|
| Published Test Name                         | Test ID | External Only        |             |           | Boric Acid | 50% Acetic Acid | Toluene   | Na <sub>2</sub> CO <sub>3</sub> | 6N HCl | 6N HNO <sub>3</sub> | Thymol | Ambient (Plain) Internal Only | External   | Internal   |
|   |         | Ambient              | Refrigerate | Frozen    |            |                 |           |                                 |        |                     |        |                               |  |            |
| Immunofixation, 24 Hour, Urine              | IFXU    | OK                   | Preferred   | OK        | No         | No              | OK        | No                              | No     | No                  | OK     | OK                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 5 days<br>Ambient OK ≤ 72 hours    | Ambient OK |
| Immunoglobulin Total Light Chains, Urine    | TLCU    | OK < 72 hours        | Preferred   | OK        | No         | No              | No        | No                              | No     | No                  | No     | < 72 hours OK                 | Refrig preferred ≤ 7 days<br>Frozen OK ≤ 20 days<br>Ambient OK ≤ 72 hours    | Ambient OK |
| Iodine, 24 Hour, Urine                      | UIOD    | OK                   | Preferred   | OK        | No         | OK              | No        | No                              | No     | No                  | No     | OK                            | Refrig preferred ≤ 146 days<br>Frozen OK ≤ 146 days<br>Ambient OK ≤ 146 days | Ambient OK |
| Lead, 24 Hour, Urine                        | PBU     | OK                   | Preferred   | OK        | No         | OK              | OK        | No                              | OK     | OK                  | No     | OK                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 28 days<br>Ambient OK ≤ 28 days    | Ambient OK |
| Leukotriene E4, Urine                       | LTE4    | No                   | Preferred   | OK        | OK         | OK              | OK        | OK                              | No     | No                  | No     | OK                            | Refrig preferred ≤ 7 days<br>Frozen OK ≤ 30 days<br>Ambient OK ≤ 24 hours    | Ambient OK |
| Magnesium, 24 Hour, Urine                   | MAGU    | OK                   | Preferred   | OK        | OK         | OK              | OK        | No                              | OK     | OK                  | OK     | OK                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 14 days<br>Ambient OK ≤ 72 hours   | Ambient OK |
| Manganese, 24 Hour, Urine                   | MNU     | OK                   | Preferred   | OK        | No         | No              | No        | No                              | No     | No                  | No     | OK                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 28 days<br>Ambient OK ≤ 7 days     | Ambient OK |
| Mercury, 24 Hour, Urine                     | HGU     | No                   | Preferred   | OK        | No         | OK              | OK        | No                              | OK     | OK                  | No     | No                            | Refrig preferred ≤ 7 days<br>Frozen OK ≤ 7 days<br>Ambient NO                | Ambient OK |
| Metanephrines, Fractionated, 24 Hour, Urine | METAF   | No                   | OK          | OK        | Preferred  | Preferred       | OK        | OK                              | OK     | OK                  | No     | No                            | Refrig preferred ≤ 7 days<br>Frozen OK ≤ 14 days<br>Ambient OK ≤ 7 days      | Ambient OK |
| N-Methylhistamine, 24 Hour, Urine           | NMHIN   | OK                   | Preferred   | OK        | OK         | OK              | OK        | OK                              | OK     | OK                  | No     | OK                            | Refrig preferred ≤ 8 days<br>Frozen OK ≤ 14 days<br>Ambient OK ≤ 24 hours    | Ambient OK |
| Microalbuminuria, 24 Hour, Urine            | MA24    | OK                   | Preferred   | OK        | OK         | No              | OK        | No                              | No     | No                  | OK     | OK                            | Refrig preferred ≤ 7 days<br>Frozen OK ≤ 7 days<br>Ambient OK ≤ 7 days       | Ambient OK |
| Monoclonal Protein Study, 24 Hour, Urine    | MPSU    | OK                   | Preferred   | OK        | No         | No              | OK        | No                              | No     | No                  | OK     | OK                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 5 days<br>Ambient OK ≤ 72 hours    | Ambient OK |
| Nickel, 24 Hour, Urine                      | NIU     | OK                   | Preferred   | OK        | No         | OK              | No        | No                              | No     | OK                  | No     | OK                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 28 days<br>Ambient OK ≤ 28 days    | Ambient OK |
| Nitrogen, Total, 24 Hour, Urine             | NITU    | OK                   | OK          | Preferred | No         | OK              | OK        | OK                              | OK     | No                  | OK     | OK                            | Refrig preferred ≤ 7 days<br>Frozen OK<br>Ambient OK ≤ 7 days                | Ambient OK |
| Oxalate, 24 Hour, Urine                     | OXU     | No                   | OK          | OK        | No         | No              | Preferred | No                              | No     | No                  | OK     | No                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 14 days<br>Ambient NO              | Ambient OK |
| Phosphorus, 24 Hour, Urine                  | POU     | OK                   | Preferred   | OK        | OK         | OK              | OK        | No                              | OK     | OK                  | OK     | Preferred                     | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 14 days<br>Ambient OK ≤ 7 days     | Ambient OK |

*Urine Preservatives—Collection and Transportation for 24-Hour Urine Specimens* (continued)

|   |         | Preservative Options |             |        |            |                 |           |                                 |        |                     |        | Transport Temperature         |  |   |
|---|---------|----------------------|-------------|--------|------------|-----------------|-----------|---------------------------------|--------|---------------------|--------|-------------------------------|--|---|
| Published Test Name                         | Test ID | External Only        |             |        | Boric Acid | 50% Acetic Acid | Toluene   | Na <sub>2</sub> CO <sub>3</sub> | 6N HCl | 6N HNO <sub>3</sub> | Thymol | Ambient (Plain) Internal Only | External   | Internal                                      |
|   |         | Ambient              | Refrigerate | Frozen |            |                 |           |                                 |        |                     |        |                               |  |   |
| pH, 24 Hour, Urine                          | UPH24   | No                   | OK          | OK     | No         | No              | Preferred | No                              | No     | No                  | OK     | No                            | Refrig preferred ≤ 7 days<br>Frozen OK ≤ 7 days<br>Ambient NO              | Ambient OK                                    |
| Porphyrins, Quantitative, 24 Hour, Urine    | PQNU    | No                   | No          | No     | No         | No              | No        | Required*                       | No     | No                  | No     | No                            | Frozen ≤ 7 days<br>Ambient NO<br>Refrig NO                                 | Refrig OK<br>Ambient NO<br>Protect from light |
| Potassium, 24 Hour, Urine                   | KUR     | OK                   | Preferred   | OK     | OK         | OK              | OK        | OK                              | OK     | OK                  | OK     | Preferred                     | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 14 days<br>Ambient OK ≤ 7 days   | Ambient OK                                    |
| Protein, Total, 24 Hour, Urine              | PTU     | No                   | Preferred   | OK     | OK         | No              | OK        | No                              | No     | No                  | OK     | Preferred                     | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 14 days<br>Ambient OK ≤ 24 hours | Ambient OK                                    |
| Retinol-Binding Protein, 24 Hour, Urine     | RBP24   | Preferred            | OK          | OK     | OK         | No              | OK        | No                              | No     | No                  | OK     | Preferred                     | Refrig preferred ≤ 7 days<br>Frozen OK ≤ 7 days<br>Ambient NO              | Ambient OK                                    |
| Serotonin, 24 Hour, Urine                   | SERU    | No                   | Preferred   | OK     | No         | Preferred       | OK        | No                              | No     | OK                  | No     | OK                            | Frozen preferred ≤ 14 days<br>Refrig OK ≤ 7 days<br>Ambient NO             | Frozen OK                                     |
| Sodium, 24 Hour, Urine                      | NAU     | OK                   | Preferred   | OK     | OK         | OK              | OK        | No                              | OK     | OK                  | OK     | Preferred                     | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 14 days<br>Ambient OK ≤ 7 days   | Ambient OK                                    |
| Sulfate, 24 Hour, Urine                     | SULFU   | No                   | Preferred   | OK     | OK         | No              | OK        | OK                              | No     | No                  | OK     | OK                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 14 days<br>Ambient NO            | Ambient OK                                    |
| Supersaturation Profile, 24 Hour, Urine     | SAT24   | No                   | OK          | OK     | No         | No              | Preferred | No                              | No     | No                  | No     | No                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 14 days<br>Ambient NO            | Ambient OK                                    |
| Thallium, 24 Hour, Urine                    | TLU     | OK                   | Preferred   | OK     | No         | OK              | OK        | No                              | OK     | OK                  | No     | OK                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 28 days<br>Ambient OK ≤ 28 days  | Ambient OK                                    |
| Urea, 24 Hour, Urine                        | URAU    | No                   | OK          | OK     | Preferred  | OK              | OK        | OK                              | OK     | OK                  | OK     | No                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 14 days<br>Ambient NO            | Ambient OK                                    |
| Uric Acid, 24 Hour, Urine                   | URCU    | No                   | OK          | OK     | Preferred  | No              | OK        | OK                              | No     | No                  | OK     | No                            | Refrig preferred ≤ 14 days<br>Frozen OK ≤ 14 days<br>Ambient NO            | Ambient OK                                    |
| Vanillylmandelic Acid (VMA), 24 Hour, Urine | VMA     | No                   | No          | No     | OK         | Preferred       | No        | No                              | OK     | OK                  | No     | No                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 180 days<br>Ambient NO           | Ambient OK                                    |
| Zinc, 24 Hour, Urine                        | ZNU     | OK                   | Preferred   | OK     | No         | OK              | OK        | No                              | OK     | OK                  | No     | OK                            | Refrig preferred ≤ 28 days<br>Frozen OK ≤ 28 days<br>Ambient OK ≤ 28 days  | Ambient OK                                    |

## *Urine Preservatives—Collection and Transportation for 24-Hour Urine Specimens* (continued)

The conditions and concentrations of urine preservatives are defined for 24-hour collections as follows:

|  |                                    |
|--|------------------------------------|
| <b>Ambient</b>                                 | Room temperature (21–25 degrees C) |
| <b>Refrigerated</b>                            | 4 degrees C                        |
| <b>Frozen</b>                                  | -20 degrees C                      |
| <b>6N HCl</b>                                  | 30 mL per 24-hour collection       |
| <b>50% Acetic Acid</b>                         | 25 mL per 24-hour collection       |
| <b>Na<sub>2</sub>CO<sub>3</sub></b> (crystals) | 5 g per 24-hour collection         |
| <b>Toluene</b>                                 | 30 mL per 24-hour collection       |
| <b>6N HNO<sub>3</sub></b>                      | 15 mL per 24-hour collection       |
| <b>Boric Acid</b> (crystals)                   | 10 g per 24-hour collection        |
| <b>Thymol</b> (10% in isopropanol)             | 10 mL per 24-hour collection       |

Preservative and condition guidelines have been evaluated specifically for Mayo Clinic Laboratories assays. If you have questions regarding the use of preservatives, contact Mayo Clinic Laboratories at 800-533-1710 or 507-266-5700.