## TITLE: Collection, Determination and Calculation of Urine Specimens

## PRINCIPLE: To provide a guide to collecting, determining and calculating urine specimens. Most urine testing is performed as a way of diagnosing and monitoring kidney disease, though other disease states can also be diagnosed by urine testing. Two disease states may include diabetes and toxemia in pregnancy. For testing principles, refer to the individual testing procedures.

## SPECIMEN COLLECTION/TREATMENT:

1. Properly collected 24 hour urine, 12 hour urine, 2 hour urine, or random/spot urine:
2. A 24 hour urine collection is the preferred specimen for all urine testing. The 24 hour urine eliminates the variance of the urine concentration at different times during a day. Reference ranges are established from 24 hour urine testing.
3. 12 hour urine specimens are acceptable for creatinine clearance testing.
4. 2 hour urine specimens are acceptable for timed urine amylase testing.
5. Random “spot” urines are accepted for all urine testing, however, they are not the specimen of choice. Urine osmolality, UProtein, Chloride and Amylase are the only tests which have established normal values. All other random urine testing does not have established normal values.
6. The proper collection technique for a timed urine:
7. The patient is to void and discard the urine specimen. This will be considered the “collection start time”. This will ensure that the patient has an empty bladder at the start of collection.
8. All of the remaining urine voided during the collection time is to be placed in the proper urine collection bottle. The patient must be careful not to lose or discard any of the urine.
9. At the time the collection is to end, the patient is to void again, completely emptying the bladder and placing the specimen into the proper collection bottle.
10. Once the collection is complete, the urine specimen should be brought to the Laboratory as soon as possible.
11. Proper preservatives must be added for some urine testing. (Refer to the table in the “Procedure” section for individual urine testing and the preservatives that are required to perform those tests).
12. Once the urine is in the Laboratory, mix, measure and record the volume on the computer label. If the volume is in question, call the floor or the doctor’s office to verify if a complete collection was obtained.
13. Pour off urine into a 100ml sterile cup and label with the computer LIS patient information label. Be certain to include the total volume of the collection on the label. Aliquot the urine into a 13 x 100 glass tube (put a barcode label on the tube).
14. Adjust the pH of the urine if it is necessary. (Refer to the table to determine if this is required).
15. Centrifuge all specimens.
16. If a creatinine clearance has been ordered, a serum or heparinized plasma specimen is required to perform the serum creatinine.
17. The specimen should be collected during the urine collection time.
18. If the specimen was not collected during the 24 hour period, it must be collected within 24 hours of urine collection.

## REAGENTS AND EQUIPMENT:

Refer to individual test procedures for reagent preparation.

Abbott Architect Chemistry Analyzer

###### Advanced Micro-Osmometer and supplies

0.9% Saline

Brown Collection Bottles

Transfer Pipettes

**CALIBRATION:**

Consult manual and follow procedure for specific test and instrument used.

**QUALITY CONTROL:**

1. Bio-Rad Urine Control Level 1 and 2 are to be run whenever patient testing is ordered. The test that is to be run should be specific for the testing that has been ordered.
2. Follow routine quality control procedures and policies for test and instrument used. Refer to the “Current Quality Control Material and Schedule” procedure in the General Chemistry Procedure Manual.

## STEPWISE PROCEDURE:

1. Run the urine chemistries, except Osmolality, on the Abbott Architect analyzer.

Calculations will automatically be calculated through the Laboratory Information System. If the system is down and the calculations cannot be done automatically, refer to the “Calculations” section of this procedure to perform the calculations manually.

1. If the result obtained is below the lower limit of the assay, result the test as < the lower limit of the assay range.

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| --- | --- | --- | --- | --- |
| **TEST** | **MATERIAL USED FOR DILUTION** | **Urine Preferred Preservatives**  **24 hr. specimen Random Specimen** | | **Reference Ranges** |
| Amylase | Saline | None | None | 24 hr.: 59-401 U/24 hr.  Random: 32-641 U/L |
| Urea Nitrogen | Saline | None but may use Thymol | None | 24 hr.: 12-20 g/24 hr. |
| uAlbumin | Saline | None | None | Random: <30 mg Alb/g creaU |
| Creatinine | Saline | None but may use boric acid or HCL | None | 24hr: 1000-2000 male mg/24 hr.  24hr. 800-1800 female mg/24 hr.  Creatinine clearance: 66-165 mL/min |
| Phosphorous | Saline | None | None | 24 hr. 400-1300 mg/24hr |
| Sodium | Do not Dilute | None | None | 24 hr.: 40-220 mmol/24 hr. |
| Potassium | Do not Dilute | None | None | 24 hr.: 25-125 mmol/24 hr. |
| Chloride | Do Not Dilute | None | None | 24 hr.: 110-250 mmol/24 hr.  Random: 18-208 |
| Osmolality | Do not Dilute | None | None | 300-1300 mOsm/kg |
| Protein | Saline | None | None | 24 hr. 0-300 mg/24 hr.  Random: 0-12 mg/dL |

### CALCULATIONS FOR CREATININE CLEARANCE AND 24 HR URINE TESTING

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| --- | --- | --- |
| **TEST** | **CALCULATION** | **UNITS** |
| uAlbumin/Creatinine Ratio Random only | uAlb/uCrea x 1000 | mg Alb/g Creat |
| 24 hr. Creatinine Clearance | (uCrea/sCrea) x (TV/min) x (1.73/BSA) note: 24hrs equals 1440 min | mL/min |
| 24 hr. Urine Sodium | Ur Sodium x TV/1000 | mmol/24hr |
| 24 hr. Urine Potassium | Ur Potassium x TV/1000 | mmol/24hr |
| 24 hr. Urine Chloride | Ur Chloride x TV/1000 | mmol/24hr |
| 24 hr. Urine Protein | Ur Protein x TV/100 | mg/24hr |
| 24 hr. Urine Urea | Ur Urea x TV/100,000 | G/24hr |
| 24 hr. Urine Creatinine | Ur Crea x TV/100 | mg/24hr |
| 24 hr. Urine Amylase | Ur Amylase x TV/1000 | U/24hr |
| 24 hr. Urine Phosphorus | Ur Phos x TV/100 | mg/24hr |

\*TV=Total Volume BSA=Body Surface Area

NOTE:

* If the patient’s height and weight are not known, leave the 1.73 factor and the BSA factor in #1 out of the equation.
* Creatinine Serum/Plasma specimen is to be drawn any time during the urine collection time.

### REPORTING RESULTS

1. Laboratory Information System Entry:

Enter the results of the urine tests under “Accession Result Entry” for the Abbott Architect ci8200 instruments. The LIS will automatically do calculations for you.

1. Electrolytes are reported out as mmol/24 hours.
2. Random urine electrolytes are reported as mmol/L.
3. Most Chemistry tests are reported as mg/24 hours.
4. Urea Amylase is reported as U/24 hr.
5. Osmolality is reported as mOsm/kg.
6. Creatinine clearance is reported as mL/minute.
7. 2 hour or 24 hour amylase is reported as IU/2 hours or IU/24 hours.

NOTES: Urine collection bottles for the floors are ordered through S.P.D.

**Mosteller Formula**



**REFERENCES:**

1. Clinical Diagnosis and Management by Laboratory Methods, John Bernard Henry, M.D., 2001.

2. Abbott Architect ci8200