## TITLE: Refractometer Operation and Maintenance

## PRINCIPLE:

Specific gravity is the ratio of the mass of a solution compared with the mass of an equal volume of water. Specific gravity can be measured by use of a refractometer. The refractometer actually measures the refractive index or ratio of the velocity of light in air to the velocity of light in solution and is dependent upon the number and weight of the dissolved particles.

**CLINICAL SIGNIFICANCE:**

The specific gravity of urine is used to measure the concentrating and diluting power of the kidney in its efforts to maintain homeostasis in the body.

Specific gravity reflects the concentration of dissolved substances in the urine and correlates reasonably well with osmolality. The normal kidney may concentrate up to 1.030 with water restriction. Urines consistantly showing a specific gravity of <1.010 demonstrate an inability of the kidneys to concentrate and may indicate renal damage.

**PERSONNEL:**

###### Medical Technologists

## SPECIMEN COLLECTION/TREATMENT:

Patient Preparation: No patient preparation required.

Type of Specimen: Urine and Body Fluid.

## REAGENTS AND EQUIPMENT:

1. Reichert TS-Meter
2. Distilled water
3. Alta Diagnostics Controls (Level I & II)
4. Kimwipes

## STEPWISE PROCEDURE:

I. Operation

1. Hold the instrument in a horizontal position (Figure 2).

 to minimize evaporation, place the cover plate over

 the measuring prism.

2. Place the sample liquid on the exposed end of the measuring prism. The liquid will be drawn into the space between the prism and the cover plate by capillary action. Take care to avoid lifting the cover plate before the reading is made. A dropper may be used to

transfer the sample to the measuring prism. The dropper should be plastic to minimize the possibility of scratching the prism surface.

3. To obtain a reading, hold the instrument underneath a light source so the light is shining down into the sample prism. To obtain the optimum contrast between the light and dark boundary, the instrument must be properly tilted under the light source. The eye guard may be extended to reduce reflections. To lock in place, gently turn the eye guard clockwise.

4. Focus the scale (Figure 1) seen in the eyepiece by rotating the

 eyepiece by rotating the eyepiece. This setting does not need to

 be changed as long as the same individual continues to use the

 instrument. Read the appropriate scale at the point where the

 dividing line between bright and dark fields cross.

 Use the conversion tables in this manual, if required.

5. Use a soft cloth or tissue moistened with water to wipe the prism and dry thoroughly. If the prism surface or cover plate is not cleaned before the next sample is loaded, an erroneous or fuzzy reading may result. Do not immerse the eyepiece in water. Never use gritty cleaning compounds or extremely hot water to clean the prism. Caution: Never expose the instrument to temperature correction device may be compromised.

6. Report results in the LIS

**II.** **CALIBRATION**

 **Calibration of the Refractometer is required at least annually.**

The Zero setting of the TS METER Refractometer rarely needs adjustment. In order to check adjustment, make sure the temperature of the instrument is between 60° F (15°) and 77°F (25°C) and take a reading with distilled water. If a reading departs from 1.000 on the Urine Specific Gravity scale by more than ½ division or 0.05%, gently remove the black rubber plug on the underside of the instrument and turn the adjustment screw with the supplied 1.5mm al1en wrench tool clockwise to increase it, counterclockwise to decrease it. Make sure that final motion is clockwise. Seal the hole with the plug after the correct reading has been obtained.

Following the calibration always run a specific gravity on a sample of distilled water and

Quality Controls (Alta Level 1 and Alta Level 11)

### III QUALITY CONTROL

Distilled water is a constant. Alta Level I and Alta Level II are assayed controls with known ranges.

A. Daily (When patient testing indicates)

1. Using above procedure do specific gravity on a sample of Alta Level I and Alta Level II.

 2. Record results in the Quality Control section of the LIS.

**REPORTING AND INTERPRETING RESULTS**

 Urine: Referance range 1.000-1.030

 Body fluids: No know reference range established

### REFERENCE

Reichert TS400 Instruction Manual

Reichert Analytical Instruments

Reichert INC

3362 Walden Ave

Depew, NY 140

<http://webserver.pa-ucl.com/wwwdocs/analyticalproc/FrameA.htm>

S:Laboratory P&P/Urinalysis/4840-UA-1008/ch 01/27/16