

**Macroscopic Urinalysis (for Chemstrip 7)**

**Points:** Points are awarded for Skills, including general lab requirements, as well as successful and timely completion of Study Questions.

- Objectives:**
1. According to the standards set by the instructor, the student will be able to perform the following physical and rapid chemical macroscopic examinations within  $\pm 1$  unit difference ( $\pm 0.003$  on TS meter)
    1. Color
    2. Transparency
    3. Specific gravity (by TS meter and / or dipstick)
    4. Urine chemical concentrations of protein, glucose, ketones, bilirubin, blood, nitrite, urobilinogen, leukocyte esterase, and pH using Multistix reagent strip method
    5. Protein by sulfosalicylic acid (minimum of 3)
    6. Ketones by Acetest tablet method (minimum of 1)
    7. Bilirubin by Ictotest tablet method (minimum of 1)
    8. Reducing substances by Clinitest tablet method (minimum of 1)
  2. According to the standards set by the instructor, use appropriate recording format.
  3. Use quality control results to determine the acceptability of test results.
  4. Answer all pre-test and study questions using related information found in the textbook, lecture guide, and this lab procedure.

**Equipment** 1. TS Meter

**&** 2. Reagent strips

**Supplies:** 3. Urine controls

4. Color charts for Chemstrip 7, Acetest, Ictotest, and Clinitest
5. Pasteur or other transfer pipets @ 5 3/4" size
6. 3% sulfosalicylic acid
7. Acetest tablets & product insert
8. Ictotest tablets , absorbent pads & product insert
9. Clinitest tablets, reaction tubes & product insert
10. Test tubes, racks, marking pens, Kim-wipes, paper towels
11. Distilled water and sodium chloride solution

**References** Package inserts for Chemstrip 7, Clinitest, Acetest, and Ictotest reagents.  
Lecture and Lab Guides  
Current UA / BF course textbook(s)

- Principles & Related info:**
1. Determining the physical properties of urine is done by making simple but important empirical observations. Physical properties can provide clues to subsequent findings and/or dictate the need for additional tests not always performed on each sample. In addition, the physical appearance of a urine sample can often tell a great deal about a patient's condition. A significant change in urinary color or clarity that deviates from accepted normal classifications may indicate the presence of a disease.
  2. It is important to work with a freshly collected sample or one that has been properly preserved. A number of changes can occur in an aging sample. Many of the changes are due to the growth of any bacteria present. Although urine is normally a sterile body fluid, a few bacteria may be seen due to contamination of the specimen during the voiding process. Without a means of preservation, these bacteria grow quickly. They utilize any glucose present as well as convert urea into ammonia, changing the pH. The increasing pH causes microscopic structures such as blood cells and urinary casts to deteriorate. Other changes that occur in the unpreserved aging urine include: darkening in the color, decreased clarity, decrease / loss of ketones, bilirubin and urobilinogen. Review the listing of changes occurring to unpreserved urine as listed in your textbook.
  3. The first of the physical properties to be considered is *color*. The color of urine often varies with its concentration and is most often reported as some shade of yellow (straw, light yellow, yellow, dark yellow, and amber). Normal urine can be found in any of these colors, with the exception of the 'amber' color. Urine that is truly an amber color is most often associated with an increased bilirubin level as seen in patients with hepatitis. Review listing of abnormal urine colors provided in lecture guide and textbook - relate the abnormal colors with their probable cause(s).

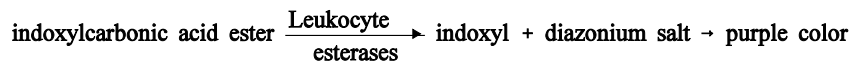
4. A urine's *transparency* or *clarity* is best assessed by observing light through a recently mixed sample. Terms used to report transparency include clear, hazy, cloudy, and turbid. Properly collected freshly voided urine is normally clear or sometimes slightly hazy. Urine that is contaminated is more likely to be hazy. Common sources of contamination include vaginal blood, mucous, or prostatic fluids. Freshly voided urine that is cloudy is strongly associated with bacterial urinary tract infections (UTIs) due to the presence of WBC's. Urine that is turbid contains salt crystals that precipitate out as the specimen cooled.
5. The specific gravity of a liquid is defined as the ratio of the density of the substance being measured to the density of water at a specified temperature. Urine specific gravity is a measure of the amount of *solutes* (electrolytes, urea, etc.) present in the urine sample. Specific gravity indicates how *dilute* or *concentrated* is the specimen. The assigned reference value of water is 1.000. Most authors consider 1.015-1.025 to be the normal urine specific gravity range although the kidneys are capable of 1.001-1.030.
6. The kidneys help to regulate the body's acid-base balance by excreting excess acid or excess alkali. The accepted method for routine measurement of urine pH reaction is by means of pH indicators. Dipstick pH range is 4.5 - 9.0 while the kidneys are capable of producing urine in the pH range of 4.5 - 8.0. Most urines will have a pH of @  $6.0 \pm 1.0$ .  
If a urine sample produces a pH > 8, mishandling of the sample - allowing it to remain at room temperature should be first suspected. A properly collected and processed sample with this high pH is strong evidence of a severe UTI, where intra-bladder bacteria has produced ammonia.
7. Other urine physical properties of volume, odor, and foam are not routinely reported.
8. Interfering substances: The chemical nature of **ASCORBIC ACID** has been known to cause positive reaction on Clinitest, but also suppresses reactions on dipstick for glucose, blood, bilirubin, nitrite, & leukocyte esterase; therefore some dipstick manufacturers include an "Ascorbic Acid" test square on their dipsticks.
9. Multistix or Chemstrips
  - General handling instructions
    1. Keep strips in their original containers.
    2. Store strips in a cool (room temperature) dry place; with the desiccate.
    3. Use strips before expiration date; & verify reactivity using QC specimens.
    4. Avoid touching the pad areas.
    5. Dip the strip completely in the specimen, allowing all squares to be covered - but avoid overdipping.
    6. Blot off extra urine, & keep strip level to avoid allowing the reagents to run together.
    7. Read the reaction pads at the appropriate time, under appropriate light, an report accordingly.
  - Sources of error
    1. Testing cold samples
    2. Inadequate mixing of sample before dipping
    3. Over-dipping
    4. Not blotting extra sample away - failure to keep strip horizontal
    5. Improper timing of tests
    6. Improper reading of results due to poor light or mis-reading chart.
    7. Very high specific gravities will suppress reactions.
    8. High pH may depress color development.
    9. Ascorbic acid
      - Ascorbic acid / vitamin C in the urine can result in falsely low or 'false negative' reactions for the analytes being tested on the urinalysis test strip. Increased levels (ie. > 25 - 50 mg/dl) of ascorbic acid will suppress the reactions of bilirubin, glucose, nitrite, leukocytes, blood and urobilinogen on the dipstick while causing a 'false positive' reaction on the Clinitest for reducing substances. A patient should submit urine specimens for testing after discontinuing vitamin C therapy for at least 10-12 hours for results to be valid.

Chemical principles of procedures: (NOTE: The following chemical tests are found on various manufacturer's urine dipsticks, however, not all of them are on the Chemstrip 7.)

- a. **Specific Gravity** - Polyelectrolytes in the reagent area contain acid groups which dissociate according to the ionic concentration of the specimen. Check individual manufacturer's package insert for more information.
- b. **pH** – The indicators methyl red and bromthymol blue provide a broad range of colors covering the entire urinary pH range. Colors range from orange through yellow and green to blue.
- c. **Protein** – Of the chemical tests, protein is the most indicative of renal disease. Of the serum proteins, the albumin protein fraction is easily lost through the urine when the kidney integrity is compromised. This test is based on the protein-error-of-indicators principle; at a constant buffered pH, the development of any green color is due to the presence of protein. (that is to say: the pH indicator demonstrates one color in the presence of protein and another in the absence of the protein, even though the pH is held constant.) Colors range from yellow for "Negative" through yellow-green, green to blue-green for "Positive" reactions.  
This test is the most indicative screening test for renal disease and is *most sensitive for albumin*, while globulins do not react.
- d. **Glucose** – This test is based on a double enzyme reaction. The enzyme glucose oxidase catalyzes the formation of gluconic acid and hydrogen peroxide from the oxidation of glucose. The second enzyme, peroxidase, catalyzes the reaction of hydrogen peroxide with a potassium iodide chromogen to oxidize the chromogen to colors ranging from green to brown.  
This test is specific for glucose, however false positive reactions due to contaminating peroxides or oxidizing detergents. Enzyme reaction can be suppressed by reducing agents such as ascorbic acid or due to high specific gravity. As with any enzymatic reaction, low temperatures will decrease reaction rate resulting in falsely decreased results.
- e. **Ketones** – This test is based on the development of a purple color when acetoacetic acid or acetone reacts with nitroprusside.
- f. **Bilirubin** – Bilirubin is the breakdown product of hemoglobin metabolism which occurs daily in the liver. Finding bilirubin in the urine sample can be the first indication of liver disease.  
This test is based on the coupling of bilirubin with diazotized dichloroaniline in a strongly acid medium. Dipsticks are capable of detecting levels as low as 0.5mg/dL. The color ranges through various shades of tan. Bilirubin is easily destroyed by the effects of light, therefore it is imperative that urine samples be tested quickly and / not allowed to be left in the light.
- g. **Blood** – This test is based on the peroxidase-like activity of hemoglobin or myoglobin (muscle hemoglobin) which catalyzes the reaction of cumene hydroperoxide and orthotolidine. The resulting color ranges from orange through green to dark blue. Intact RBCs can also be detected and show up as spots on the pad.
- h. **Nitrite** – \*Nitrite is formed in the bladder by the action of certain bacteria on urinary nitrate. At an acid pH, the nitrite reacts with p-arsanilic acid to form a diazonium compound.
- i. **Urobilinogen** – Urobilinogen and stercobilinogen are breakdown products of bilirubin occurring in the small intestine due to bacterial action on the bilirubin being delivered through the bile duct. The stercobilinogen proceeds on through the intestines where it is metabolized further and eventually excreted. The urobilinogen is absorbed in the intestine and is returned to the liver by way of the portal circulation. The vast majority of it will be trapped and filtered out by the liver. A small amount (@ 1%) is able to escape the liver and will enter the general circulation. Because urobilinogen is water soluble, it will be excreted through the kidneys. Therefore, a small amount of urobilinogen will normally be found in the urine daily. Review the dipstick color key for urobilinogen. A dipstick result that matches either of the first two pad colors should be reported as "Normal" rather than 'negative'. Increased urobilinogen levels are seen in patients with liver diseases including hepatitis, cirrhosis

and carcinoma. Increased levels are also seen in patients with hemolytic disorders that result in increased destruction of RBCs and the consequential increased levels of conjugated bilirubin. Decreased levels of urobilinogen are seen in patients with conditions that obstruct the flow of bilirubin down the bile duct, however decreased levels are not detectable by this test methodology. The Multistix uses the Ehrlich aldehyde reaction in which paradimethylaminobenzaldehyde reacts with urobilinogen in a strongly acid medium to produce colors from light to dark pink. Like bilirubin, urobilinogen is light sensitive and false negatives may result if samples are not properly handled / protected.

j. **Leukocyte esterase\*** – Reaction as follows:



\*Nitrite test and leukocyte esterase are not available on all dip stix

### URINE BACKUP TESTS

In addition to dipstick testing, there are alternative methods for the testing urine specific gravity, protein, ketones, bilirubin/bile, glucose / other reducing substances. These tests are collectively known as the 'urine back-up tests'. While these tests are not routinely performed, there are instances where they may be called upon to assist in clarifying a dipstick's result. Explanation of when these tests would be used is provided within the following sections. During this course, each student will have several opportunities to practice these tests in preparation for competency validation.

**Protein by SSA** 10. **Protein by Sulfosalicylic Acid** – This test is based on the level of turbidity formed as the result of acid precipitation of urine proteins. It is important that any other source of turbidity (ie. crystals, mucous, cells, etc.) be removed by centrifugation; therefore this procedure must be performed on the supernatant.

The 3% sulfosalicylic acid precipitates protein in solution, turning the urine specimen milky. The degree of turbidity is graded from trace to 4+. This test will react equally with all forms of protein, not just albumin. There are a number of reasons justifying the use of this protein back-up test, such as: 1. Specimen has a strong color that masks the dipstick result. 2. Specimen has a strongly alkaline pH that results in false positive / increase in the dipstick result. 3. Technician has difficulty deciding between the 'negative' and the 'trace' or 'trace' and '1+' squares on the dipstick.

**Ketones by Acetest** 11. Ketones by **Acetest** reagent tablets – Three ketone bodies are byproducts of fat metabolism.

1. Acetone

Acetone makes up 2% of the ketones produced. It is volatile (meaning that it easily goes to a gas state) and is often removed by the lungs. Acetone can be detected on the dipstick and by Acetest.

2. Diacetic Acid / Acetoacetic Acid

Diacetic acid, also frequently called Acetoacetic acid is the first of the three ketone bodies to be formed and is the form most detectable by dipstick or Acetest tablet. Diacetic Diacetic acid makes up 20% of the total ketone bodies.

3. Beta-hydroxybuturic acid makes up the majority of the ketones formed, but is not detected at all by dipstick or Acetest methodology.

Acetest reaction principle: Acetoacetic acid or acetone in urine or blood will form a purple colored complex with nitroprusside in the presence of glycine. (Chemstrip and Multistix strips utilize this same reaction principle, but are less sensitive and strip results are more easily affected by adverse urine color.

In addition to verifying a positive urine dipstick result, this test is used in determining the extent of ketosis by testing on series of dilutions. This test can also be used on serum, EDTA plasma and whole blood samples.

**Bilirubin by Ictotest** 12. **Bilirubin by Ictotest** reagent tablets – The reaction is based on the coupling of a unique solid diazonium salt with bilirubin in acid medium to give the blue or purple reaction product. This test is a back-up for questionable dipstick results. It is less subject to the effects of interfering substances and is much more sensitive than is the dipstick counterpart. The Ictotest method has sensitivity from 0.05 - 1.0 mg/dL, while dipsticks are only sensitive to 0.5 mg/dL., therefore the Ictotest is an excellent choice to detect early stages of liver disease.

**Glucose, (as a reducing substance) by Clinitest**

13. **Glucose and other Reducing substances by Clinitest** reagent tablets for reducing sugars. This test is based on the classic Benedict's copper reduction reaction, the earliest test for glucose. Copper sulfate react with reducing substances in urine, converting cupric sulfate to cuprous oxide. Colors range from blue through green to orange. In addition to detecting glucose, this test will detect other sugars that are reducing substances (i.e., lactose and galactose). It is most often used to screen for galactosemia in infants and young children and sometimes used to detect carbohydrate reducing substances in loose stool specimens.

Clinitest tablets are hygroscopic and will react with any water present, therefore they must be stored at room temperature in their tightly closed bottle and kept away from water sources. Additionally they must be handled with care to avoid contact with skin. See product insert for procedure and additional precautions.

The Clinitest® method can detect reducing substances in the urine up to 2 g/dL. When the amount of sugar is over 2 g/dL (often expressed as 2%), a "pass through" phenomenon occurs. Pass through appears as rapid color changes through green, tan, and orange, and then a reversion in color back to the brownish color. This reversion in color indicates levels of reducing substances greater than 2 g/dL. Even a fleeting orange color should be recorded as "greater than or equal to 2 g/dL." It is vital that you watch the boiling and color changes throughout the entire reaction so that a "pass through" is not missed. Many laboratories prefer the "2 drop" method, rather than the "5 drop" method will reduce the occurrence of pass through. Follow the manufacturer's directions exactly and compare the color developed to the appropriate chart.

**Specific gravity by refractometer**

14. Refractometry determines the concentration of dissolved particles in a specimen by measuring the refractive index. Refractive index is the comparison of the velocity of light in air with its velocity in a solution. The concentration of dissolved substances within the solution determines the velocity and angle at which the light beam passes through the solution. Review textbook, Refractometer, for additional explanation of principle of refractometry.

Procedure varies somewhat based on particular equipment, but basically a small drop of urine is placed on a glass prism / plate. A flap holds the urine in place. Hold the refractometer up towards an area of natural light to view a scale. The specific gravity is read from the scale at the point of contrast line (area where a boundary between light and dark) crosses the scale.

**Procedure:** After observing the instructor's demonstration, the student will:

1. Mix specimens well and classify five (5) specimens for color. Note any unusual colors and record.
2. Visually inspect and classify the same five (5) specimens for clarity. Be sure specimen has been well-mixed *before* classifying.
3. Determine the specific gravity of the five (5) specimens using the AO TS meter. Before determining the s.g. of the five (5) urines, check the refractometer's accuracy by measuring the s.g. of a drop of deionized H<sub>2</sub>O (should be 1.000) and the s.g. of a drop of 5% sodium chloride solution (should be 1.022 ± 0.001). If the s.g. of the deionized H<sub>2</sub>O and the sodium chloride do not match what they should be, consult the instructor for further directions. An alternative to checking the refractometer with the sodium chloride solution, would be to use a commercially prepared control solution to verify the accuracy of the instrument.
4. Determine the following chemical concentrations on the **five** specimens using the Multistix reagent strips and the following procedure:
  - a. Mix the specimen.
  - b. Completely immerse all reagent areas of the strip.
  - c. Remove the reagent strip immediately and tap off any excess urine.
  - d. Hold the strip in a horizontal position to prevent possible mixing of chemicals and/or soiling of hands with urine.
  - e. Compare the test areas on the strip to the corresponding color chart on the bottle at exactly the times specified.\*

**\*NOTE:** Always check and follow the timing and other instructions of the product manufacturer.

5. Perform a sulfosalicylic acid test for protein on each urine showing a positive protein on the dipstick  
**Note: each student must do a minimum of three of these. Contact instructor for specimens.**
  - a. Into a small test tube, pour about  $\frac{1}{2}$  - 1 ml (10 - 20 drops) of the supernatant from a centrifuged urine.
  - b. Addition an equal amount of 3% sulfosalicylic acid solution to the urine
  - c. Mix well by either "flicking" the urine or placing parafilm on the top of the test tube and inverting 2-3 times.
  - d. Grade for cloudiness as follows:
    - Negative – no cloudiness
    - Trace – Cloudiness is just perceptible against a black background
    - 1+ – Cloudiness is distinct but not granular
    - 2+ – Cloudiness is distinct and granular
    - 3+ – Cloudiness is heavy with distinct clumping
    - 4+ – Cloud is dense with large clumps that may solidify
  
6. Perform an Acetest on each specimen showing a positive ketone on the dipstick using the following procedure. **Note: each student must do a minimum of one of these. Contact instructor for specimens.**
  - a. Place an Acetest table on a white paper.
  - b. Add one (1) drop of urine directly on the tablet.
  - c. At 30 seconds, compare the color of the tablet with the color chart provided by the manufacturer.
  - d. Report as negative, 1+ (for small amount), 2+ (for moderate amount), or 3+ (for large amount).
  
7. Perform an Ictotest on each specimen showing a positive bilirubin on the dipstick using the following procedure. **Note: each student must do a minimum of one of these. Contact instructor for specimens.**
  - a. Place a square of the absorbent test mat (provided by manufacturer) onto a white paper.
  - b. Place ten (10) drops of urine onto the center of the test mat.
  - c. Place one (1) Ictotest tablet on the moistened mat.
  - d. Carefully place one (1) drop of distilled/deionized water onto the top of the tablet. *Wait five (5) seconds.* Add a second drop of water to the table so that the water runs off the tablet onto the mat.
  - e. The presence of a blue or purple color on the mat indicates a positive test for bilirubin. (Slight pink or red color should be ignored.)
  - f. The test is subjectively graded as negative or trace to 4+. See manufacturer's product insert for example of positive results.
  
8. Clinitest (5 drop method) Perform this procedure on urine specimens of all children under the age of 12 years to check for the reducing sugar, galactose. Because the dipstick is more sensitive and specific for glucose, this procedure is NOT used to quantify urine glucose. **Note: each student must do a minimum of one of these. Contact instructor for specimens.**
  - a. Place five (5) drops of urine into a clean glass test tube.
  
  - b. With the same size dropper, add ten (10) drops of deionized water.
  
  - c. Drop one (1) Clinitest table into the test tube. Watch while boiling reaction takes place. Do not shake tube during the reaction or for 15 seconds after the boiling has stopped. Remember to observe for the "pass through phenomenon."
  - d. At the end of the 15 second waiting period, shake test tube gently to mix contents.
  
  - e. Compare the color of the liquid contents to the color chart provided for the five (5) drop method and report the percent (%) of the closest matching color.

## EXERCISE 2

## Macroscopic Urinalysis

9. Record all results in appropriate place. Use appropriate format for recording patient and performance control results on the report form provided. Result forms not using appropriate format will have a minimum 50% penalty.

\* Recording of any laboratory result **MUST** be in black or blue ink.

\* Acceptable recording for positive results:

Positive OR Pos

\* Acceptable recording for negative results:

Negative OR Neg

\* Other results are to be as indicated on the manufacturer's chart or by the instructor's direction.

Example Report form Specimen #	Example 1				Backup tests	Backup tests results
Name ID #	Jones, Jim (Adult patient) 123434					
Color	dk Yellow					
Clarity	sl cloudy					
Specific Gravity (refractometer)	1.022					
pH 60 seconds	6.5		NITRITE 60 seconds	Neg	3% SSA	1+
GLUCOSE 60 seconds	1/4 250 mg/dl		PROTEIN 60 seconds	1+ 30 mg/dl	Acetest (for ketones)	trace
KETONES 60 seconds	trace 5 mg/dl		BLOOD 60 seconds	Neg	Ictotest (for bilirubin)	trace
LEUKOCYTES 60 seconds, if neg 2 minutes, if pos at 60 sec.	small 1+				Clinitest (for reducing substances)	Not warranted **
<p>** The Clinitest is not warranted in this case. The patient is an adult, so no need to check for reducing substances. The dipstick is more sensitive and is specific for glucose.</p>						

EXERCISE 2

Macroscopic Urinalysis

Name \_\_\_\_\_

Date \_\_\_\_\_

QC LAB REPORT FORM

/ 10 pts

Specimen # Name / ID		Control 1	Control 1 expected results	Control 2	Control 2 expected results	Comments: Within Range? <b>Yes or No</b> <small>(if No, must bring to instructor's attention and add a comment - as to course of action.) <b>Whether yes or no, you must include your initials!</b></small>
Physical Properties:	Color					
	Transparency					
	SpGr - Refractometer					
Dipstick: Read all at 60 seconds.  If leukocytes are positive, final reading is at 2 minutes.	pH					
	Glucose					
	Ketones					
	Leukocytes					
	Nitrite					
	Protein					
	Blood					
Microscopic (only if indicated by manufacturer and directed by instructor)						
<b>Back-up Tests</b>						
3% sulfosalicylic acid						
	Acetest					
	Ictotest					
	Clinitest					
Refractometer QC	DI water	Control 1	Control 1 expected results	Control 2	Control 2 expected results	Comments: Within Range? (See info above)

Comments

**Macroscopic Urinalysis Report Sheet for Chemstrip 7**

Name \_\_\_\_\_ Date \_\_\_\_\_

/ 25 points

Students have the option of using their own urine specimen as their unknown # 5,

Note: All dipstick readings at 60 sec, except Leukocyte Esterase

Specimen #	1	2	3	4	5 - - your specimen would go here
Name					
ID #					
Color					
Clarity					
Specific Gravity (refractometer)					
pH 60 seconds					
GLUCOSE 60 seconds					
KETONES 60 seconds					
LEUKOCYTES 60 seconds, if neg 2 minutes if pos					
NITRITE 60 seconds					
PROTEIN 60 seconds					
BLOOD 60 seconds					
ADDITIONAL TESTING	Perform the following tests as directed by the instructor.				
3 % SULFOSALICYLIC ACID (protein)					
ACETEST (ketones)					
ICTOTEST (bilirubin)					
CLINITEST (glucose / reducing substances)					

REFRACTOMETER / TS Meter Calibration Check:

Distilled water \_\_\_\_\_

Quality Control \_\_\_\_\_

Name \_\_\_\_\_

Date \_\_\_\_\_

**Study Questions**

/ 30 points

Unless otherwise noted, each question is worth one point. Using lecture notes, reading assignments and information presented in this lab, answer the following questions.

(5 pts)

1. According to the references, list ten (10) changes that begin to occur in an un-preserved urine specimen if it is not examined within one (1) hour.

1	2
3	4
5	6
7	8
9	10

(2 pts)

2. Explain the principle for determining specific gravity by

a. refractometer

b. dipstick

3. What are the proper storage requirements for Clinitest tablets, and explain why.

4. The term "pass-through" is sometimes used when discussing Clinitest procedure. When does it occur, and how can it be prevented?

(3 pts)

5. List at least three (3) precautions that should be taken in handling reagent strips (dipstix).

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

6. Of the routine chemical tests performed on urine, which is the most indicative of renal disease?

7. Why should the SSA (sulfosalicylic acid precipitation test) be performed on supernatant from centrifuged specimens?

## EXERCISE 2

## Macroscopic Urinalysis

(3 pts)

8. Name three (3) substances that can result in a false negative reaction on the dipstix for glucose.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

9. What does a positive nitrite test indicate?

10. What is myoglobin and what urine dipstick test will detect it?

11. Why is the bilirubin test an important part of the routine urinalysis?

12. What is the most frequent error associated with bilirubin testing?

13. Why is a small amount of urobilinogen normally found in urine?

14. (2 pts) List two (2) diseases / disorders that cause an increased level of urobilinogen.

1. \_\_\_\_\_
2. \_\_\_\_\_

15. Explain how a decreased level of urobilinogen would be considered significant.

16. (2 pts) List the 3 ketone bodies and indicate which are detectable by a reaction with sodium nitroprusside (ie. Dipstick or Acetest).

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

17. (3 pts) What effect does high levels of ascorbic acid have on the following urinalysis tests?

Test	Effect
Clinitest	
Glucose	
Blood	
Bilirubin	
Nitrite	
Leukocyte esterase	