

Urinalysis Lab

Background Notes: Urine and other body fluids can contain information useful to a crime investigator to provide inferences, clues or evidence to link a suspect to a crime scene. Body fluids can include saliva, mucus, semen, vagina fluid, breast milk, or urine. These fluids can carry metabolites (waste products), drugs, medicines, AB and Rh antigens, proteins, hormones, salts (electrolytes), and sugars. There exists a secretory gene (Se) which is found in about 80% population independent of blood type, i.e. a person could be Type A and Se or Type B and Se, etc. This gene interacts with blood type genes and determines your ability to secrete your blood type antigens into other fluids. In other words, secretors put blood type antigens into the blood and body fluids while non-secretors put little to no blood type antigens into body fluids. Persons who are secretors can have their body fluids tested for blood type. Secretors tend to have stronger immune systems, therefore it is better to be a secretor than a non-secretor.

Urine is 95% water and 5% other dissolved or suspended substances including metabolites (waste products), drugs, medicines, A, B, and Rh antigens, proteins, hormones, salts (electrolytes), and sugars. A person produces 0.6 to 2.5 liters of urine depending on the person's intake and environment, i.e. temperature and humidity. If a person is diabetic, their urine may contain high levels of glucose. The presence of protein in the urine often indicates some type of illness.

Fundamental Understanding:

- Urine is a body fluid that contains many different types of identifiable substances, including proteins, sugars, electrolytes, and metabolites.

Essential Questions:

- How can urine from different individuals be identified?
- What substances may be found in urine?

Purpose: To analyze different simulated urine samples for specific gravity, pH, color, glucose and protein.

Safety Precautions:

- Do not drink anything in the lab.
- Wash hands after the experiment

Materials:

1. Centrifuge
2. 20 ml pyrex test tubes
3. hot plates
4. 250 ml beakers (for hot water baths)
5. 100 ml beakers (for urine samples)
6. Benedict's Solution

7. pH paper
8. Samples of synthetic urine
9. graduated cylinders or pipettes to measure volumes

Procedure:

1. Obtain crime scene urine and urine from the 2 suspects
2. Make a Data Table for the three samples which will include the 4 tests: specific gravity, pH, albumen (+ or -), glucose (+ or -), and the observations of color, odor and clarity.
 - a. TEST 1: Determine specific gravity (density) using a balance and graduated cylinder. Record observations of mass, volume and calculate the specific gravity i.e. density.
 - b. TEST 2: Determine the pH of the urine samples using pH paper and record results.
 - c. TEST 3: Test for albumin: centrifuge 10-15 ml of each urine sample (label each test tube with water proof pen), remove supernatant into 2 clean test tubes. Place one test tube in a hot water bath for 2-4 minutes and compare clarity with original sample. If the heated sample becomes more cloudy then albumin is present (record a + in the data table). Repeat for other samples.
 - d. Test for glucose: Add 10.0 ml of each sample to a labeled pyrex test tube, then add 10 drops of Benedict's solution to each of the 3 samples. Place all three test tubes into a hot (not boiling) water bath. Observe and record color. If the blue changes to yellow or gold, then glucose is present (put a + in your data table).