Student's Name _____ Class _____ Date_____

LAB-AIDS Kit #4A SIMULATED VETERINARY URINALYSIS INVESTIGATION
Student Worksheet and Guide

In this activity you will assume the role of a veterinary technician responsible for running numerous lab tests and writing up reports. The local animal shelter needs medical histories for five dogs they would like to put up for adoption and has brought in urine samples from each of the dogs. In this activity you will test simulated (not real) urine for specific gravity, pH, phosphates, chlorides, and glucose levels. Afterwards, you will prepare a written summary of test results and provide feedback to the animal shelter about each dog's health.

Urine is a complex aqueous solution of organic and inorganic substances most of which are the waste products of metabolism. **Urinalysis**, or the test for chemical contents, can yield much information about the overall health of the animal, especially the kidneys. The kidneys function as the waste filter for the bloodstream with some wastes eliminated through urine, or in some cases, recycle important chemicals. The kidneys are the major organ of **homeostasis**, or stability, in the body. Analysis of urine informs veterinarians if the kidneys are functioning properly and if the correct levels of chemicals are being removed or maintained in the animal.

A routine urinalysis usually consists of tests for specific gravity (concentration of solids), protein (albumin), and sugar (glucose). Protein present in urine is the best indicator of kidney disease. Microscopic examination for bacteria, parasites, chemical crystals, casts (solid matter of bacteria, blood cells, protein, etc.) a pH test, color, odor, and transparency are also involved.

PROCEDURE

A. PREPARATION

1. Wear safety goggles and, if provided, a laboratory apron.

B. SPECIFIC GRAVITY OF URINE

Specific gravity is a measure of the proportion of dissolved material to total volume.

1. To test the specific gravity of "dog urine", fill one of the small tubes containing 2 beads about one third full with "urine" then cap the tube and tap the bottom firmly on the table 3 times. The beads will either float or sink.
2. Use the "OBSERVATIONS" column for your dog in Table 1 to record the position of the beads.
3. Empty the density tube into a waste container or sink and carefully rinse the tube with water.
4. If you are testing more than one dog, repeat Steps 1-4 for each different dog.

TABLE 1. Specific Gravity Test Results

SAMPLE	OBSERVATIONS	SPECIFIC GRAVITY	KIDNEY FUNCTION
Dog 1			
Dog 2			
Dog 3			
Dog 4			
Dog 5			

5. Consult the Key to estimate the specific gravity of each sample and record this in the SPECIFIC GRAVITY column of Table 1.

Key:

Observations	Estimated Specific Gravity
Both beads sink	< 1.000 g/mL
One bead sinks, one floats	1.000 - 1.015 g/mL
Both beads float	> 1.015 g/mL

6. The specific gravity of urine from healthy dogs is usually between 1.016-1.060 g/mL. A specific gravity that is less than 1.000 g/mL indicates very poor kidney function. Use this information to fill in the "KIDNEY FUNCTION" column. Make sure you record the observations from any dogs your group did not test and fill in the "KIDNEY FUNCTION" for these dogs.

C. URINE AND pH

pH refers to how acidic or alkaline urine is. Urine may be acidic in cases of diabetes, dehydration, or an extremely high protein diet. Highly alkaline urine is present when there is a urinary tract infection. The typical pH for dog urine ranges from 5.5-7.0.

1. Place 1 drop of "dog urine" in an empty, clean cavity of your Chemplate.
2. Carefully tear a pH strip in half and dip one end of it into the drop of "urine". Match the resulting color to the colors on your pH card and record the color and its associated pH value in Table 2.
3. If you are testing more than one dog, repeat Steps 1 and 2 for each different dog.
4. Make sure you record the data from any dogs your group did not test.

TABLE 2. Test Results

SAMPLE	pH	PHOSPHATES	CHLORIDES	GLUCOSE
Dog 1				
Dog 2				
Dog 3				
Dog 4				
Dog 5				

D. URINE AND PHOSPHATES

1. Place 2 drops of "dog urine" in an empty, clean cavity of your Chemplate.
2. Add 1 drop of Phosphate Test Solution 1 to the "urine" in the cavity and allow the mixture to stand for 2 minutes.
3. Add 1 drop of Phosphate Test Solution 2 to the mixture in the cavity and gently shake the Chemplate. A blue color indicates the presence of phosphate. Record your observations in Table 2 using a **+** for a positive result and a **–** for negative result.
4. If you are testing more than one dog, repeat Steps 1–3 for each different dog.
5. Make sure you record the data from any dogs your group did not test.

E. URINE AND CHLORIDES

1. Place 1 drop of of "dog urine" in an empty, clean cavity of your Chemplate.
2. Add 1 drop of Chloride Test Solution to the mixture in the cavity and gently shake the Chemplate. A white precipitate indicates the presence of chloride. Record your observations in Table 2 using a **+** for a positive result and a **–** for negative result.
3. If you are testing more than one dog, repeat Steps 1–3 for each different dog.
4. Make sure you record the data from any dogs your group did not test.

F. URINE AND GLUCOSE

Glucose in the urine often means the sugar level in blood entering the kidney is so high it exceeds the kidney's ability to pass it back into the blood. This condition is associated with diabetes, pancreatitis, and hypothyroidism.

1. Use safety equipment, such as safety gloves, as directed by your teacher.
2. Place 30-35 drops of Benedict's Solution into a test tube. Mark the tube with your initials.
3. Add 30-35 drops of "dog urine" to your test tube containing Benedict's solution.
4. Following your teacher's instructions, very carefully place your test tube in the boiling water bath for 2 minutes.
5. Carefully remove your test tube from the water bath and place it in a rack or cup that will support it. In a positive reaction, the blue will turn yellowish to a brick red color. Record **+** or **–** for the presences of glucose in Table 2.
6. If you are testing more than one dog, repeat Steps 1–5 for each different dog.
7. Make sure you record the data from any dogs your group did not test.

ANALYSIS and CONCLUSIONS

1. Based on your analysis of the the "urine specimens", what health concerns (if any) would you look further into for each dog? Give evidence for your recommendations.

2. Why is it important to develop a case history of the physical symptoms of each dog?

3. If a urinalysis result is different from the norm (color, pH, etc) should the veterinarian make an immediate diagnosis? Explain why or why not.