UNIVERSITY of LIFE SCIENCES in Lublin
FACULTY OF VETERINARY MEDICINE

DEPARTMENT OF BIOCHEMISTRY
20-033 Lublin, Akademicka 12
Phone +48 81 445 66 08
www.biochwet.up.lublin.pl

Body fluids
Physiological and pathological urine

Enter obtained results into the table below.

Parameter		Sample	
		Physiological urine	Pathological urine
Color of urine			-
pH of urine			-
Density of urine			-
Chloride ions			-
Phosphate ions			-
Calcium ions			-
Sulphate ions			-
Protein	With sulphosalicylic acid		
	With trichloracetic acid		
	Reaction of Heller		
Glucose			
Ketone bodies			
Bile pigments	Reaction of Gmelin		
	Reaction of Rosin		

1. Physical properties of physiological urine

Protocol:

1. Color of urine

Urine of majority of animals is transparent and yellow.

2. pH of urine.

The examination of pH of urine is done by use of paper (strip) indicators. pH of urine of carnivorous is between 5,0-7,0, while herbivorous between 7,4-8,2.

3. Density of urine.

Density of urine is examined with urometer. Pour urine into the cylinder and insert urometer. Read off the scale numerical value which represents density of urine in g/cm^3. Physiological values are between 1,015-1,060 g/cm^3

2. Chemical properties of physiological urine

Protocol.

- **1. Detection of Chloride ions**

Take 2 cm^3 of urine to glass tube, acidify with few drops of 2 mol/dm^3 HNO_3 and add few drops of 0.2% $AgNO_3$ – as positive result white, caseous precipitate of AgCl will be formed.

- **2. Detection of Phosphate ions**

Take 1 cm^3 of urine to glass tube, add 1 cm^3 concentrated HNO_3 and 2 cm^3 ammonium molybdate solution (molibdenian amonu). Heat it carefully over the burner to boil. As positive result yellow precipitate of ammonium phosphoro-molybdate will be formed.

3. Detection of Calcium ions

Take 2 cm^3 of urine to glass tube, add few drops of 0,2 mol/dm^3 CH_3COOH and 0,1 mol/dm^3 ammonium oxalate ($(NH_4)_2C_2O_4$). As positive result white cloudiness of calcium oxalate (CaC_2O_4) will be formed.

4. Detection of Sulphate ions

Take 5 cm^3 of urine to glass tube and add few drops of 2 mol/dm^3 HCl and 1 cm^3 of 0,25 mol/dm^3 $BaCl_2$. As positive result white cloudiness of $BaSO_4$ will be formed.

3. Properties of pathological urine

Protocol.

1. Detection of protein

a. Take 1 cm^3 of urine and add 2 drops of 10% sulphosalicylic acid. Precipitate or cloudiness will indicate the presence of protein.

b. Take 1 cm^3 of urine and add few drops of 10% **T**ri**C**hlor**A**cetic acid. Cloudiness will indicate the presence of protein.

c. Reaction of Heller – take 1 cm^3 of concentrated HNO_3 and gently avoiding mixing of solutions add 1 cm^3 of urine. Thin layer of denatured protein will appear on the border between solutions.

2. Detection of glucose

Take 1 cm^3 of Benedict reagent and add 0,5 cm^3 of urine. Heat it carefully over the burner to boil. As positive result yellow or red precipitate, depending on the content of sugars, will be formed.

3. Detection of ketone bodies – reaction of Legal

Take 1 cm^3 of urine, add 1 cm^3 of 3% nitropruside and 0.5 cm^3 2 mol/dm^3 NaOH. Red color will be formed.

4. Detection of bilirubin

a. Reaction of Gmelin – take 2 cm^3 of urine and add gently 1 cm^3 of concentrated HNO_3. Green layer on the border between solutions will be formed.

b. Reaction of Rosin – take 2 cm^3 of urine and add gently 0,05 % solution of iodium. Grey-green colour caused by the oxidation of bilirubin to biliwerdin will be formed.