

21 TESTS FOR EXCRETORY PRODUCTS OF ANIMALS OF DIFFERENT HABITATS

21.1 INTRODUCTION

In an organism's body metabolism produces a variety of by-products. Some are useful and others are of no further use to the organism, rather they are harmful if retained by the body. In smaller organisms with a large surface/body ratio the waste products are lost by diffusion but larger animals have special mechanisms for detoxification, transport, storage and removal of their excretory products.

You have learnt in Unit-4 of the course on Physiology (LSE-05) that nitrogen is toxic and needs to be excreted as soon as it is formed or converted to a less toxic form before excretion. Therefore, nitrogen is excreted in different forms by different animals depending on their habitat. Animals living in an aqueous environment have different problems of excretion as compared to those living on land. Animals can be classified according to the type of nitrogen containing excretory product they produce, namely ammonia, urea and uric acid. Animals that excrete ammonia are called ammonotelic. Those that excrete urea are ureotelic and the ones that excrete mainly uric acid are uricotelic.

In this experiment you will test the excretory products of animals that live in different habitats i.e. on land as well as in water and classify them according to their excretory product.

Objectives

After performing this experiment you should be able to:

- detect the presence of ammonia, urea or uric acid in the excretory product of vertebrates
- identify the habitats of different animals based on the type of excretory product produced by them.

21.1 MATERIALS REQUIRED

Water from a fish aquarium

Water from the aquarium in which frogs have been kept for a few days

Cow's urine

Bird guano

Test tubes

Pipettes

Nessler's reagent

Urease enzyme or freshly made horsegram powder

2% sodium carbonate solution

Conc. HCl

Conc. HNO₃

Dilute ammonium hydroxide

21.3 PROCEDURE

Your counsellor will provide you the various excretory products listed under the materials required.

Take 12 test tubes and arrange them in 3 sets. Mark them as A, B and C. Each set would have 4 test tubes. Number them 1 to 4

Take the excretory products in the three sets of test tubes as follows

- Test tube 1 fish water
- Test tube 2 frog water
- Test tube 3 cow's urine
- Test tube 4 bird guano

To dissolve bird guano add 2ml. of 2% Na_2CO_3 solution and boil. Leave it to cool. Decant the clear fluid to another test tube. Label it as No. 4 and use for the various tests.

One set of 4 test tubes will be used for testing for the presence of ammonia; one set for urea and the third set for testing for the presence of uric acid.

Test for Ammonia

Use set A for testing ammonia

1. Add in each test tube 2ml. of Nessler's reagent
2. Note the change in colour. A brownish red colour will indicate the presence of ammonia. Record your results in Table 21.1

Test for Urea

Use set B for testing urea

1. Add in each test tube a pinch of urease powder. In case the enzyme is not available, use horsegram powder.
2. Cover the test tubes with aluminium foil and keep aside for 10 minutes.
3. Add 2ml. of Nessler's reagent in each tube. Note the change in colour. Record your results in the Table 21.1.

SAQ 1. What is the action of urease enzyme on urea?

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SAQ 2. Why do we need to cover the test tubes?

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Test for Uric Acid

Use set C for this test

1. Add in each test tube, along the sides 2ml. of conc. HCl.
2. Observe the formation of uric acid crystals. Record your results
3. Drain out liquid from the test tube containing crystals. Now wash the crystals with a few ml. of distilled water
4. Empty the contents on to a clean watch glass and observe under the microscope. Draw the structure of crystals in your note book.

SAQ 3. How will you dissolve uric acid crystals?

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SAQ 4. Why do aquatic animals excrete ammonia and not urea?

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AQ 5. Why do birds excrete uric acid and not urea?

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21.4 RESULTS

Table 21.1

Organism	Excretory Product		
	Ammonia	Urea	Uric Acid
Fish			
Frog			
Cow			
Bird			

Note: Indicate a positive result by a + sign and negative result by a — sign

SAQ 6. In your experiments do you get positive results for the different excretory products in the same animal? If the answer is yes, give reasons for it.

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