

Investigation 9.B: Urinalysis

Answer Key

Expected Results

Your results should be similar to those shown below.

| Test | Control tests | Crime scene | Suspect 1 | Suspect 2 | Suspect 3 | Suspect 4 |
|--------------------------------|------------------------------|-----------------------------|-----------------------------|-------------------------|------------------------------|-----------------------------|
| 1. Colour/odour/clarity | cloudy, normal odour, yellow | fruity smell, clear, yellow | clear, yellow, has an odour | clear, yellow, no odour | cloudy, yellow, has an odour | clear, yellow, fruity smell |
| 2. Protein | positive | negative | negative | negative | positive | negative |
| 3. pH | between 5 and 7 | between 5 and 7 | below 5 | above 7 | between 5 and 7 | between 5 and 7 |
| 4. Glucose | positive (high amount) | positive (high amount) | negative | negative | negative | positive (high amount) |

Answers to Analysis Questions

- Suspect number 4 committed the crime.
- The urine sample collected at the crime scene matches the urine sample from suspect number 4 (odour: fruit/apple; positive test for glucose; negative test for protein).

Answers to Conclusion Questions

- Suspect number 4 may have diabetes mellitus. Urine normally doesn't contain any glucose. Glucose is reabsorbed from the glomerular filtrate in the proximal tubule of the nephron. Diabetes mellitus is characterized by high blood sugar (glucose) levels, which result from defects in insulin secretion, or action, or both. Diabetes mellitus, commonly referred to as diabetes, means "sweet urine." Elevated levels of blood glucose (hyperglycemia) lead to a spillage of glucose into the urine, hence the term "sweet urine."
- Your answer may include the following:
 - There are usually no red blood cells in urine.
 - Hemoglobin is not normally found in the urine.
 - Bilirubin is normally not detected in the urine.
 - There may be a trace of urobilinogen in the urine.
 - Nitrites and white blood cells (leukocytes) are not normally present in the urine.
- Possible answers could include the fact that
 - the tests were not quantitative,
 - the tests were not performed using medical laboratory protocols (cleanliness), or
 - sophisticated technology was not used to analyze the urine.

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| ANSWER KEY | | |

To get a more comprehensive picture, more tests have to be performed in this investigation. These include bilirubin, hemoglobin, microscopic analysis, specific gravity, and ketones, to name a few.

Answers to Extension Questions

6. Glucose passes from the glomerulus and is found in the filtrate. Specific carrier molecules in the proximal tubule ensure that all of the glucose is reabsorbed into the circulatory system. Protein molecules are normally too large to pass through the pores in the glomeruli. They do not enter the filtrate in a healthy individual.
7. Some performance-enhancing drugs may be secreted into the filtrate as it passes through the distal tubule. These molecules will not be absorbed in the collecting duct and will be found in the urine.