

OREGON HEALTH & SCIENCE UNIVERSITY  
Hospitals and Clinics  
Point of Care

**pH by Nitrazine Paper**

Principle

The pH is the measurement of hydrogen ion activity in various samples.

The determination of eye fluid pH is a useful screening test to determine the need and success of irrigation after caustic exposure.

In vaginal secretions it is used to detect small quantities of amniotic fluid. This test is used in conjunction with the Fern Test to help detect ruptured membranes. The Nitrazine paper is highly sensitive but not very specific. Premature rupture of the membranes before onset of labor may lead to fetal infection and subsequent mortality. The risk is largely eliminated by induction of labor.

The determination of vaginal pH using pH paper is a useful screening test for bacterial vaginosis. The diagnosis of the cause of vaginitis symptoms generally requires the assessment of clinical symptoms (vaginal discharge, odor, appearance, discomfort, etc.) in conjunction with laboratory tests (pH, microscopic, whiff test, and possibly cultures). The normal pH of vaginal secretions is 3.8 to 4.2 and with bacterial vaginosis the pH rises to > 4.5.

In gastric and intestinal aspirates, the pH is a useful screening test for the placement and maintenance of gastrostomy and jejunostomy tubes for enteral feedings.

The determination of urine pH is a useful screening test for determining the acid-base status of a patient. Acidosis may result from starvation diets, severe diarrhea, diabetes mellitus, and respiratory diseases. Alkalosis may result from excess alkali ingestion, severe vomiting, and respiratory hyperventilation. A urinary tract infection associated with urea-splitting organisms (Proteus or Pseudomonas) may also cause alkaline urine.

Specimen Requirements

1. Eye fluid. Use pH paper with 4.5-7.5 range.
2. Vaginal secretions from the posterior vaginal pool. Use pH paper with 4.5-7.5 range.
  - a. Do not touch the swab or pH paper to the mucus plug in the cervix.
  - b. Test the sample immediately after collection.
3. Vaginal secretions. Use pH paper with 1-6 range.
4. Aspirated gastric/ intestinal secretions. Use pH paper with 1-6 range for gastric and 4.5-7.5 range for intestinal secretions.
5. Fresh urine sample. Use pH paper with 4.5-7.5 range.

## Interferences

1. There are no interferences with, eye fluid, vaginal, gastric, and intestinal secretions, or urine samples.
2. Specimen contamination will result in erroneous pH results.
3. For amniotic fluid:
  - a. False positive results may occur from specimen contamination due to heavy vaginal discharge, blood, cervical mucus, semen, alkaline urine, and soap.
  - b. False negative results may be produced by prolonged rupture of membranes (longer than 24 hours) or when a small volume of fluid has leaked.

## Reference Range

1. Eye: pH of 6.5 – 7.5.
2. Amniotic fluid: pH of 7.0-7.5.
3. Vaginal secretions: pH of 3.8-4.2.
4. Gastric secretions: pH of < 4.
5. Intestinal secretions: pH of >6.
6. Urine: pH of 5-8.

## Alert Values

None

## Quality Control

1. Contact Point of Care at 4-6788 to QC pH paper when a new shipment arrives. pHydrion buffers obtained from the Core Laboratory will be used.
2. Tear off pieces of Nitrazine paper of the desired length.
3. Apply 1 drop of buffer to the strip of Nitrazine paper. Shake off excess fluid.
4. Immediately match the strip color with the closest color on the dispenser color chart.
5. Record date, initials, department, Nitrazine paper lot number and expiration date (if present), buffer lot number(s), and buffer expiration date(s). Document QC results on the QC logsheet kept in the POCT Office.
6. Buffer pH results must be identical to manufacturer result.
7. If QC fails, repeat. If QC fails a second time, do not use Nitrazine paper for patient testing.
8. Repeat for subsequent buffers if necessary.

## Procedure

1. Tear off piece of Nitrazine paper of the desired length.
2. For gastric/ intestinal aspirates: the gastrostomy or jejunostomy tube should be flushed with 30 mL of air before aspirating specimen
3. Apply patient sample to Nitrazine paper.
4. Immediately match the strip color with the closest color on the dispenser color chart.
5. For eye fluid:
  - a. If the patient is exposed to an acidic agent, once the pH of the eye reaches the target range, further irrigation is not needed.
  - b. If the patient is exposed to an alkaline agent, repeat pH testing every 15-30 minutes and continue irrigation until the pH of the eye is maintained in the target range during the post-flush period.
6. For gastric/ intestinal aspirates: the gastrostomy or jejunostomy tube should be flushed with 30 mL of air before aspirating specimen

## Results Reporting

1. Record results in patient's chart.
2. POCT recommends sending specimen containing abnormal pH result to Core Lab for confirmation. The specimen must be greater than 1 mL for analysis.
3. For Amniotic Fluid:
  - a. When the membranes rupture, the amniotic fluid leaks into the vagina and raises the pH of the vaginal secretions.
  - b. If the pH is 4.5-6.0, the test is negative for amniotic fluid.
  - c. If the pH is 6.5-7.5, the test is positive for amniotic fluid.
  - d. If the Nitrazine and Fern tests are positive, probable membrane rupture has occurred.
  - e. If the Nitrazine test is negative, but the Fern test is positive, there is probable rupture of the membranes due to the Fern's greater specificity.
  - f. If the Nitrazine test is positive, but the Fern test is negative, a second specimen should be collected and tested.

## Reagents

1. Nitrazine pH paper:
  - a. Stable at room temperature in the original container until 2 years from open date.
  - b. Store out of direct light.

2. pHydrion Buffers:
  - a. Buffers made in Core Lab.
  - b. Stable at room temperature for 3 weeks from the date they are made.

### References

1. Burtis, Carl A. "Tietz Textbook of Clinical Chemistry," 3<sup>rd</sup> Ed., W.B. Saunders Company, Philadelphia, 1999, p. 1828.
2. Kaplan, Lawrence A., Pesce, Amadeo J., Kazmierczak, Steven C. "Clinical Chemistry – Theory, Analysis, Correlation", 4<sup>th</sup> Ed., Mosby, St. Louis, 2003, p. 783.

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