



Class: Third Stage
Subject: Practical Biochemistry
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Serum phosphorus measurement.

Practical Biochemistry (3st.)

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Phosphorus

- It is a mineral found in many foods like beer, cheese, beans, and fish.
- It is also one of the most common substances in your everyday environment and in your body.
- It plays an important role in the health of your kidneys, bones, muscles, and blood vessels, as well as each cell in your body.

Finding foods with high phosphorus levels :

1-Pork, cod, salmon, and tuna are all high in phosphorus.

2-Good dairy sources include: (milk, chocolate, yogurt, eggnog, ricotta and American cheese and instant pudding).

3-Bran cereal, blueberry muffins, and nachos are also high in phosphorus.

Function of phosphorus in body:

1-You need phosphorus to:

A-keep your bones strong and healthy

B-help make energy

C-move your muscles

2-In addition, phosphorus helps to:

A-build strong teeth.

B-manage how your body stores and uses energy.

C-reduce muscle pain after exercise.



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E-filter out waste in your kidneys.

F-grow, maintain, and repair tissue and cells. produce DNA and RNA — the body's genetic building blocks.

G-balance and use vitamins such as vitamins **B** and **D**, as well as other minerals like **iodine**, **magnesium**, and **zinc**

H-maintain a regular heart beat.

I-facilitate nerve conduction.

Serum phosphorus

It is measured in milligrams of phosphorus per deciliter of blood (mg/dL). According to Mayo Medical Laboratories, a normal range for adults is generally **2.5** to **4** mg/dL. The normal range varies slightly depending on your age.

Other names: phosphorus test, P, PO₄, phosphorus-serum.

What is it used for phosphate in blood test ?

1-Diagnose and monitor kidney disease and bone disorders

2-Diagnose **parathyroid disorders** Parathyroid glands are small glands located in the neck. They make **hormones** that control the amount of calcium in the blood. If the gland makes too much or too little of these hormones, it can cause serious health problems.

3-A phosphate in blood test is sometimes ordered along with tests of calcium and other minerals.



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Many medications can affect your phosphorus levels, including:

- 1-Antacids
- 2- Vitamin D supplements, when taken in excess.
- 3-Intravenous glucose.

What are the risks associated with a serum phosphorus test?

- 1- As with any blood test, there's a slight risk of bruising, bleeding, or infection at the puncture site.
- 2- You may also feel lightheaded after having blood drawn.
- 3- In rare cases, your vein may swell after blood is drawn. This is known as **phlebitis**.
Applying a warm compress to the site several times a day can ease the swelling.

Hyperphosphatemia

- A high level of phosphates in the blood
- These symptoms include: joint pain, muscle pain, and muscle weakness.
- People with high phosphorus levels can also experience itching and red eyes.
- Symptoms of more severe cases of high phosphorus may include severe constipation, nausea, vomiting, and diarrhea.



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Hypophosphatemia

- Insufficient phosphorus is referred to as Hypophosphatemia.
- This causes your energy levels to drop.
- It can also cause muscle weakness, fatigue, and a low tolerance for exercise.
- Insufficient phosphorus coinciding with low levels of calcium and vitamin D can lead to weaker, softer bones over long periods of time. This causes joint and muscle pain.
- Chronic **alcohol use disorder** and **vitamin D deficiency**, can cause your blood phosphorus level to become too low.

Low phosphorus levels may be due to a range of nutritional problems and medical conditions, including:

1. Chronic use of antacids.
2. Lack of vitamin D
3. Not getting enough phosphorus in your diet.
4. Malnutrition
5. Alcoholism
6. Hypercalcemia, or high serum calcium levels.
7. Hyperparathyroidism and severe burns.



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ESTIMATION OF PHOSPHORUS

Specimen

Serum.

Plasma must not be used. Anticoagulants may cause false low results.

Stability in serum: 7 days at +4°C

2 days at 20...25°C

Assay

Wavelength: 340 nm, Hg 334 nm

Optical path: 1 cm

Temperature: 20...25°C

Measurement: against reagent blank; one reagent blank per series is required

Pipetting Scheme

Pipette into cuvettes	Reagent blank	Sample or STD
Sample/ STD	---	10 µl
RGT	1000 µl	1000 µl

Mix, incubate at least 1 minute at room temperature. Measure the absorbance of the sample and the **STD** against the reagent blank within 60 minutes (ΔA).

AC



Calculation of phosphorus concentration

$$C = 10 \times \frac{\Delta A_{\text{Sample}}}{\Delta A_{\text{STD}}} \quad (\text{mg/dl})$$

or

$$C = 3.2 \times \frac{\Delta A_{\text{Sample}}}{\Delta A_{\text{STD}}} \quad (\text{mmol/l})$$

Normal Values³

Inorganic phosphorus

Adults:	2.5-5.0 mg/dl	0.81-1.62 mmol/l
Children:	4.0-7.0 mg/dl	1.30-2.26 mmol/l