

# **RayBio® Acid Phosphatase Activity Fluorometric Assay Kit**

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**RayBio® Acid Phosphatase Activity Fluorometric  
Kit Protocol**

(Cat#: 68FL-AcPh-S500)



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RayBiotech, Inc.

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## RayBio® Acid Phosphatase Activity Fluorometric Assay Kit

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### I. INTRODUCTION

Acid phosphatase (AP) dephosphorylates phosphate groups from the phosphate esters in acid conditions. Different forms of acid phosphatase are found in different organs, and their serum levels are used as a diagnosis for disease in the corresponding organs. For example, elevated prostatic acid phosphatase levels may indicate the presence of prostate cancer and elevated tartrate resistant acid phosphatase levels may indicate the bone disease. RayBiotech's Acid Phosphatase Fluorometric Assay Kit uses non-fluorescent Methylumbelliferyl phosphate disodium (MUP) as the substrate which has Ex/Em=360/440 nm when dephosphorylated by AP. The kit is an ultra-sensitive, simple, direct and HTS-ready fluorometric assay designed to measure AP activity in serum and other bio-samples. The detection sensitivity is ~1  $\mu$ U, more sensitive than colorimetric assays. The kit is suitable for both research and drug discovery.

## II. REAGENTS

Components	100 Assays	Cap Color	Part Number
AP Assay Buffer	100 ml	NM	Item A
MUP Substrate	1 vial	Red	Item B
AP Enzyme	1 vial	Green	Item C
Stop Solution	25 ml	WM	Item D

## III. STORAGE AND HANDLING

Store the kit at  $-20^{\circ}\text{C}$ , protect from light. Allow Assay Buffer to warm to room temperature before use. Briefly centrifuge vials before opening. Read the entire protocol prior to performing the assay.

## IV. REAGENT RECONSTITUTION AND GENERAL CONSIDERATION

**MUP Solution:** Dissolve MUP substrate into 1.2 ml Assay Buffer to generate 5 mM MUP substrate solution. The MUP solution is stable for 2 month at  $-20^{\circ}\text{C}$ .

**AP Enzyme:** Reconstitute AP Enzyme with 1 ml Assay Buffer. The enzyme is stable for up to 2 months at  $4^{\circ}\text{C}$  after reconstitution. **DO NOT FREEZE!**

Ensure that the Assay Buffer is at room temperature before use. Keep samples and AP Enzyme on ice during the assay.

## V. ACID PHOSPHATASE ASSAY PROTOCOL

### 1. Sample Preparations:

Inhibitors of AP, like tartrate, fluoride, EDTA, oxalate, and citrate, should be avoided in sample preparation. Serum, plasma, urine, semen, and cell culture media can be assayed directly. Cells ( $1 \times 10^5$ ) or tissue ( $\sim 10$  mg) can be homogenized in 100  $\mu\text{l}$  Assay Buffer, centrifuge to remove insoluble material at 13,000g for 3 minutes. Add test samples directly into 96-well plate, bring total volume to 110  $\mu\text{l}$  with Assay Buffer.

In order to avoid interference of other components in the sample, set a sample background control. Add the same amount of samples into separate wells, bring volume to 110  $\mu$ l with Assay Buffer. Add 20  $\mu$ l Stop Solution and mix well to terminate AP activity in the sample.

2. Dilute enough (1:10) 5 mM MUP substrate solution to 0.5 mM with Assay Buffer. Add 20  $\mu$ l 0.5 mM MUP substrate solutions to each well containing the test samples and background controls. Mix well. Incubate the reaction for 30 min (or longer if AP activity in sample is low) at 25°C, protect from light.

### 3. Standard Curve:

Dilute 10  $\mu$ l of the 5 mM MUP solution with 990  $\mu$ l Assay Buffer to generate 50  $\mu$ M MUP standards. Add 0, 2, 4, 6, 8, 10  $\mu$ l into 96-well plate in duplicate to generate 0, 0.1, 0.2, 0.3, 0.4, 0.5 nmol/well MUP standard. Bring the final volume to 120  $\mu$ l with Assay Buffer.

Add 10  $\mu$ l of AP enzyme solution to each well containing the MUP standard. Mix well. Incubate the reaction for 30 min at 25°C, protect from light. The ALP enzyme will convert MUP substrate to equal amount of fluorescent 4-Methylumbelliferone (4-MU).

4. Stop all reactions by adding 20  $\mu$ l Stop Solution into each standard and sample reaction except the sample background control reaction (since 20  $\mu$ l Stop Solution has been added into the background control when prepare the sample background control in step 1), gently shake the plate. Measure fluorescence intensity at Ex/Em 360/440 nm using a fluorescence microtiter plate reader.
5. Correct background by subtracting the value derived from the sample background controls. Plot 4-MU standard Curve. Apply sample readings to the standard curve to get the amount of 4-MU generated by AP sample. AP activity of the test samples can then be calculated:

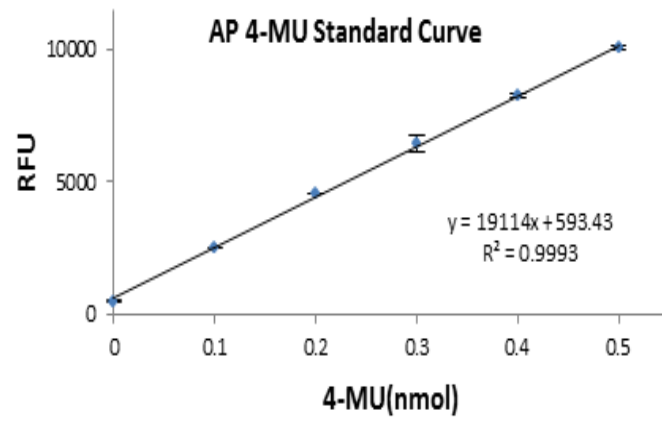
$$\text{AP Activity} = A/V/T \text{ (mU/ml)}$$

Where: A is amount of 4-MU generated by sample (in nmol).

V is the volume of sample added in the assay well (in ml).

T is reaction time (in minutes).

**Unit Definition:** 1 unit of AP is the amount of enzyme causing hydrolysis of 1  $\mu$ mol of MUP per minute at 25°C.



## VI. GENERAL TROUBLESHOOTING GUIDE:

Problems	Cause	Solution
Assay not working	<ul style="list-style-type: none"> <li>• Use of ice-cold assay buffer</li> <li>• Omission of a step in the protocol</li> <li>• Plate read at incorrect wavelength</li> <li>• Use of a different 96-well plate</li> </ul>	<ul style="list-style-type: none"> <li>• Assay buffer must be at room temperature</li> <li>• Refer and follow the data sheet precisely</li> <li>• Check the wavelength in the data sheet and the filter settings of the instrument</li> <li>• Fluorescence: Black plates (clear bottoms) ; Luminescence: White plates ; Colorimeters: Clear plates</li> </ul>
Samples with erratic readings	<ul style="list-style-type: none"> <li>• Use of an incompatible sample type</li> <li>• Samples prepared in a different buffer</li> <li>• Cell/ tissue samples were not completely homogenized</li> <li>• Samples used after multiple free-thaw cycles</li> <li>• Presence of interfering substance in the sample</li> <li>• Use of old or inappropriately stored samples</li> </ul>	<ul style="list-style-type: none"> <li>• Refer data sheet for details about incompatible samples</li> <li>• Use the assay buffer provided in the kit or refer data sheet for instructions</li> <li>• Use Dounce homogenizer (increase the number of strokes); observe for lysis under microscope</li> <li>• Aliquot and freeze samples if needed to use multiple times</li> <li>• Troubleshoot if needed</li> <li>• Use fresh samples or store at correct temperatures until use</li> </ul>
Lower/ Higher readings in Samples and Standards	<ul style="list-style-type: none"> <li>• Improperly thawed components</li> <li>• Use of expired kit or improperly stored reagents</li> <li>• Allowing the reagents to sit for extended times on ice</li> <li>• Incorrect incubation times or temperatures</li> <li>• Incorrect volumes used</li> </ul>	<ul style="list-style-type: none"> <li>• Thaw all components completely and mix gently before use</li> <li>• Always check the expiry date and store the components appropriately</li> <li>• Always thaw and prepare fresh reaction mix before use</li> <li>• Refer datasheet &amp; verify correct incubation times and temperatures</li> <li>• Use calibrated pipettes and aliquot correctly</li> </ul>
Readings do not follow a linear pattern for Standard curve	<ul style="list-style-type: none"> <li>• Use of partially thawed components</li> <li>• Pipetting errors in the standard</li> <li>• Pipetting errors in the reaction mix</li> <li>• Air bubbles formed in well</li> <li>• Standard stock is at an incorrect concentration</li> <li>• Calculation errors</li> <li>• Substituting reagents from older kits/ lots</li> </ul>	<ul style="list-style-type: none"> <li>• Thaw and resuspend all components before preparing the reaction mix</li> <li>• Avoid pipetting small volumes</li> <li>• Prepare a master reaction mix whenever possible</li> <li>• Pipette gently against the wall of the tubes</li> <li>• Always refer the dilutions in the data sheet</li> <li>• Recheck calculations after referring the data sheet</li> <li>• Use fresh components from the same kit</li> </ul>
Unanticipated results	<ul style="list-style-type: none"> <li>• Measured at incorrect wavelength</li> <li>• Samples contain interfering substances</li> <li>• Use of incompatible sample type</li> <li>• Sample readings above/below the linear range</li> </ul>	<ul style="list-style-type: none"> <li>• Check the equipment and the filter setting</li> <li>• Troubleshoot if it interferes with the kit</li> <li>• Refer data sheet to check if sample is compatible with the kit or optimization is needed</li> <li>• Concentrate/ Dilute sample so as to be in the linear range</li> </ul>
<p><b>Note:</b> The most probable list of causes is under each problem section. Causes/ Solutions may overlap with other problems.</p>		

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