

**Eclogiena**<sup>®</sup>

**Estrone(E1)  
ELISA KIT  
(Microplate)  
User's Guide**

**Estrone (E1) ELISA KIT (Microplate)  
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**LIMITED WARRANTY**

Japan EnviroChemicals, Ltd. (the Company, hereunder) warrants its products. (the Product, hereunder) to be manufactured in accordance with its specifications and free from defects in material. This warranty is expressly limited to the refund of the price of any defective Product or the replacement of any defective Product with new Product. This warranty applies only when the Buyer gives written notice to the Company within thirty (30) days after the receipt of the Product by the Buyer. In addition, this warranty applies under conditions of normal use, but does not apply to defects that result from intentional damage, negligence or unreasonable use.

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The design of the Product is under constant review and every effort is made to keep this guide up to date, the Company reserves the right to change specifications and equipment at any time without prior notice.

## Kit Feature

- ✧ E1 monoclonal antibody binds exclusively with E1 and does not show cross-reaction with other chemicals of similar structures. A monoclonal antibody is uniform in quality, generating very little lot-to-lot variation.
- ✧ The quantitative analysis ranges from 0.05µg/L to 5µg/L (ppb).
- ✧ The ELISA measurement is highly reproducible; the coefficient of variation (CV) is mostly under 10%.
- ✧ The assay requires less amount of harmful solvent than instrument analyses.
- ✧ With ease of handling, the total time for measurement is only 2.5 hours.
- ✧ The kit, a 96-well microplate format, enables simultaneous measurement of multiple samples at more reasonable cost.

## Measuring Principle

### 1. Competitive Reaction

The test is based on the recognition of E1 by specific monoclonal antibodies. E1 present in the sample and an E1-enzyme conjugate (i.e. E1 labeled with a coloring enzyme) are premixed and added into each well of a microplate, and allowed to compete for limited number of binding sites of specific antibodies immobilized on the surface of the wells. When the E1 concentration is higher relative to the enzyme conjugate, the E1 will predominantly bind the antibody and vice versa.

### 2. Chromogenic Reaction

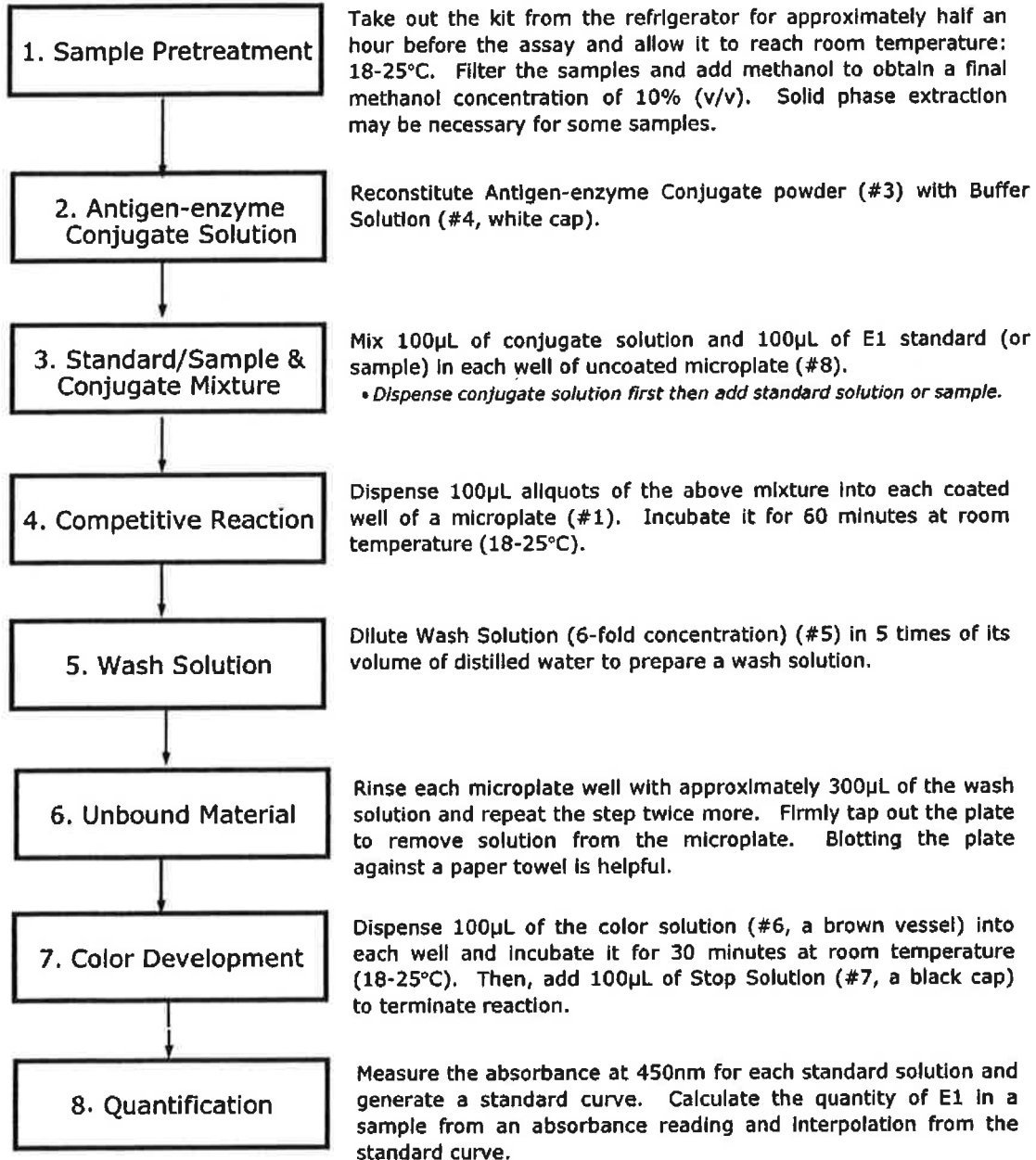
Unbound E1 and excess E1-enzyme conjugates are washed out. The presence of E1 is detected by adding a chromogenic substrate. The enzyme-labeled E1 bound to the E1 antibody in the plate, catalyzes the conversion of the substrate to a colored product. After an incubation period, the reaction is stopped by the addition of a diluted acid. The higher the E1 concentration in a sample, for example, leads to less antigen-enzyme conjugate bound to the antibody binding sites in a microplate well, generating a lighter color, i.e. lower absorbance.

### 3. Quantitative Analysis

The standard curve, a dose-response curve obtained from known concentrations of E1 standards, is determined from the absorbance at 450nm. The E1 concentration in each sample is accurately calculated by interpolation using the absorbance intensity obtained from the standard curve.

## Flowchart for E1 Measurement

<Please follow the steps described in Test Protocol (PP6-8)>



## Kit Content

#	Contents	Volume	Quantity	Storage
1	MoAb-Coated Microplate	96 Wells	1 Plate	2-8°C
2	E1 Standard 0µg/L (10%MeOH)	1.5mL each	1 Vial each	2-8°C
	E1 Standard 0.05µg/L (10%MeOH)			
	E1 Standard 0.3µg/L (10%MeOH)			
	E1 Standard 0.8µg/L (10%MeOH)			
	E1 Standard 5.0µg/L (10%MeOH)			
3	Antigen-enzyme Conjugate powder		2 Vials	2-8°C
4	Buffer Solution - <b>white cap</b> -	7mL	2 Vials	2-8°C
5	Wash Solution (6-fold concentration)	50mL	1 Vial	2-8°C
6	Color Solution - <b>brown vessel</b> -	15mL	1 Vial	2-8°C
7	Stop Solution - <b>black cap</b> -	15mL	1 Vial	2-8°C
8	Uncoated Microplate	96 Wells	1 Plate	---
9	Plate Cover	---	1	---
10	Instruction Booklet	---	1	---

### Other Essential Reagents/Materials

#### Essential - When Sample Concentration is NOT Required.

1. Disposable test tubes (e.g. IWAKI, item No. 9831-1207)  
\*Be sure to use disposable tubes to avoid ES adsorption.
2. Glass fiber filters (e.g. ADVANTEC Co., item No. 36481047 Ø47mm) and filtering equipment
3. Micropipettes (20µL - 200µL and 100µL - 1000µL, e.g. Gilson Pipetman P-200, P-1000) and tips (e.g. ICN Superpack 96NS)
4. Multichannel pipettes (50µL - 300µL e.g. LabSystems Finnpiptette Digital 8-channel Pipettor) and tips (e.g. ICN Superpack 96NS)
5. Microplate reader (450nm wavelength) (e.g. TECAN Sunrise Remote)
6. Stop watch
7. Strip ejector (e.g. COSTAR, No.2578)
8. Methanol (HPLC grade)

#### Essential - When Sample Concentration through SPE is Required.

- 1-8. the same as above
9. Solid phase extraction cartridge (e.g. J.T. Baker SPE Column C18, cat # 562-20014; Bond Elut C18 Octadecyl, cat # 5010-11024)
10. Solid phase extraction cartridge (e.g. Waters Corporation, Sep-Pak Plus NH2 Cartridges CodeNo.020535)
11. Dichloromethane, Hexane (HPLC grade)

#### **IMPORTANT**

- Comparative tests should be needed if an alternate supplier is used for specified reagents or materials.

## Test Protocol

### **IMPORTANT**

- For research use only, not for human use.
- Take out all the kit contents from the refrigerator and let them reach room temperature (18-25°C) for approximately 30 minutes prior to the assay.
- Do not mix reagents from different kits.
- Store reagents under refrigeration (2-8°C)

### Test Protocol (continued)

- Do not use expired kits.
- Dispose of kit components in accordance with applicable regulations after use.
- Duplicate measurement is recommended for more accurate determination.

### **CAUTION**

Wear appropriate protective clothing, gloves and eyewear to avoid any accidental contacts.

#### 1. Sample Pretreatment

Filter raw water samples through the specified glass fiber filter (1µm pore diameter).

If there remains sediment on the filter, pour MeOH to extract the analyte from the solid and add the eluant to the filtrate.

Make sure the amount of MeOH dose not exceed 1% of the total volume of the filtrate. i.e. For 1L of filtered sample, the amount of MeOH should be less than 10mL.

Confirm the pH of the filtrate is between 5 and 8. If pH is out of this range, add acid or base to adjust pH.

If a sample concentration and clean-up are necessary, follow the solid phase extraction.

[Example]

- 1) Pour the filtrate, prepared above, through a C18 cartridge (ex. 500ml) preconditioned with methanol (ex. 5ml) and distilled water (ex. 10ml).
- 2) Wash the C18 cartridge with distilled water (ex. 5ml) and dry the column with vacuuming for about a minute. Wash the cartridge with hexane (ex. 5ml).
- 3) Elute the analyte with dichloromethane (ex. 5ml). Then, evaporate the solvent with nitrogen gas.
- 4) Dissolve the dried material in methanol (ex. 1ml), then pour it through an aminopropyl cartridge, which has been preconditioned with methanol (ex. 5ml). Keep the filtrate of the loaded sample in a tube.
- 5) Elute the remaining estrone with methanol (ex. 5ml) and receive the eluate into a tube, which contains the previously obtained filtrate. Then, evaporate the solvent with nitrogen gas.
- 6) Add 100% methanol to the residue and stir the mixture with a vortex. Terminate the mixing and pour distilled water to adjust the content at 10% methanol (v/v).

If estrone (E1) in the sample need not be analyzed, the protocol can be simplified. Please visit our web site ([www.jechem.co.jp/eco/index-e.html](http://www.jechem.co.jp/eco/index-e.html)) for the latest information

### **IMPORTANT**

- Dichloromethane is a possible carcinogen, classified as Group B in NTP and as Group 2B in IARC. Follow the applicable regulation when you use it.
- Keep the methanol concentration to be 10%. Higher methanol content may result in inaccurate readings.
- Use a new cartridge for each filtrate.

## **2. Antigen-enzyme Conjugate Solution**

Reconstitute a bottle of antigen-enzyme conjugate powder (#3) with each buffer solution (#4, white cap) to prepare antigen-enzyme conjugate solution.

- Store the conjugate solution at 2-8°C; it will be stable for approximately 2 weeks. 7mL is sufficient for approximately 50 wells.
- Mix by filling the tip and expelling the contents with a pipette. Be sure not to generate bubbles when you transfer liquid.
- Mix a pair of reconstituted solutions when you use them altogether.

## **3. Mixture of Standard/Sample and Conjugate Solution**

Transfer 100µL of conjugate solution, and then transfer 100µL of E1 standard or 100µL of sample, prepared as 10 % (v/v) methanol solution, into each well of the uncoated microplate (#8) and mix by filling the tip and expelling the contents with a pipette.

- Dispense conjugate solution first then add standard solution or sample, to avoid adsorption on the inner surface of the well.
- Mix by filling the tip and expelling the contents with a pipette. Be sure not to generate bubbles when you transfer liquid.
- Use 10% methanol as a blank.

## **4. Competitive Reaction**

Dispense 100µL aliquots of the mixture, prepared in the above Section 3, into each coated well of the microplate (#1). Tap the plate lightly to make the liquid level horizontal. Incubate the microplate for 60 minutes at room temperature (18-25°C).

- Split the microplate, with a strip ejector for example, to use necessary number of wells. This microplate is breakable into 12 strips, each of which consists of 8 wells. Place back the unused plate strips in the packet, seal and store them at 2-8°C.
- Be sure not to generate bubbles when you transfer liquid to avoid erroneous reading. To remove them, tap a plate lightly.
- Cover a microplate with film to avoid contamination and evaporation.
- Do not move or shake a microplate during the reaction.
- A temperature-controlled bath (18-25°C) is recommended.
- Secure the constant reaction time for each well, particularly to measure multiple samples.

## **5. Wash Solution**

Dilute Wash Solution (6-fold concentration) (#5) in 5 times of its volume of distilled water to prepare a wash solution, e.g. 20mL of concentrate and 100mL of distilled water.

- Prepare the necessary amount of solution if you plan to run assays on different days with a split plate. The rule of thumb is 1.2mL of wash solution is required per well, i.e. approximately 120 mL for a whole plate.
- The wash solution must be stored at 2-8°C; it will be stable approximately for a month after preparation.

## **6. Unbound Material**

Rinse each microplate well with approximately 300µL of the wash solution and repeat the step twice more. Then, firmly tap out the plate to remove solution from the microplate. Blotting the plate against a paper towel, a clean cloth or a lint-free towel is helpful.

- Be sure to remove any remaining solution, which may cause a measurement error.
- Be sure the bottom of the plate is free from any fingerprints or dirt. Otherwise absorbance readings will be significantly altered.
- Do not discharge any untreated waste liquid. For example, soak cloth or paper in fluid for incineration.

## 7. Color Development

Dispense 100µL of the color solution (#6, a brown vessel) into each microplate well and incubate the microplate for 30 minutes at room temperature (18-25°C). Then, add 100µL of Stop Solution (#7, a black cap) to terminate the reaction.

- A temperature-controlled bath (18-25°C) is recommended.
- Secure the constant reaction time for each well, particularly to measure multiple samples.
- Each well colored with a blue color from the color solution will turn yellow once the stop solution is added.

## 8. Quantification

Read the absorbance at 450nm for each standard solution and samples with a plate reader.

- Measure the absorbance within 15 minutes after the reaction is stopped.
- Prepare a standard curve based on at least duplicate standards for every assay.
- Be sure the bottom of the plate is free from any fingerprints or dirt. Otherwise absorbance readings will be significantly altered.
- The assay must be performed within the range between 0.05µg/L and 5µg/L. Samples of concentration beyond 5µg/L must be diluted with 10% methanol and re-tested. If the concentration of E1 in a sample is completely unknown, more than one dilution of each pretreated sample is recommended to be included in the assay.

Several options are available for the calculation of the E1 concentration in samples.

### ( 1 ) Computer aided Calculation

Calculate using microplate analysis software.

A 4-parameter logistic fitting software is recommended, for example " Delta Soft " from BioMetallics, Inc., Princeton, NJ (<http://www.microplate.com>).

### (2)Graph Paper (Section Paper) aided Fitting

Calculate using Log-Log (or Log-Linear) Graph Paper (Section Paper) Fitting.

X-axis : E1 concentration

Y-axis : Optical Density(OD) or Inhibition Rate(B/B0%)

Inhibition Rate(B/B0%) = (Sample or standard OD)/(OD at E1 standard=0)

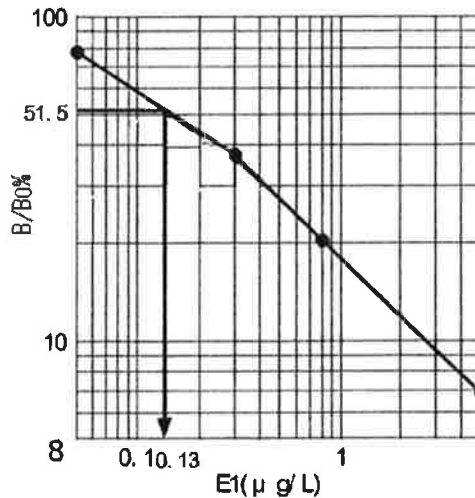
(Example)

#### Standard OD or B/B0%

E1(ug/L)	OD	B/B0%
0	1.489	100
0.05	1.157	77.9
0.30	0.557	37.5
0.80	0.301	20.3
5.00	0.102	6.9
Sample	0.767	51.5

#### Log-Log Graph Paper Calculation

E1=0.13(ug/L) from B/B0%=51.5%





# APPENDIX

## 1. Plate Layout

E1 MoAb-Coated Microplate has 96 wells breakable into 8 x 12 strips.

### Example 1) Full Plate Format

Five different concentrations of E1 standards (0, 0.05, 0.3, 0.8, 5µg/L) are assayed in duplicates. The standards take up 10 wells, leaving the rest of 86 wells for samples. With duplicate measurement, the whole plate can take 43 samples altogether.

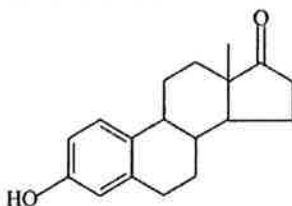
	1	2	3	4	5	6	7	8	9	10	11	12
A	■	■										
B	■	■										
C	■	■										
D	■	■										
E	■	■										
F												
G												
H												

### Example 2) Partial Plate Format

Six different concentrations of E1 standards are assayed in duplicates. The plate is split into two for independent assays. Half a plate can take up to 19 samples with duplicate measurement.

	1	2	3	4	5	6	7	8	9	10	11	12	1
A	■	■						■	■				
B	■	■						■	■				
C	■	■						■	■				
D	■	■						■	■				
E	■	■						■	■				
F													
G													
H													

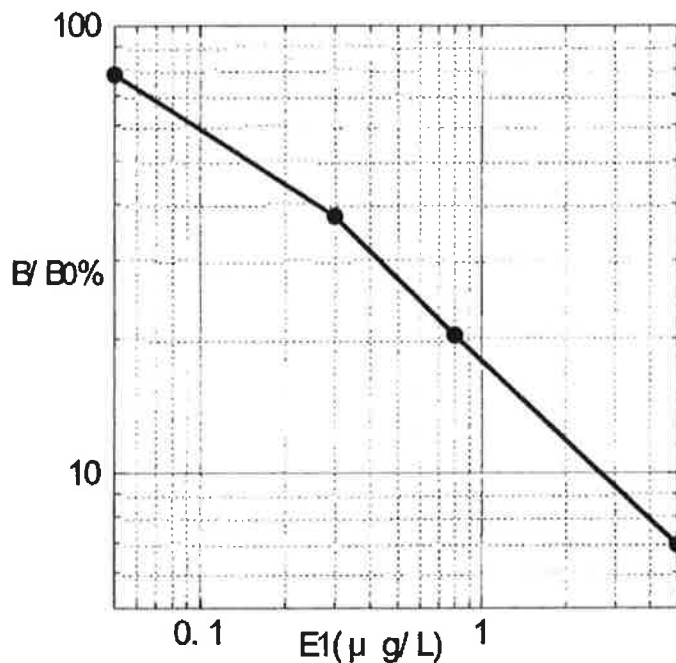
## 2. Chemical Structure of E1 Standard



## 3. Cross-reactivity Pattern

Compound	%reactivity
<b>Estrone (E1)</b>	<b>100</b>
2-methoxy E1	0.2
17 $\beta$ -Estradiol (E2)	0.3
16-keto-E2	0.2
E2-17-glucuronide	<0.1
E2-3-glucuronide	<0.1
E2-3-sulfate-17-glucuronide	<0.1
Estriol (E3)	<0.1
16-epi-E3	<0.1
E3-16-glucuronide	<0.1
Ethynyl E2	<0.1

## 4. E1 Standard Curve



Samples containing E1 within the dynamic range between 0.05 $\mu$ g/ L and 5 $\mu$ /L. can be directly applied to assay after filtration. E1 content below the range must be concentrated with solid phase extraction prior to the ensuing session.

Coefficient of variation (CV) is generally under 10% throughout the dynamic range.

Ver.0405

**India Contact:**

## **Life Technologies (India) Pvt. Ltd.**

306, Aggarwal City Mall, Road No. 44, Pitampura, Delhi – 110034, India

Mobile: +91-98105-21400, Tel: +91-11-42208000, 8111, 8222, Fax: +91-11-42208444

Email: [customerservice@lifetechindia.com](mailto:customerservice@lifetechindia.com), [www.atzlabs.com](http://www.atzlabs.com) ; [www.lifetechindia.com](http://www.lifetechindia.com)