

1. Purpose

To test the bactericidal activity of a UV irradiation device Pure Light

2. Test sample

UV irradiation device Pure Light

3. Test organism

Escherichia coli NBRC 3972

Salmonella enterica IFO 13494 (= NBRC 3133)

Vibrio parahaemolyticus NBRC 12711^T

Pseudomonas aeruginosa IFO 132725 (= NBRC 13275)

Staphylococcus aureus NBRC 12732

Bacillus cereus IFO 13494 (= NBRC 13494)

4. Testing Conditions

- UV intensity: 1.9 mW/cm² (Minolta UM-250, wavelengths 220-300 nm)
- Irradiation time: approximately 20 sec.

5. Method

The test bacteria was incubated at 35 °C for 24 hours in Tryptic Soy Agar (Difco), and then inoculated in Trypticase Soy Broth (BBL) for 24-hour incubation. The test bacterial solution was diluted with sterilized ion-exchanged water to prepare bacterial content of about 10⁵-10⁶ CFU/mL. On the surface of Tryptic Soy Agar was plated 0.1 mL of the bacterial solution.

The device was turned on no less than 15 minutes before irradiation to stabilize the UV lamp. The medium plated the bacterial solution was placed in position with UV intensity of 1.9 mW/cm² and then irradiated with UV radiation for 20 seconds.

The irradiated medium was then incubated at 35 °C for 24 hours. The resultant colonies were then counted.

In the test of *V.parahaemolyticus*, sodium chloride (Wako Pure Chemical) was added to water and the medium by 3%.

6. Results

The result was shown in the following Table.

The bactericidal rate of the Pure Light was no less than 99.99% for *E.coli*, *V.parahaemolyticus*, *S.enterica*, and *S.aureus*, 99.64% for *B. cereus*.

Table. Bactericidal activity of UV irradiation device Pure Light (CFU / plate)

Test organism	Test No.	UV irradiation		Bactericidal rate
		No (A)	20 sec. (B)	
<i>Escherichia coli</i> NBRC 3972	1	88,000	1	/
	2		1	
	3		1	
	4		0	
	5		0	
	Mean	88,000	1	>99.99%
<i>Salmonella enterica</i> IFO 3313 (= NBRC 3313)	1	72,000	0	/
	2		0	
	3		0	
	4		0	
	5		0	
	Mean	72,000	0	>99.99%
<i>Vibrio parahaemolyticus</i> NBRC 12711 ^T	1	130,000	0	/
	2		0	
	3		0	
	4		0	
	5		0	
	Mean	130,000	0	>99.99%
<i>Pseudomonas aeruginosa</i> IFO 13275 (= NBRC 13275)	1	110,000	0	/
	2		0	
	3		0	
	4		0	
	5		0	
	Mean	110,000	0	>99.99%
<i>Staphylococcus aureus</i> NBRC 12732	1	190,000	0	/
	2		0	
	3		0	
	4		0	
	5		0	
	Mean	190,000	0	>99.99%
<i>Bacillus cereus</i> IFO 13494 (=NBRC 13494)	1	36,000	120	/
	2		95	
	3		140	
	4		140	
	5		140	
	Mean	36,000	130	99.64%

Tested organism: *Staphylococcus aureus* NBRC 12732

$$\text{Bactericidal rate(\%)} = [(B) - (A)] / (B) \times 100(\%)$$

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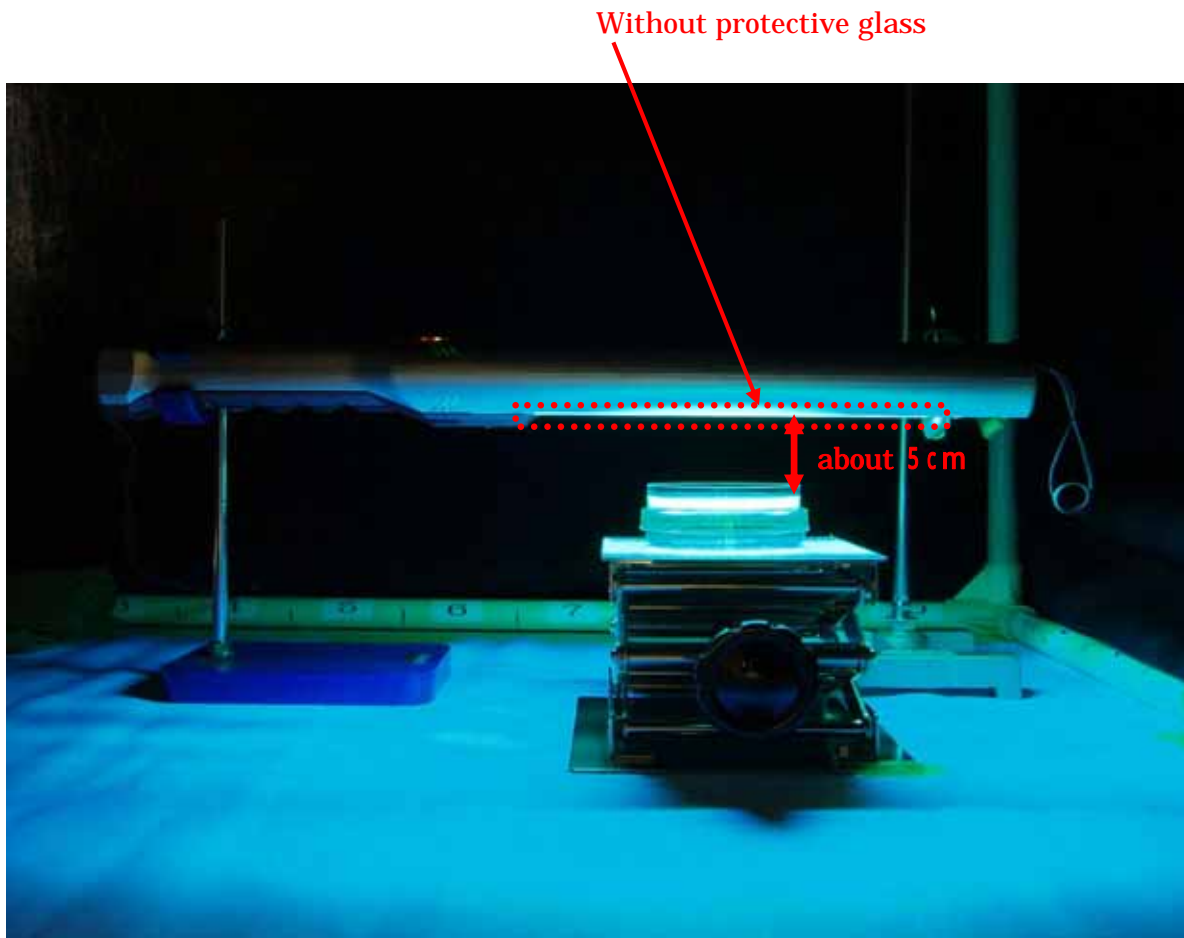
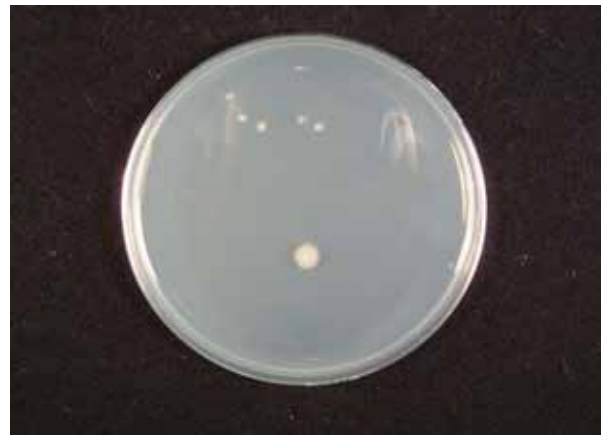


Photo: Actual Testing Setting

The dish was too wide for UV radiation to cover the entire dish when initial irradiation was conducted while maintaining contact between the device and dish. For full coverage, therefore, the device was placed about 5 cm away from the dish. The protective glass was removed so that UV intensity was the same ($1.9 \text{ mW} / \text{cm}^2$) as that under the initial irradiation condition.



E.coli NBRC 3972
Non-irradiated



E.coli NBRC 3972
Irradiated for 20 sec.



S.enterica IFO 3313
Non-irradiated



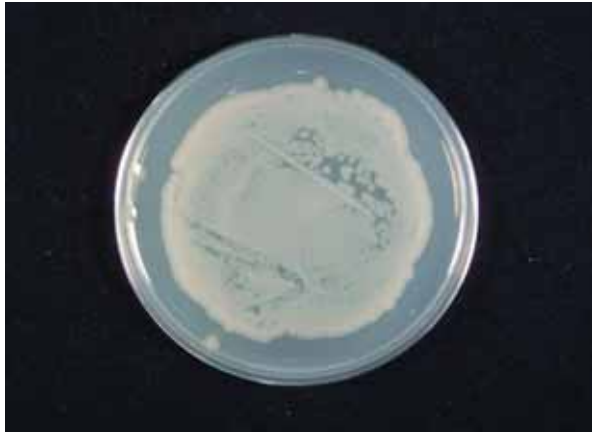
S.enterica IFO 3313
Irradiated for 20 sec.



V.parahaemolyticus NBRC 12711^T
Non-irradiated



V.parahaemolyticus NBRC 12711^T
Irradiated for 20 sec.



P.aeruginosa IFO 13275
Non-irradiated



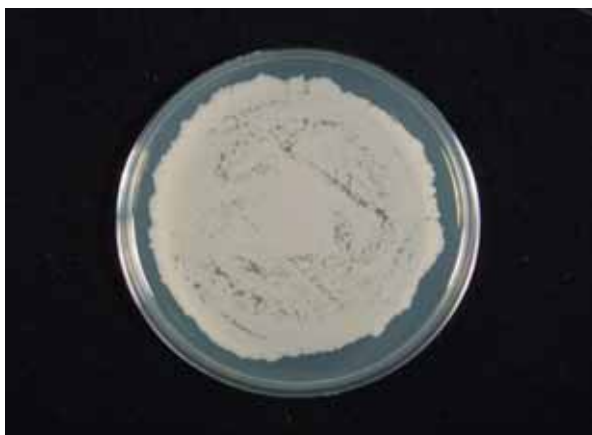
P.aeruginosa IFO 13275
Irradiated for 20 sec.



S.aureus NBRC 12732
Non-irradiated



S.aureus NBRC 12732
Irradiated for 20 sec.



B.cereus IFO 13494
Non-irradiated



B.cereus IFO 13494
Irradiated for 20 sec.