

LumActiv Air Purification Capabilities

The ability of photocatalytic TiO_2 to break down NO_x and SO_x in the atmosphere was tested. A sample with TiO_2 was placed into a sealed 0.25-m³ chamber that was then filled with a known amount of NO_2 . The sample was exposed to UV light and the NO_2 content was measured at various time intervals. The test was then run again replacing the NO_2 with SO_2 . Results of the tests are summarized in the tables below.

Time (Min)	NO_2 Content (ppm)	Percent Removed
0	5.6	0.0%
15	2.8	50.0%
30	2.5	55.4%
45	1.0	82.1%
60	0.8	85.7%

Table 1. Removal of NO_2 by photocatalytic TiO_2

Time (Min)	SO_2 Content (ppm)	Percent Removed
0	5.4	0.0%
15	1.8	66.7%
30	0.6	88.9%
45	0.2	96.3%
60	0.2	96.3%

Table 2. Removal of SO_2 by photocatalytic TiO_2

The data shows that after one hour of exposure to activated TiO_2 in a sealed environment, 85.7% of the NO_2 and 96.3% of the SO_2 were removed .

Testing was done by two additional third party labs to determine the molar amount of NO_x removed from a moving stream. The average test conditions and results are summarized in the table below .

¹ Data obtained from test results from SGS Taiwan LTG. Original report available upon request

² Data obtained from tests performed by Kon Corporation. Original report available upon request

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Coated Sample Size (cm²)	50.0
Temperature (C°)	25.0
% Relative Humidity	50.0
UV Exposure (W/m²)	10.0
No Stream Concentration	1.0
Exposure Time	5.0
Flow Rate (L/min)	3.0
Net No	2.31

Table 3. Test conditions and results for NO_x removal from air stream

From this data, it can be estimated that 1 m² of substrate coated with the photocatalytic TiO₂ can break down ~0.924 mmol of NO₂ per day (assuming 10 hours of sunlight exposure per day). By comparison, one tree is able to break down on average 18.39 mmol per day. This means that roughly 20 m² of TiO₂ coated substrate has the air cleaning power of one tree. Further, this means that application to the outer wall of one 5-story building (~100 m²) is the equivalent of planting 5 trees and application to the outer wall of one 20-story building (~2,000 m²) is the equivalent of planting 100 trees. The air purification power is even greater in urban areas where NO_x concentration is very high and the number of planted trees is low.

³ Estimates assume “one tree” specifies one maidenhair tree of breast height diameter of 15cm. Atmospheric NO₂ level estimated to be 23 ppb.