



Gmicro Testing

REPORT FOR ANALYSIS

Report №.

2025FM15760R01E

Name of Sample

Air purifier

Applicant

KEEPEATFRESH

Test Type

Entrustment Test

GDDCM

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Verification Code: 4J3W8ECT

Name of Sample	Air purifier	Test Type	Entrustment Test
Applicant	KEEPEATFRESH	Address	60 RUE FRANCOIS IER, 75008 PARIS,France
Sample Source	Submitted for Testing by the Applicant	Sample Quantity	One
Spec and Lot № of Sample	Holus	State and Characteristic	Machine
Sample Received Date	2025-08-27	Test Completion Date	2025-10-29
Item Tested	Shelf-life assessment of fresh food products (fruits/vegetables) by use of Holus		
Test Standard and Method	Method provided by sponsor		
Test Conclusion	The test data of the sample(s) is attached to the page(s) of this report. Issue Date: 2025-10-29		
Remarks			

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Approver: *Xie Xiaobao*



REPORT FOR ANALYSIS

Report №.: 2025FM15760R01E

Name of Sample	Air purifier	Sample Received Date	2025-08-27
Test item	Shelf-life assessment of fresh food products (fruits/vegetables) by use of Holus	Test Completion Date	2025-10-27

I. Purpose

The purpose of this test is to evaluate the performance of the air purifier Holus in extending the shelf life of fresh food products stored in a domestic refrigerator. Holus operates through a photocatalytic air purification process designed to remove unpleasant odors and reduce the presence of microorganisms such as mold and bacteria.

To assess its effectiveness under realistic household conditions, two identical refrigerators were used: one equipped with Holus (test group) and one without (control group). Various fresh fruits and vegetables were stored in both units to compare their preservation and degradation over time.

II. Materials

Food products:

Zucchini, strawberry, mushroom, cherry tomato, grape, and apple.

All food products were purchased by the laboratory on behalf of *KEEPEATFRESH* to ensure uniformity of source and quality.

Equipment:

Two identical refrigerators from the same manufacturer were used for the test:

- Test group: Refrigerator equipped with Holus
- Control group: Refrigerator without Holus

Microorganisms:

Paecilomyces variotii (AS 3.4253, generation 3),

Rhizopus oryzae (ATCC 10404, generation 3),

Botrytis cinerea (CGMCC 3.4584, generation 3),

All strains were cultured at 28°C.

These species represent common molds responsible for food spoilage. They are naturally present in the air and proliferate easily on moisture- and carbohydrate-rich foods such as fruits, vegetables, and bread. Introducing these microorganisms into the refrigerators allowed the simulation of a typical airborne microbial environment, closely reflecting actual household storage conditions.

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III. Method:

Both refrigerators were set to +6 °C and sanitized prior to testing to reproduce typical domestic storage conditions.

A fresh fungal suspension (~10⁴ CFU/mL) was prepared by adding 50 mL of PBS. Two cotton pads (8 cm × 8 cm) were immersed in the suspension, then placed in separate petri dishes positioned at identical locations within the two refrigerators.

Fresh food products—zucchini, strawberry, mushroom, cherry tomato, and grape—were purchased by the laboratory from the same market to ensure comparable quality and freshness. On the day of purchase, the food products were divided into equal quantities and placed in both refrigerators under identical conditions.

To promote natural ripening and ethylene exposure, one apple was placed in each refrigerator.

The products were monitored periodically through visual inspection and sensory assessment, supplemented by microbiological and physicochemical observations. The study aimed to compare the rate of deterioration and the overall preservation performance of foods stored with Holus (test group) versus those stored without it (control group), in order to determine the air purifier's effectiveness in extending shelf life.

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ANALYSIS AND TEST RESULT

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IV. Evaluation Criteria

At each scheduled time point, the freshness of the food products was evaluated through visual and tactile sensory assessment. The condition of each product was rated on a 5-point scale, where a score of 5 indicated *Very Fresh* (no visible spoilage) and a score of 1 indicated *Totally Spoiled* (extensive mold and decay). The scoring criteria were based on observable indicators such as the presence of mold, spots, discoloration, texture softening, and liquid exudation, along with the estimated percentage of affected surface area.

Score	Condition	Description
5	Very Fresh	No rot and mildew spots. The food is clean, with a natural color, free of spots or mold.
4	Slightly Deteriorate	Only very minor changes (e.g. slight discoloration or 1-2 small spots, less than 10% of surface area). No mold or liquid exudation.
3	Moderately Corrupt	Obvious spoilage: Presence of mold, several small spots, around 30–40% of surface area. Slightly softened.
2	Seriously Corrupt	Large areas of mold, around 40-70% of surface area. Visible softening or dehydration. Liquid release or slight collapse.
1	Totally Corrupt	A large amount of mold covers more than 70% of the surface. Severely softened, with liquid flowing out, and obvious decay. Not edible.

The efficacy of the Holus in extending freshness was quantified at the 21-day mark. The calculation involves two steps:

First, the difference in sensory scores is calculated: $\Delta S = (\text{Score of Test Group}) - (\text{Score of Control Group})$.

Second, the resulting ΔS value is mapped to a predefined scale to determine the "Effect of Freshness Extending," expressed as a percentage. This percentage represents the relative improvement in freshness preservation attributed to the Holus.

ΔS	the Effect of Freshness Extending
4	110%-120%
3	90%-100%
2	70%-80%
1	50%-60%

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V. Result:

1. Day 0

Refrigerator With Holus



Refrigerator Without Holus



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2. Zucchini

VI.

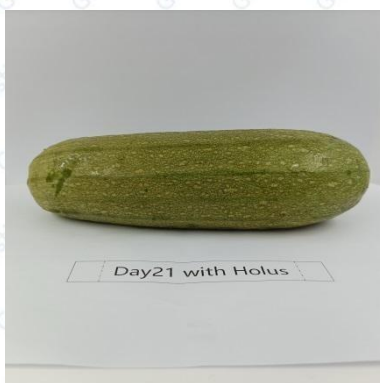
Day 1



Day 12



Day 21



On Day 12, the zucchini in the refrigerator with Holus is clean, intact, with no spots or mold; a small amount of spoilage spots appear on the surface of the zucchini without Holus. Up to day 21, the zucchini in the refrigerator with Holus does not show mold/rot nor stains with abnormal coloration; the zucchini without Holus have a large amount of spoilage patches, severe dehydration and altered shape.

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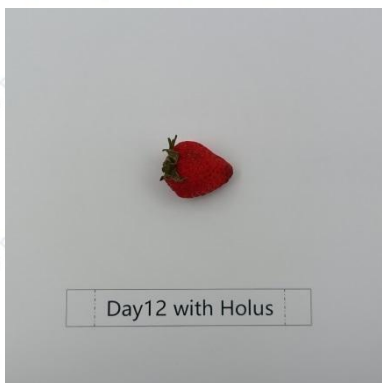
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1. Strawberry

Day 1



Day 12



Day 21



Up to day 12, the strawberries in the refrigerator with Holus only show slight point like blackening, with intact color and shape; the strawberries in the refrigerator without Holus show large areas of black spots, with an area exceeding 40% and a slight collapse in shape. Up to day 21, the strawberries in the refrigerator with Holus have firmer flesh, no rot and mildew spots; strawberries in the refrigerator without Holus have large areas of mold, and with liquid release - stains.

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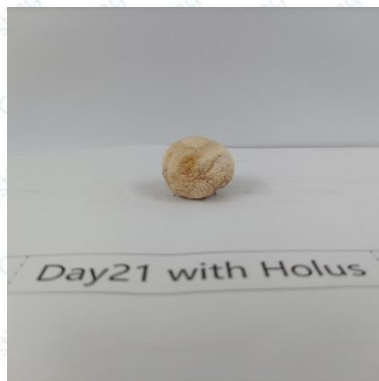
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2. Mushroom

Day 1



Day 21



Up to day 21, the surface of the mushrooms in the refrigerator with Holus show slight shrinkage, and exhibit signs of mild spoilage; the mushrooms in the refrigerator without Holus have significant shrinkage, with over 60% of the surface area exhibiting signs of spoilage, totally inedible.

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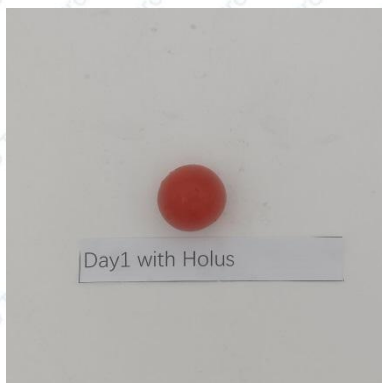
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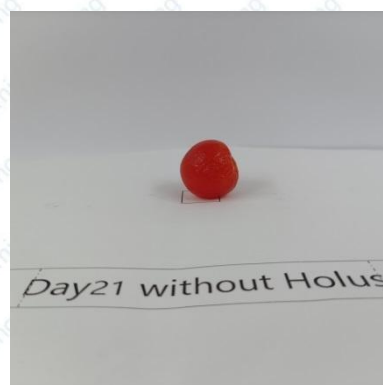
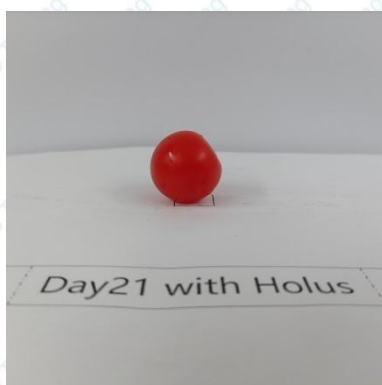
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3. Cherry tomato

Day 1



Day 21



Up to day 21, the cherry tomatoes in the refrigerator with Holus exhibited a clean and intact surface, with natural color and no spots or mold; whereas the cherry tomatoes in the refrigerator without Holus showed a dull color, visible signs of softening and dehydration, and a slightly softened and collapsed morphology.

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4. Grape

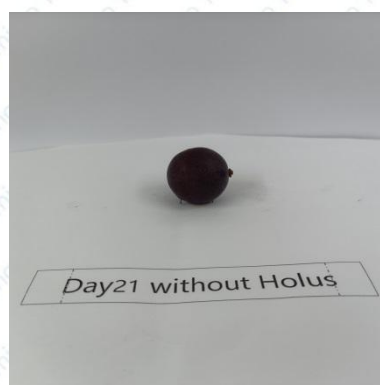
Day 1



Day 9



Day 21



Up to day 9, the grapes in the refrigerator with Holus show slight softening and collapse; the grapes in the refrigerator without Holus have less firm flesh. Up to day 21, the grapes in the refrigerator with Holus have clean and intact surfaces, natural colors, and no spots or mold; the grapes in the refrigerator without Holus have a less firm texture and pulp, show signs of softening and dehydration.

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Table1 the Effect of Freshness Extending

Food Products	Score at the Day 21			
	Test Group (With Holus)	Control Group (Without Holus)	ΔS	the Effect of Freshness Extending
Zucchini	5	1	4	110%-120%
Strawberry	4	1	3	90%-100%
Mushroom	4	1	3	90%-100%
Cherry tomato	5	3	2	70%-80%
Grape	5	4	1	50%-60%

ΔS =Score with Holus - Score without Holus

After 21 days of storage, the Air Purifier (Holus) significantly prolonged the freshness of all tested fruits and vegetables compared with the control refrigerator (without Holus):

Zucchini: Score 5 vs 1 ($\Delta S = 4$) — Zucchini with Holus remained intact and mold-free; those without Holus exhibited severe spoilage and deformation.

Strawberry: Score 4 vs 1 ($\Delta S = 3$) — Strawberries with Holus remained firm, with no rot or mildew, while those without Holus showed large moldy areas and liquid release.

Mushroom: Score 4 vs 1 ($\Delta S = 3$) — Mushrooms with Holus only slightly shrank; those without Holus were over 60% spoiled and inedible.

Cherry Tomato: Score 5 vs 3 ($\Delta S = 2$) — With Holus, tomatoes kept a natural color and intact surface; without Holus, they softened and dehydrated.

Grape: Score 5 vs 4 ($\Delta S = 1$) — Grapes with Holus stayed clean and firm; without Holus, they showed softening and dehydration.

Overall Result: The Holus Air Purifier extended the shelf life of fresh produce by approximately 50% to 120%, effectively reducing mold growth and maintaining the natural appearance and texture of fruits and vegetables during refrigerated storage.

VII. Conclusion:

The test results demonstrate that the Air Purifier Holus significantly extends the shelf life of fruits and vegetables, with efficacy ranging from 50% to 120% across the tested products. This effect is attributed to Holus's advanced photocatalytic technology, which actively eliminates microorganisms in the refrigerator environment, including *Paecilomyces variotii*, *Rhizopus oryzae*, and *Botrytis cinerea*, key contributors to food spoilage.

By inhibiting microbial growth and reducing decay, Holus effectively preserves the freshness, texture, and visual quality of perishable foods under typical domestic refrigeration conditions. The device offers a scientifically validated solution for reducing food waste and maintaining produce quality over extended periods.

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