

October 2, 2018

Japan Tobacco Inc.

Information on Ploom TECH

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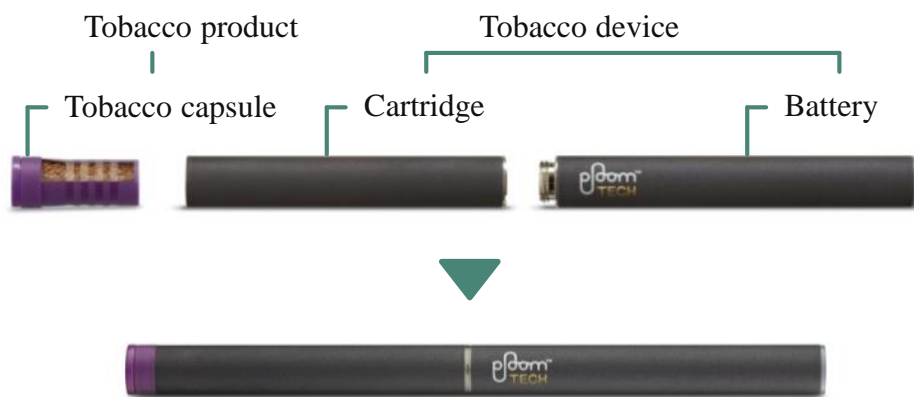
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Ploom TECH – JT's Tobacco-infused Vapor Product

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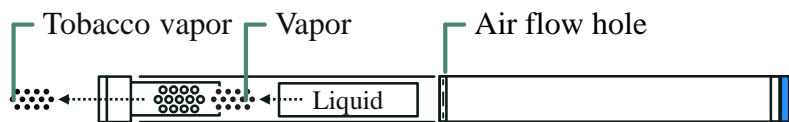
Ploom TECH – JT's Tobacco-infused Vapor Product

Ploom TECH is a Tobacco-Infused Vapor product that generates tobacco vapor by heating the liquid in the cartridge and passing it through a tailor-made tobacco capsule. No smoke is generated as it does not involve combustion of tobacco.



T-vapor is generated by heating the liquid in the cartridge and passing it through a tailor-made tobacco capsule.

There is no direct heating of tobacco leaves. The vapor only causes slight temperature increase inside the tobacco capsule to about 30°C.



The constituents of the liquid in the cartridge are propylene glycol, glycerin, flavoring ingredients and water, which are also additives approved for foods and flavorings.

Tobacco capsule

Deliver constituents from tobacco leaves, including nicotine, and flavorings to vapor

Cartridge

Generate vapor through electrically heating the liquid

Battery

Supply electricity to the cartridge

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Effects on Indoor Air Quality

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Effects on Indoor Air Quality – Our Perspective

- We believe the health risks of passive exposure to the vapor from T-Vapor products should be considered separately to exposure to Environmental Tobacco Smoke (ETS) from combustible cigarettes, as when using T-Vapor products, there is no combustion of tobacco leaves and no generation of ETS.
- No smoke is generated as Ploom TECH does not involve combustion of tobacco. The use of Ploom TECH does not affect indoor air quality, we therefore believe that there is no substantial health risks to bystanders associated with its use*.

* “there is no substantial health risks” is stated based on the concept that it is substantially safe and socially acceptable when the predicted health risks from exposure to substances of health concern are substantially low.

<Environmental standards>

- ✓ The Environmental Standards of the Ministry of the Environment^{*1} states, “it is appropriate to establish a risk level and corresponding environmental target value based on the idea that harmful air pollutants with no threshold amount can be considered substantially safe if the health risks predicted from the exposure level is sufficiently low”^{**2}. Carcinogen, said to have no threshold amount, is considered acceptable as a virtually safe dose if its carcinogenic probability is less than 10^{-5} .
- ✓ Moreover, three constituents of health concern (formaldehyde, acetone, and ammonia) detected in the vapor of Ploom TECH are also generated from the human body and present in the natural world. In addition, the amounts were extremely small and were not detected in the exhaled air and indoor environments or the amount did not differ between before and after the use of Ploom TECH.

^{*1} There are several air quality standards; Air quality standards stipulated by the Ministry of the Environment and the Building Environmental Health Management Standards (commonly known as the Building Management Law). We apply the concept of air quality standards, which require stricter standards.

^{**2} “Proposal for Measures for Hazardous Air Pollutants in the Future (Interim Report)” Central Environment Council of the Environment Agency (January 1996)

Conducted Studies and Researches

As for Ploom TECH, we believe the health risks (presence/absence and level) to bystanders from exposure to environmental vapor should be considered separately to that of combustible cigarettes since there is no tobacco smoke nor sidestream smoke generated by tobacco combustion.

[Studies on the effects on indoor air quality during use of Ploom TECH]

Conducted

Chemical analysis (constituents in tobacco vapor)

Conducted

Chemical analysis (constituents in user's exhaled air)

Conducted

Chemical analysis (constituents in indoor air)

Conducted

Sensory evaluation
(investigation of odor in indoor air)

We have conducted a variety of chemical analyses and surveys to evaluate the effects of the use of Ploom TECH on the indoor air quality.

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Constituents of health concern in Tobacco Vapor

Study conductor	External contract research organization
Test tobacco product	<ul style="list-style-type: none"> ○ Combustible cigarette <ul style="list-style-type: none"> ▸ Standard test cigarette (3R4F) ○ Ploom TECH <ul style="list-style-type: none"> ▸ MEVIUS Regular for Ploom TECH
Methodologies	<p>Chemical analysis of constituents of health concern contained in Tobacco smoke/Tobacco vapor</p> <p>Tobacco smoke/tobacco vapor was generated using a smoking machine with smoking regimen referring to the Canadian Health Department's smoking method¹⁾ (puff volume: 55 mL per puff, puff duration: 2 seconds, puff interval: 28 seconds). The collection and analyses of tobacco smoke/tobacco vapor were in accordance with the Canadian Ministry of Health's methodology¹⁾ established for each constituent.</p>
Constituents measured	<p>The constituents¹⁾ (except for tar) required to be reported to the Canadian Ministry of Health were measured. These constituents are selected not only from the particle phase but also from the gas vapor phase. Nine of these are the constituents which the WHO recommend to reduce as a priority²⁾.</p>

Takahashi et al., 2017. Regul Toxicol Pharmacol. 92, 94-103.

1)Health Canada, 2000. Health Canada - Tobacco Reporting Regulations SOR/2000-273.

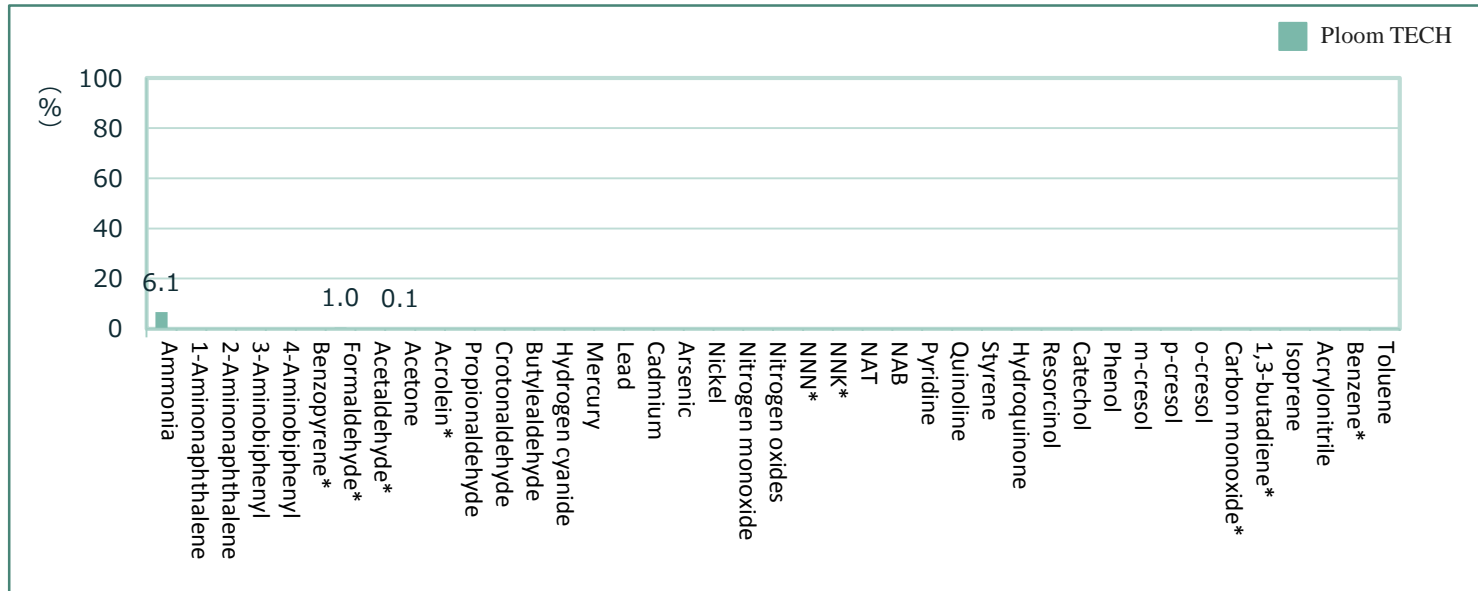
2)World Health Organization, 2008, The scientific basis of tobacco product regulation: second report of a WHO study group, WHO technical report series ; no. 951

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Constituents of health concern in Tobacco Vapor

Constituents raised as concerns by WHO or Canadian Public Health Authorities, were hardly detected in tobacco vapor from Ploom TECH (Average reduction: approximately 99%).

Amount of each constituent (per puff) generated by Ploom TECH compared to combustible cigarettes (standard test cigarettes)



*WHO's prioritized constituents

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Constituents of Health Concern in User’s Exhaled Tobacco Vapor

Study conductor	Japan Tobacco Inc.
Test tobacco product	<ul style="list-style-type: none">○ Ploom TECH<ul style="list-style-type: none">▸ MEVIUS Regular for Ploom TECH
Methodologies	<p>Measurement on constituents in exhaled tobacco vapor</p> <p>The constituents in exhaled tobacco vapor when using Ploom TECH were measured. Tobacco vapors were collected from subjects (23 smokers) who inhaled Ploom TECH’s tobacco vapor and then exhaled (10 puffs in total) into a mouthpiece connected to a glass fiber filter pad and a collection bottle. When measured “Non-use” condition, the subjects abstained from smoking from waking up to the time of the survey.</p>
Constituents measured	Constituents detected in the tobacco vapor (ammonia, formaldehyde, acetone and nicotine) were measured.

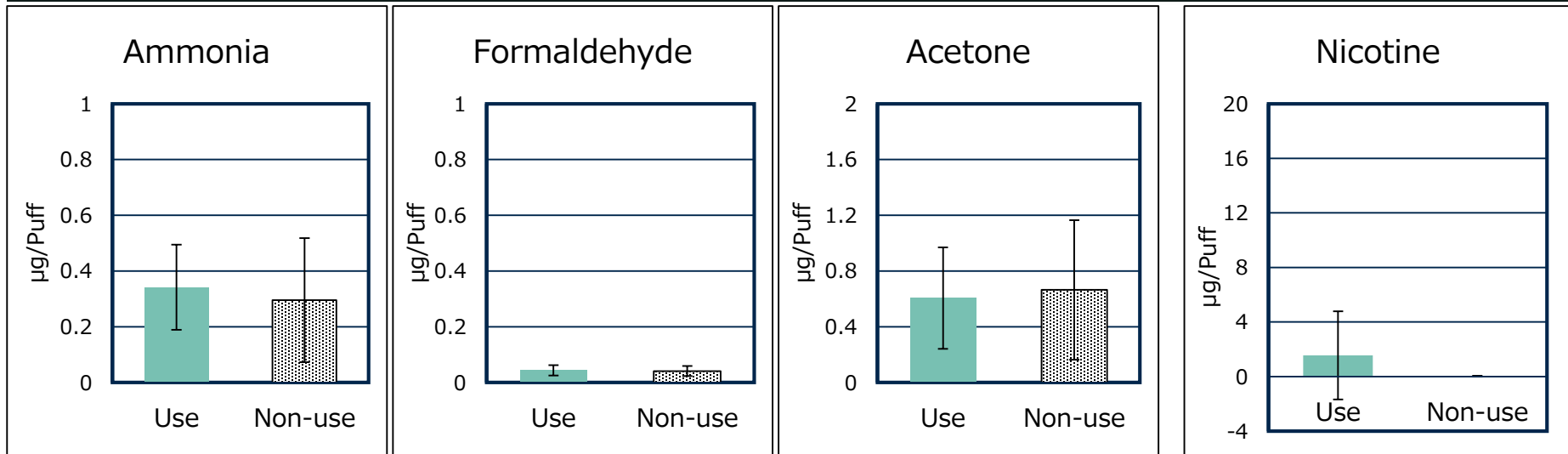
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Chemical Constituents Contained in the Exhaled Tobacco Vapor

The amounts of ammonia, formaldehyde and acetone in tobacco vapor exhaled by Ploom TECH users were not different from those in exhaled breaths without using it.

Amount of each constituent (per puff) contained in the exhaled tobacco vapor when using the Ploom TECH



To evaluate the research results, average values were calculated and tested using values of 1/2LOQ(Limit of quantification) for NQ(Not quantified) and 1/2LOD(Limit of detection) for ND(Not detected).

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(References) Comparison of the amount of Nicotine

	Amount of nicotine (µg/puff)
Ploom TECH Exhaled Tobacco Vapor	1.55
Combustible cigarette environmental tobacco smoke	566.5

- ✓ Ploom TECH exhaled tobacco vapor*: the amount of nicotine in the exhaled tobacco vapor per Puff (Average)
- ✓ Combustible cigarette environmental tobacco smoke*: the amount of nicotine in sidestream smoke of a cigarette of 1mg tar and 0.1 mg nicotine (ISO-condition, 4130 µg) divided by 7.6 (number of puffs per cigarette), and added by nicotine amount (1 puff) of exhaled combustible cigarette (1mg tar and 0.1mg nicotine. ISO-condition) smoke.

* Based on our research results

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Effects on Indoor Air Quality

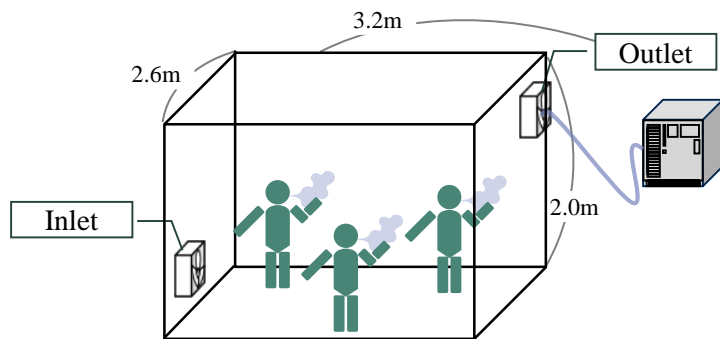
Study conductor	Japan Tobacco Inc.
Test tobacco product	○ Ploom TECH ‣ MEVIUS Regular for Ploom TECH
Study overview	Simulation of restaurants which allow smoking A study was conducted in the laboratory (16.64 m ³) by simulating the air conditioning of restaurants. Constituents in the indoor air were measured when subjects (smokers) used Ploom TECH.
Methodologies	Environment Since smoking conditions (number of smokers and number of cigarettes smoked) are set for each business situations, the study conditions were set in reference to the conditions (dining room2) described in the standards (ASHRAE STANDARD 62-2001) of the American Society of Heating and Air-Conditioning Engineers. Although it is stipulated that the amount of ventilation for smoking should be added when smoking is assumed, in this study, the amount of ventilation for smoking was not added (more severe than smoking stipulation) on the assumption that only Ploom TECH is allowed to be used.
	Measured Constituents The constituents (suspended particulate matters, carbon monoxide, carbon dioxide, and formaldehyde) stipulated in the Japan act on Maintenance of Sanitation in Bldgs (commonly known as the Building Management Law) were measured. The constituents (nicotine, ammonia, and acetone) found in tobacco vapor during the use of Ploom TECH were also measured in the study.

Ichitsubo et al., 2018. Regul. Toxicol. Pharmacol. 92, 278-294.

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Effects on Indoor Air Quality

[Measurement of Constituents in indoor air while Using Ploom TECH]



Measurement item	Measurement method
Suspended particulate matters	Piezobalanced dust meter
Carbon monoxide	CO/CO ₂ meter (constant potential electrolysis method)
Carbon dioxide	CO/CO ₂ meter (non-dispersive infrared absorption method)
Formaldehyde	Adsorbent Collection-Extraction-LC Analytical Method (in accordance with ISO16000-3)
Nicotine	Adsorbent Collection-Extraction-GC/NPD Analytical Method (in accordance with ISO18145)
Ammonia	Water Collection-IC Analytical Method (in accordance with JACA No. 35A-2003)
Acetone	Adsorbent Collection-ATD-GC Analytical Method (in accordance with ISO16000-6)

[Conditions]

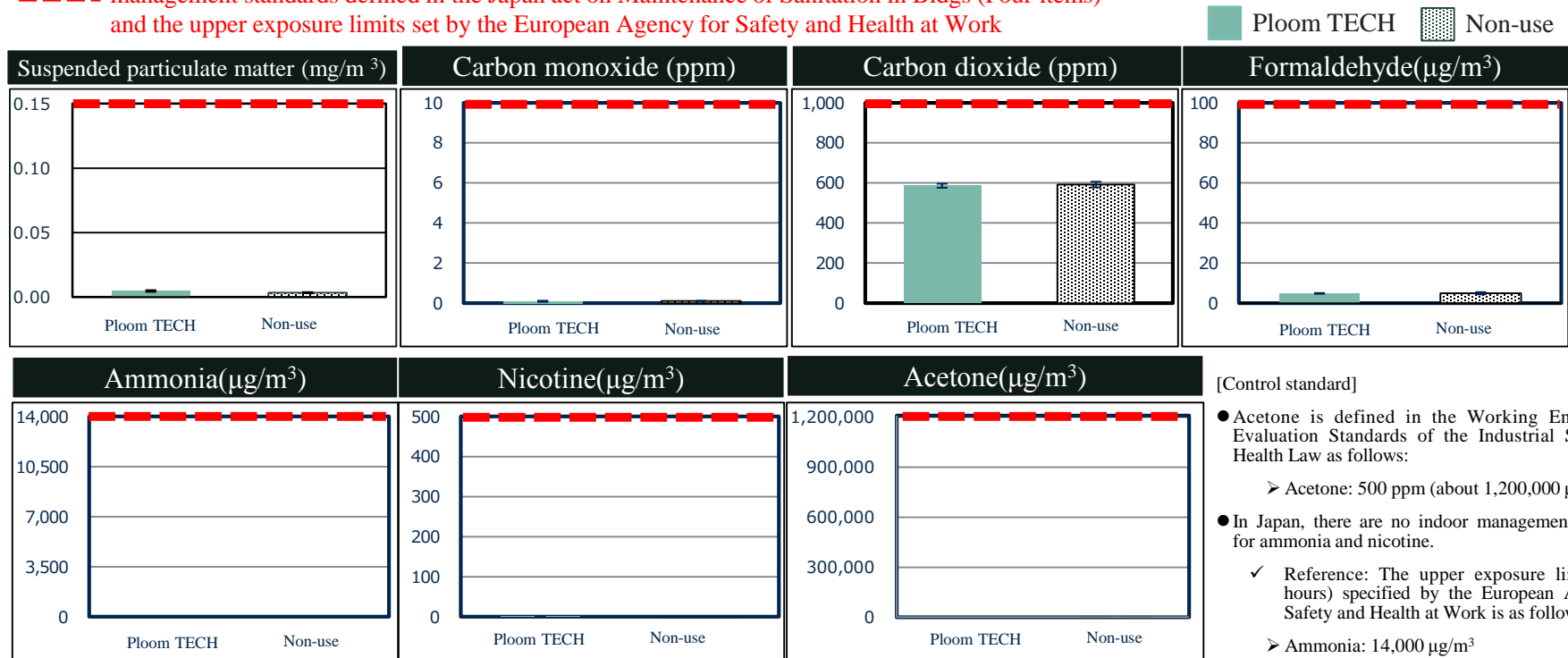
	Restaurant		Notes
	Reference	Measurement	
Area [m ²]	100	8	Round off 8.32 m ² (actual area) to set the condition.
Assumed number of people staying [people]	70	5.6	Only users stay in the laboratory because the air environment is determined by the generated amounts of constituents and ventilation. Round up the number to set the conditions.
Number of users [people]	35	3	
Number of cigarettes used [units/h · person]	0.6	1	The number of cigarettes used was set by rounding up the number. The way of using cigarettes (e.g. puff number) is not determined.
Total number of cigarettes used [units/h]	21	3	
Puff number [puffs/h · person]	4.8	16	The puff number for Ploom TECH is set based on the assumption that a cigarette requires eight puffs. The number is doubled for Ploom TECH as it only generates small amount of constituents.
Total puff number [puffs/h]	168	48	
Ventilatory volume [m ³ /h]	2520	202	The ventilation rate is set based on the expected number of people staying.

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Effects on Indoor Air Quality

As Ploom TECH does not produce tobacco smoke or sidestream smoke from combustion, there was no tobacco smoke smell and no significant difference in the indoor air quality whether it's used or not.

--- management standards defined in the Japan act on Maintenance of Sanitation in Bldgs (Four items) and the upper exposure limits set by the European Agency for Safety and Health at Work



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Smell in Indoor Air Environment

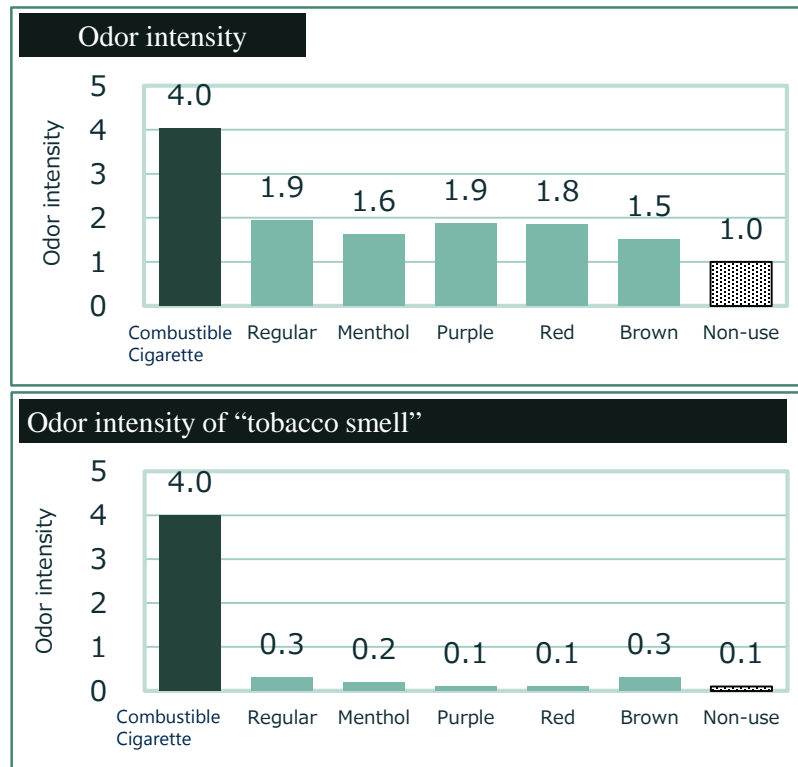
Study conductor	Environmental Control Center Co., Ltd.
Test tobacco product	<ul style="list-style-type: none"> ○ Combustible cigarette <ul style="list-style-type: none"> ▸ JT's leading brand (tar 6 mg) ○ Ploom TECH & Tobacco Capsules <ul style="list-style-type: none"> ▸ MEVIUS Regular for Ploom TECH ▸ MEVIUS Menthol for Ploom TECH ▸ MEVIUS Purple Cooler for Ploom TECH ▸ MEVIUS Red Cooler for Ploom TECH ▸ MEVIUS Brown Aroma for Ploom TECH
Methodologies	<p>We conducted the study under the supervision of a licensed smell examiner, using subjects who passed an olfactometry, according to Environmental Agency Notification No. 63 of 1995, Calculation Method for Odor Index and Odor Emission Intensity, and were found to have a generally good sense of smell.</p> <p>In the experimental chamber, mainstream and sidestream smoke were generated and collected. Since no sidestream smoke is generated from Ploom TECH, it only generates tobacco vapor, which is equivalent to mainstream smoke. Tobacco vapor was then collected and evaluated.</p> <p>Odor intensity Odor intensity (smell intensity) is one of the measurements in quantifying odor. In Japan, the "Six-grade Odor Strength Indication Method" is widely used.</p>

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Smell in Indoor Air Environment

Ploom TECH does not produce tobacco smoke or sidestream smoke since it does not involve combustion of tobacco. Hence, there is no tobacco smoke smell caused by Ploom TECH.



[Six-grade Odor Intensity Indication Method]

- Odor intensity (smell intensity) is a measure of odor that is expressed in steps.
- The Six-grade Odor Intensity Indication Method is a numerical representation of the intensity of odor divided into six grades from 0 to 5.
- Odor intensity was calculated by referring to the results of 18 subjects' evaluations in accordance with the Manual for Olfactory Measurement, edited by the Air Lifestyle and Environment Office of the Ministry of the Environment.

Odor intensity	Interpretation
5	Intense odor
4	Strong odor
3	Significant odor
2	Weak odor
1	Barely sensible odor
0	No smell

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Toward Future action: Impact on Indoor Air Quality

- We have accumulated ample knowledge through technological development related to “Bun-en”, separation of smoking, and research and development related to the evaluation of our indoor air quality. We will actively contribute in various public studies.