Indoor Air Quality Assurance for Trains

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www.somamedical.net

Swine Flu (H1N1) & SARS (H5N1) Prevention Solution

What is our solution

SM Nano TIO2 Titanium dioxide is an anti-microbial metal created by a process which crystallizes titanic iron ore into a nano liquid form. When exposed to UV light in the sub 400 range, TiO_2 becomes a photo catalyst oxidizer (PCO) as well thus creating hydroxyl radicals and superoxide ions which are two times stronger disinfectants than chlorine and 1.5 times stronger a disinfectant than ozone.

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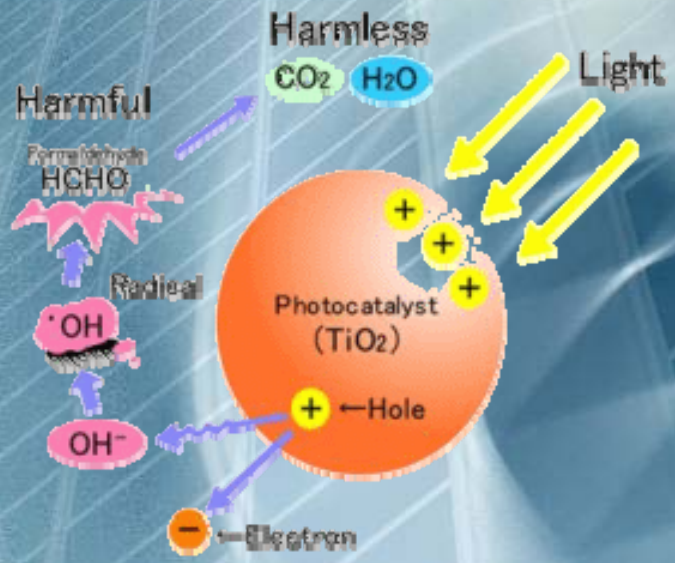
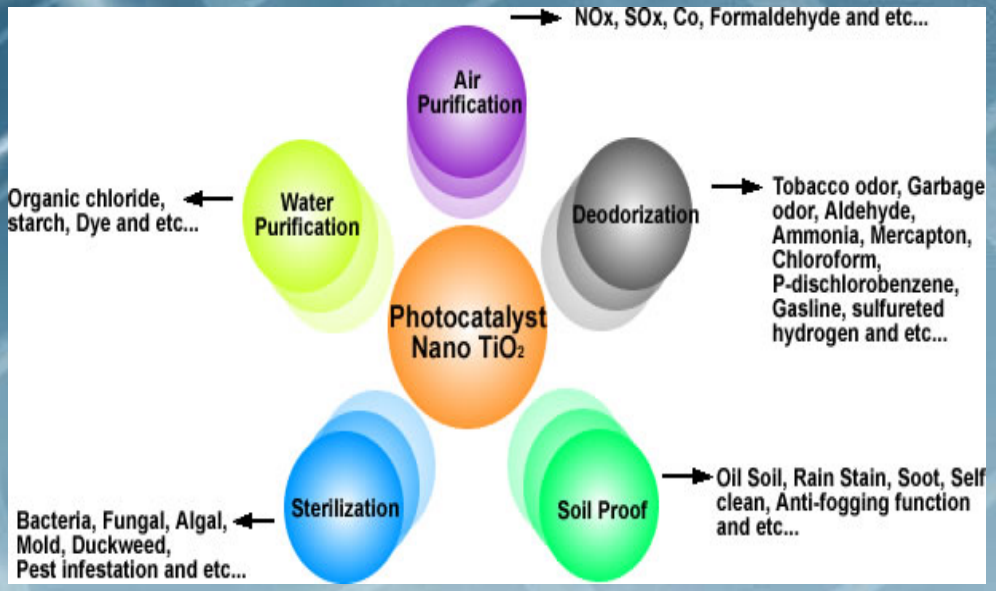
TiO_2 Catalytic Properties





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TiO_2 Nano Coat Photocatalyst

- Air Purification
- Anti-bacterial, antiviral and antifungal
- Anti-mold
- Gas decomposition
- Decomposition of organic compound
- Deodorizing

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Specifications of SM Nano TIO2

Product Series	Nano TiO_2 Sol Coating Agent
Main Compositions	Nano Titanium Dioxide
Crystallite Structure	Anatase
Average Primary Particle Size	<8nm
Coagulation Index	2-4
Executing Criterion	Q /TDIT-01-2004 GB/T 19591-2004 GB/T 19619-2004
Appearance	Bluish white / yellowish transparent liquid
Smell	Odorless
Skin Touch	Harmless
Dispersant	Water-based
Origin	Malaysia
Storage Condition	Sealed/Avoid light/Room temperature
Packaging	Plastic / Metal Barrel 10L, 25L, 30L, 200L

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Material Safety Data Sheet

Registration	CAS No.	EINECS	TSCA (USA) AICS (AUS) CEPA (CAN)	MITI (JAP)	ECL (KOR)	Content (PPM)
Titanium Dioxide	13463-67-7	236-375-5	Registered	1-558	Registered	23000-25000

Hazardous or Poisonous nature

Classification:	Non Hazardous
Hazardousness:	None
Poisonous contents:	None
Environmental effect:	None

Hazardous information

Combustibility:	Incombustible
Flammability:	None
Explosive:	None
Stability:	Stable
Skin corrosiveness:	None
Irritability:	None
Acute toxicity:	None
Cancer causing:	Non carcinogenic

Environmental influence

Degradability:	None
Accumulative:	None
Fish-toxicity:	None

Transport Handling

Leakage of liquid from container may happen.
If leakage happens please refer to 'In case of leaking'.

First-aid Measure

Contact with eyes:	Rinse with plenty of water
Contact with skin:	Rinse affected area with water
Inhaling:	Clean nose with water and gargle
Ingestion:	Gargle with water and drink a lot of water

In case of fire

Fire extinguisher procedure
None (Non-flammable)
Fire extinguisher material
None needed

In case of leaking

Wipe and wash affected area with water

Chemical disposal

Drain into sewage disposal treatment tank or use regular water sewage system

Storage

The product should be stored in a cool and dark place.
The product can not be refrigerated

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Physicochemical Data

Properties	Unit	Typical value
Appearance	-	Yellowish transparent liquid
Odor	-	None
True specific gravity	-	1023-1025
Boiling point	^{o}C	100
Volatility	-	None
Solubility	-	Dissolve in water, miscible in oil
Average primary particle size Acc: To GB/T 19591-2004	Nm	< 6 nm
Specific surface area Acc: To ISO 9277:1995	m^2/g	160 ±30
pH	-	6.5-8.5
Pb-content	mg/L	< 0.1
As-content	mg/L	< 0.5
Hg-content	mg/L	< 0.005

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Frequently asked questions

1. Is TiO_2 coating harmless to humans? Is it harmless to pets?

   Nano TiO_2 liquid is completely harmless to human bodies and is actually used widely as a food additive.

2. After application, does it produce any odor?

   No, it does not have any odor.

3. Does this Nano TiO_2 liquid have a shelf life?

   There is no shelf life. This solution should be stored in a dark, cool environment.

4. How is this Nano TiO_2 liquid applied?

   It can be brushed or sprayed onto surfaces. When applied to fabrics via spray, a brush should be used to work the solution into the fabric.

5. After it is applied, how long does it last?

   TiO_2 PCO Solution has a service life of 5-10 years or even longer on some surfaces that do not have a lot of contact.

6. Does Nano TiO_2 liquid remove odors from the air? How about from fabrics?

   When exposed to light, Nano TiO_2 liquid will create -OH (hydroxyl radical) and O- (super oxide ions) which will decompose the substances that creates the odor.

7. How does Nano TiO_2 liquid prevent and remove contamination from surfaces?

   They become oxidized by the photo-catalytic oxidation and float away as harmless substances.

8. Why does Nano TiO_2 liquid have a sterilizing and anti-microbial effect?

   Most microbes die quickly when any part of them comes in contact with a coated surface. In addition, Nano TiO_2 liquid decomposes toxins that are discharged when microbes die (Verotoxins, Enterotoxins), rendering them into harmless vapors.

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FAQ - *cont'd*

9. Exactly what type of odors will Nano TiO2 liquid eliminate?
   It will remove virtually all and any type of odor from surfaces as treated surfaces become resistant to microorganisms, mold, bacteria, viruses, smoke, odors, etc.
10. Does it work in cold environments such as freezers?

    Yes. Microbes that come in contact with a treated surface will cease to exist.
11. Does Nano TiO_2 liquid get rid of cigarette odors from tar and nicotine that have penetrated surfaces?

    Yes. If a second hand smoke contaminated surface (second hand smoke is known to have over 400 known cancer causing chemicals) is treated with TiO_2 solution, the odor will soon disappear.
12. How does the intensity of light affect the ability of this Nano TiO_2 liquid to create friendly oxidizers which purify the air?

    As a characteristic of titanium dioxide, it starts to produce friendly oxidizer en mass when exposed to ultraviolet rays of 400nm range or lower. It is more affected by the intensity of the ultraviolet rays rather than the intensity of light itself per se. However, any air pollution, VOC, or odor that comes in contact with a surface treated with Nano TiO_2 liquid will become oxidized.
13. What are some of the more popular applications for Nano TiO_2 liquid?

    Bathrooms, floor tiles, sinks, showers, car interiors, to remove and prevent tobacco odors, kitchen counters, furniture and carpets (especially if you have pets), curtains, mini-blinds, windows exposed to light, ceiling fans, car rims, white outdoor furniture, house gutters (keep them mold free), concrete or brick that you want to keep mold free, the list goes on and on.
14. Can Nano TiO_2 be applied to carpets?

    Yes, and with great results! Carpets treated with Nano TiO_2 will resist not only odors and grime but also pests such as fleas. Carpets will last much longer as well.

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Test Reports
(IMR & ALS Technichem)

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Infectious Diseases Research Centre
Institute for Medical Research
Jalan Pahang
50588 Kuala Lumpur
Malaysia
Tel. 603-26935926
Fax. 603-26935928

Form APE-I

Our Reference: IMR/IDRC/ACARO/23/2307 (5)

PRODUCT EVALUATION REPORT

Name of Client:	Soma Medical Sdn Bhd
Name of Product:	SM Anion / Nano TiO2 Air Purifier Lamp
Description / Specification of Product:	Air purifier lamp based on advanced nano-hydrosynthetic technology used for indoor air pollutant control, mold prevention and is anti-bacteria. Lamp discharges >800,000 negative ions/cm^3.
Date Product Received:	9 April 2008
Date Product Evaluated:	4 July 2008
Reference Number of Sample of Product for Evaluation:	SM 1152
Type of Evaluation Conducted:	Direct exposure of mites in closed chamber. • House dust mites: 270 adult male and female *Dermatophagoides pteronyssinus* and *Dermatophagoides farinae* per exposure period. • Test Chamber: A closed laminar flow cabinet. • Lamps: 4 lamps operated at 220-240V. • Exposure periods: 15 min, 30 min, 60 min, 8 hours, and 24 hours. • Bioassay procedure: Mites are confined on Whatman no. 1 filter papers that are attached to plastic Petri dishes. Dishes with mites are then placed inside the laminar flow chamber fixed with 4 test lamps and exposed for various periods. Mortality of mites are recorded after the exposure period.
Results of Evaluation:	• The lethal time to kill 50% (LT_{50}) and 90% (LT_{90}) of *D. pteronyssinus* is 17.4 and 1733.0 hours respectively with regression line Y=0.64X – 1.93 (where Y=mortality, X=time). • The lethal time to kill 50% (LT_{50}) and 90% (LT_{90}) of *D. farinae* is 6.6 and 369.0 hours respectively with regression line Y=0.73X – 1.90 (where Y=mortality, X=time).
Recommendations:	None

Page 1 of 2

Report Prepared By:
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Penyelidik
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Institut Penyelidikan Perubatan
50588 Kuala Lumpur.

Report Verified By:
DR. HO TZE MING
Pegawai Penyelidik Kanan
Pusat Penyelidikan Penyakit Berjangkit (Akarologi)
Institut Penyelidikan Perubatan

Report Authorized By:
Dr. Shahnaz Murad
Pengarah
Institut Penyelidikan Perubatan
Kuala Lumpur

Date of Report: 8 July 2008

Note 1: This report is only valid for the sample of product submitted for evaluation.
Note 2: This report and its contents shall not be reproduced without the approval of the Head of the Acarology Unit, Institute for Medical Research.
Note 3: The evaluation of the product is not an endorsement of the product by the Institute for Medical Research.

- END OF REPORT -

Page 2 of 2

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ALS Technichem

Page 1 of 1

CERTIFICATE OF ANALYSIS

DATE : 14 July 2008

OUR REF. : ATHQ/35010MB/2008

COMPANY : SOMA MEDICAL SDN BHD
No. 2-4-2, 4th Floor,
Menara KLH Business Centre,
2nd Mile Off Jalan Ipoh,
51200 Kuala Lumpur.
Tel: 03-2381 0553/0581 Fax: 03-2381 0351
(Attn.: Mr. Leonard)

DATE SAMPLE RECEIVED : 4 July 2008

SAMPLE DESCRIPTION : One sample

PRODUCT NAME : **TIO2**

MICROBIAL CHALLENGE TEST

Day Organism	Inoculum Count (cfu/ml)	Count Recovered (cfu/ml)	% Reduction
Staphylococcus aureus ATCC 6583	4.5×10^6	2.0×10^4	99.56
Pseudomonas aeruginosa ATCC 9027	6.2×10^6	3.0×10^4	99.52
Escherichia coli ATCC 8739	7.3×10^6	3.7×10^4	99.49
Candida albicans ATCC 10231	4.5×10^5	3.9×10^3	99.13
Aspergillus niger ATTC 16404	3.7×10^5	3.3×10^3	99.11
Method References	**USP <51>**		

Remark: 1.0 ml inoculum from 10^6 was injected in 100ml sample
Contact time: 1 Hour
Calculation for % reduction: $\frac{\text{Inoculum Count} - \text{Count Recovered}}{\text{Inoculum Count}} \times 100$
USP: United State Pharmacopoeia

Azlina Basir
B.Tech (Hons), Food Technology
Senior Microbiologist

BRANCH & COLLECTION CENTRE:
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(SWK): No.6, Jalan Setia Jaya, Stutong Indah Business Avenue, Lot 10506, 93350 Kuching, Sarawak. Tel: (6082) – 366 030 Fax: (6082) – 366 025

Laboratory Testing & Industrial Consultancy

409670

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Our sterilization protocol for commuter trains

1. Medical Germicidal UVC Sterilization lights- UV Max SM14 to be installed in all existing air-conditioning ducting. Which is activated continuously when trains are in operation.

2. Internal section of commuter train to be completely sprayed/ fogged with SM Nano 1152 TIO2 solution. Which will provide a 24/7 sterilization effect.

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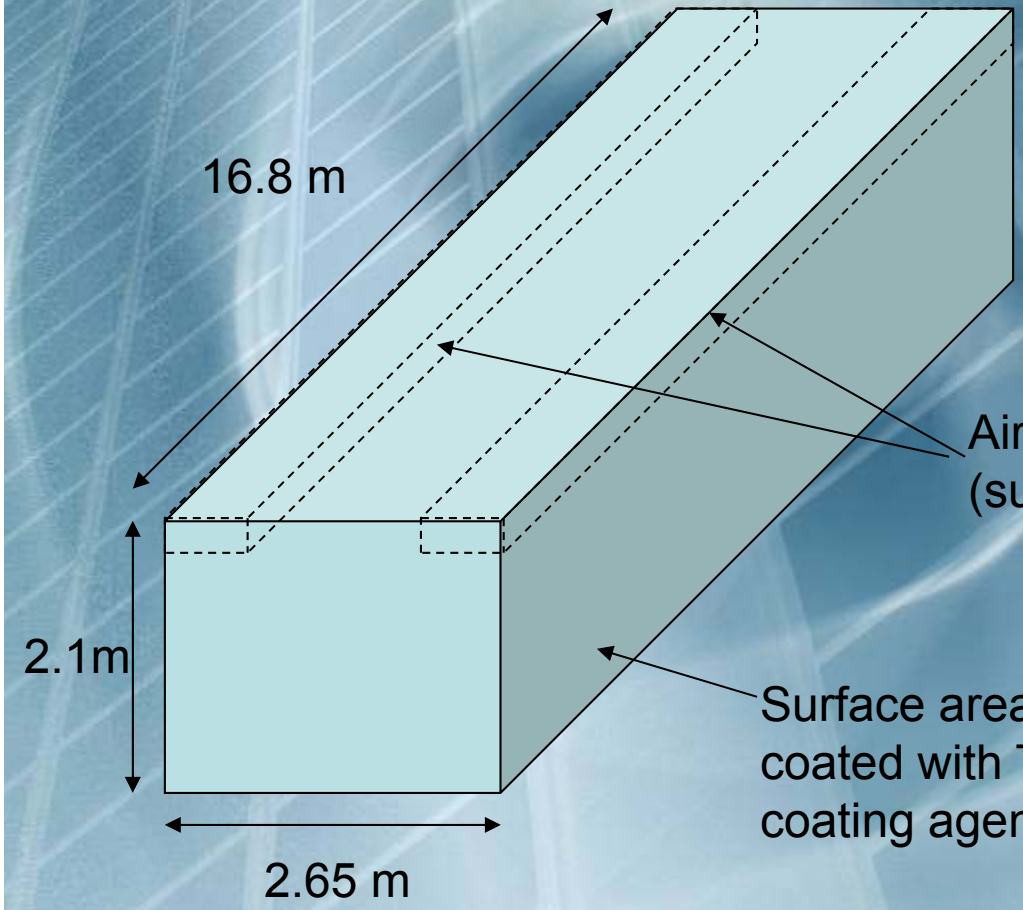
Installation Layout (train)



Air cond ducting – UVC installation
(subjected to final evaluation on site)

Surface area
coated with TiO_2
coating agent

Total surface area = 170.74 m^2 per train

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Products – UVC's

UVMax™ SM14 suspended mounted

Coverage area:
25 sq ft

Specifications	
Model	SM14 suspended/wall mounted
Ultraviolet light	Yes : Intensity 24,000 µW/cm^2 Wavelength: 235.7nm
Bulb lifespan	9,000 hours operational
Energy used	≥ 90%
Power supply	240 V 50 Hz (12 W)
Product dimension	437 mm

Products – TiO_2 Coat

SM 1152 Nano TiO_2 coating agent

Specifications	
Product Series	SM1152 Sol Coating Agent
Main Compositions	Nano Titanium Dioxide
Crystallite Structure	Anatase
Average Primary Particle Size	<4nm
Coagulation Index	2-4
Executing Criterion	Q /TDIT-01-2004 GB/T 19591-2004 GB/T 19619-2004
Appearance	Transparent liquid
Smell	Odorless
Skin Touch	Harmless
Dispersant	Water-based
Origin	Malaysia
Storage Condition	Sealed/Avoid light/Room temperature
Packaging	Plastic / Metal Barrel 10L, 25L, 30L, 200L

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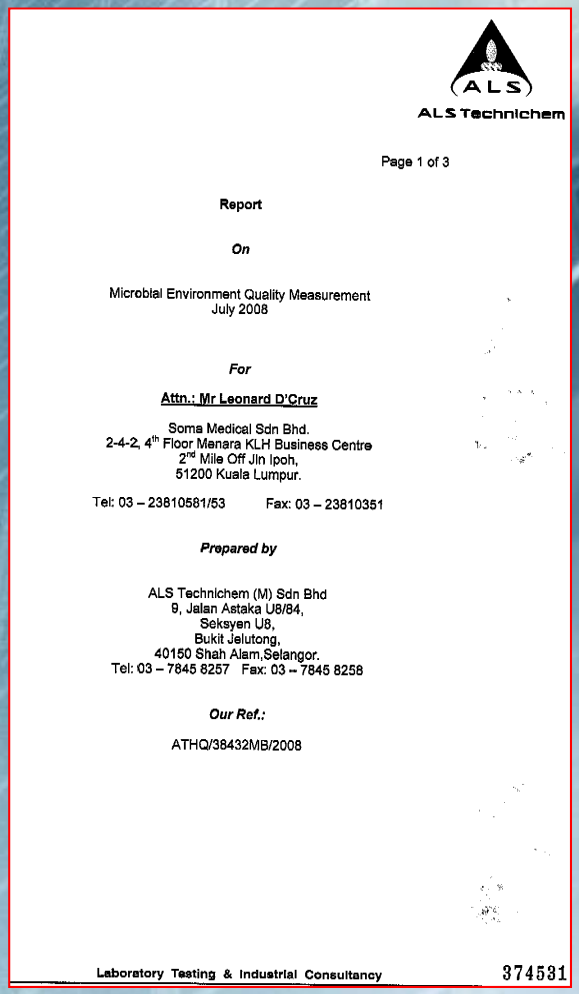
Independent Test Report By ALS Technichem on completion of project



ALS Technichem

Report

On

Microbial Environment Quality Measurement
July 2008

For

Attn.: Mr Leonard D'Cruz

Soma Medical Sdn Bhd.
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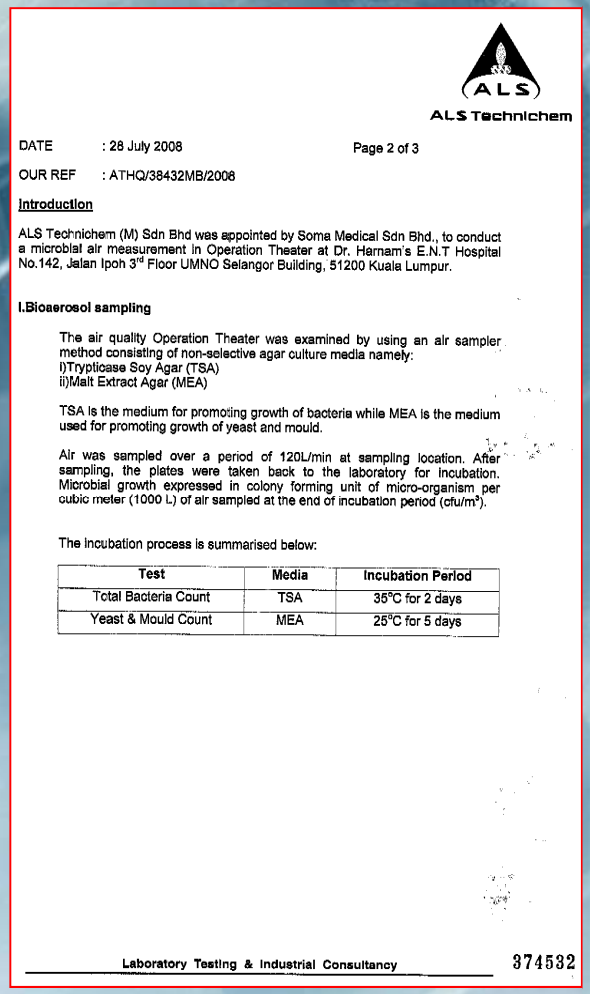
Our Ref.:

ATHQ/38432MB/2008



ALS Technichem

Introduction

ALS Technichem (M) Sdn Bhd was appointed by Soma Medical Sdn Bhd., to conduct a microbial air measurement in Operation Theater at Dr. Harnam's E.N.T Hospital No.142, Jalan Ipoh 3rd Floor UMNO Selangor Building, 51200 Kuala Lumpur.

I.Bioaerosol sampling

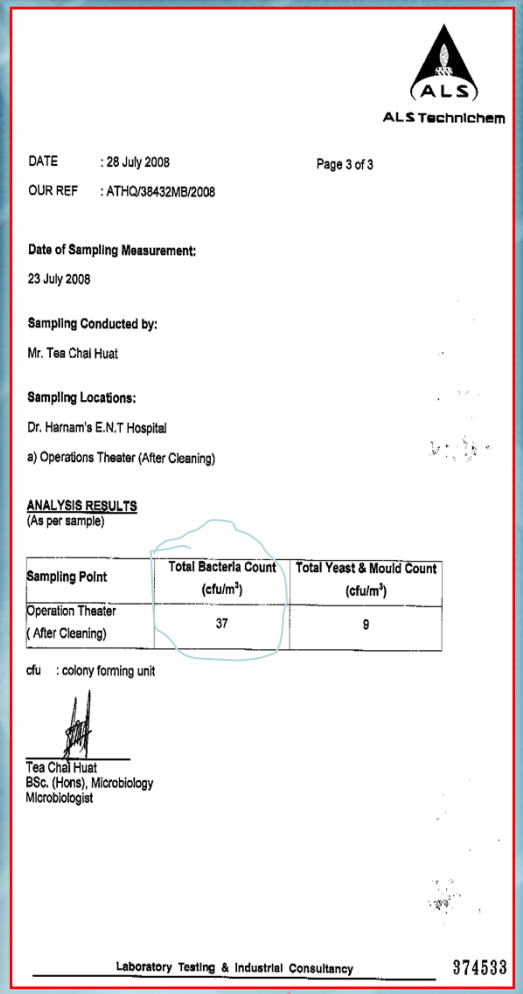
The air quality Operation Theater was examined by using an air sampler method consisting of non-selective agar culture media namely:
i)Trypticase Soy Agar (TSA)
ii)Malt Extract Agar (MEA)

TSA is the medium for promoting growth of bacteria while MEA is the medium used for promoting growth of yeast and mould.

Air was sampled over a period of 120L/min at sampling location. After sampling, the plates were taken back to the laboratory for incubation. Microbial growth expressed in colony forming unit of micro-organism per cubic meter (1000 L) of air sampled at the end of incubation period (cfu/m^3).

The incubation process is summarised below:

Test	Media	Incubation Period
Total Bacteria Count	TSA	35°C for 2 days
Yeast & Mould Count	MEA	25°C for 5 days



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Date of Sampling Measurement:

23 July 2008

Sampling Conducted by:

Mr. Tea Chai Huat

Sampling Locations:

Dr. Harnam's E.N.T Hospital

a) Operations Theater (After Cleaning)

ANALYSIS RESULTS
(As per sample)

Sampling Point	Total Bacteria Count (cfu/m^3)	Total Yeast & Mould Count (cfu/m^3)
Operation Theater (After Cleaning)	37	9

cfu : colony forming unit

Tea Chai Huat
BSc. (Hons), Microbiology
Microbiologist

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THANK YOU

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