An introduction to Occupational Hygiene

What is an Occupational Hygienist, and what do we do?

To illustrate the point of how a hygienist works, I will take you for a brief walk through two Laboratories where you get to be the hygienists and answer the questions.
Formaldehyde
CAS number: 50-00-0
Chemical formula: H2CO
TWA: 0.1 ppm (0.12 mg/m3)
STEL: 0.3 ppm (0.37 mg/m3)

Biological issues
- Anthrax
- Avian influenza
- Brucellosis
- Hantavirus
- Hendra virus
- Leptospirosis
- Bat Lyssavirus
- Q-fever
An idea would be to measure the extraction unit to see if it’s working to an appropriate level?

Is this extraction hood working for the student or against them?

Do you think a transparent hood would be a better option?

You have 4 hours to examine the laboratory and make recommendations
(Time is money and the client is not made of gold)
Nederman states:
Particular attention needs to be paid to the exhaust fans selection when other ancillary equipment is on a common exhaust system.

Air extraction was ~ 50% of what is needed.

The client said they engaged design architects to put the system together.

My thoughts on the matter, architects normally deal with qualitative aspects of the design, eg, how does the finished aspect look. If they are dealing will the system of work; maybe, they should have engaged a hygienist.
The second laboratory has an interesting issue:
RED LEAD
Lead(II,IV) oxide – \( \text{Pb}_2 \text{O}_4 \)

Workplace exposure standard (TWA) = \( 0.05 \text{ mg/m}^3 \)

Remembering Formaldehyde (TWA) = \( 0.1 \text{ mg/m}^3 \)

Requires a registered medical practitioner supervising the health monitoring program.
Ventilation

• We have recently had a spate of COVID infections in our office. We would like to confirm whether our ventilation is adequate for the current pandemic. Is our ventilation system adequate?
Our Approach

Discuss requirements with key stakeholders
Inspect office area
Review mechanical ventilation system
Assess air handing units (AHU)
Undertake air flow / ventilation assessment
Review against current standards and guidelines
What We Know

- Multi storey commercial building
- Approximately 30 to 50 persons occupying floor space
- A number of staff have been infected with COVID-19
- There is a fulltime facility manager maintaining the building
- The air handling units are used across tenancies
- AS1668.2 2012 – requirements
- National Construction Code (NCC) Handbook requirements 2021 – Indoor air quality
- ASHRAE 62.1 Ventilation for acceptable air quality 2021

### AS 1668.2 - 2012 Appendix A

<table>
<thead>
<tr>
<th>Area</th>
<th>m²</th>
<th>per person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offices</td>
<td>5</td>
<td>10 L/s.</td>
</tr>
<tr>
<td>Art rooms</td>
<td>1</td>
<td>10 L/s.</td>
</tr>
<tr>
<td>Board rooms</td>
<td>25</td>
<td>10 L/s.</td>
</tr>
<tr>
<td>Committee rooms</td>
<td>5</td>
<td>10 L/s.</td>
</tr>
<tr>
<td>Computer rooms</td>
<td>25</td>
<td>10 L/s.</td>
</tr>
<tr>
<td>Conference rooms</td>
<td>10</td>
<td>10 L/s.</td>
</tr>
<tr>
<td>Drafting rooms</td>
<td>2</td>
<td>10 L/s.</td>
</tr>
<tr>
<td>Office areas</td>
<td>2</td>
<td>10 L/s.</td>
</tr>
<tr>
<td>Waiting areas</td>
<td>10</td>
<td>10 L/s.</td>
</tr>
</tbody>
</table>
What we Found

• Poor ventilation in various office and break out areas
• Meets AS1668.2 requirements for air quantity
• Does not meet ASHRAE 62.1 ventilation requirements
• Does Not meet NCC ventilation requirements
• There is a difference between air quantity and air quality observed by various standards
Modelling our findings

ASHRAE 62.1 - dealing with Covid-19

<table>
<thead>
<tr>
<th>Location</th>
<th>Suggested ACPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offices</td>
<td>2-3</td>
</tr>
<tr>
<td>Schools</td>
<td>5-6</td>
</tr>
<tr>
<td>Restaurants</td>
<td>6-8</td>
</tr>
</tbody>
</table>

Table 4.1 Various CO₂ level limits and recommendations

<table>
<thead>
<tr>
<th>Comments</th>
<th>CO₂ concentration (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian occupational exposure limit (SWA 2011b)</td>
<td>5000</td>
</tr>
<tr>
<td>ASHRAE 62.1 recommendation (occupant comfort)</td>
<td>1000</td>
</tr>
<tr>
<td>AS 1688.2 recommendation (for CO₂ controlled ventilation)</td>
<td>800 - 800</td>
</tr>
<tr>
<td>NCC IAQ Verification Method (as an indicator for body odour)</td>
<td>850</td>
</tr>
<tr>
<td>Typical outdoor air range</td>
<td>400 - 300</td>
</tr>
</tbody>
</table>
Case Study 2
Facts
✓ Production line environment
✓ Approximately 30 workers
✓ Use of insecticides to control fungal
and microbial growth - TriPlus
✓ Recent experiences of headaches,
nausea and other such symptoms
amongst workers
✓ Large warehouse type process
✓ Natural ventilation
✓ Some extraction
✓ Personal protection used –
disposable overals, P2 masks
and nitrile gloves

The Environment

Fluency Agitator
Direction of heat and vapour
Drying tables
SDS - TriPlus

- Various areas to review
- Composition/Information on ingredients
- Toxicology
- Hazards Identification – Hazard statements
- Exposure controls
What we Found

- Poor extraction along the drying table
- Only natural ventilation for the dilution of contaminants
- TriPlus was major cause to the health impacts of workers
- PPE not sufficiently adequate
- Decontamination procedure not adequate
- Work practices contributing to exposure of dusts, fumes or vapour