



## **ConsExpo and disinfectants – Use of Propanol-2 for hand disinfection**

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# Scenario

## Hand disinfection of a nurse in patient room

Phases	Tasks
Mixing & Loading	Ready to use b.p. (70% Propanol-2)
Application	Hand disinfection
Post-application	No cleaning of instruments etc.

## Scenario (2)

### Participant:

### Hand disinfection of a nurse in patient room

- Patient room size: 25 m<sup>3</sup>
  - Ventilation rate: 2/h
  - Number of hand disinfections: 48 in 8h
  - Nurse stays 8h in one room
- worst case scenario

## Scenario (3)

### Check of plausibility:

- Room size: 25 m<sup>3</sup> → reasonable
- Ventilation rate: 2/h → reasonable based on literature\*
- Number of hand disinfections: 48 → reasonable according to expert knowledge (worst case)
- Duration: 10 min per hand disinfection → reasonable
- Nurse stays 8 h in one room → not reasonable

\* KlimaPartner 2007 Technisches Handbuch für Luft- und Klimatechnik and The Engineering Tool Box 2005 Air change rates in some typical rooms and buildings

## Scenario (4)

### Amendment of scenario:

Room size: 60 m<sup>3</sup> (3 patients per room)

Duration: 4 hand disinfections per patient room  
(30 min)

Frequency: 12 patient rooms per shift; after 90 min  
nurse re-enters the first patient room

Ventilation rate: 2/h

→ reasonable worst case

# Inhalation exposure - ConsExpo

## 1. Instantaneous release mode

### Definition:

All component is released from the product at once into the room

## 2. Constant rate release mode

### Definition:

Release of a component with a constant rate of release over a certain period of time

## Inhalation exposure (3) - ConsExpo

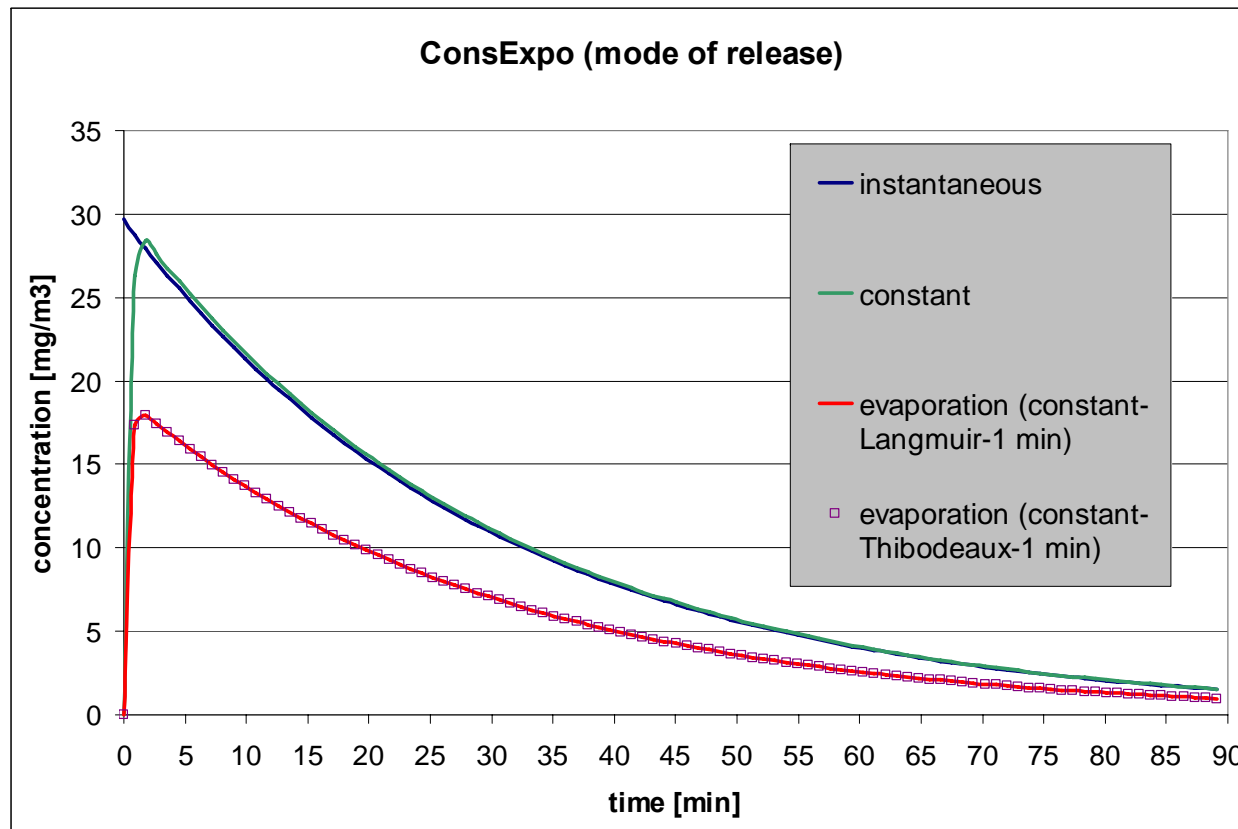
### 3. Evaporation release mode

#### Definition:

Release of the compound from the surface of the product by evaporation (release area and release rate is necessary)

# Inhalation exposure (4) - ConsExpo

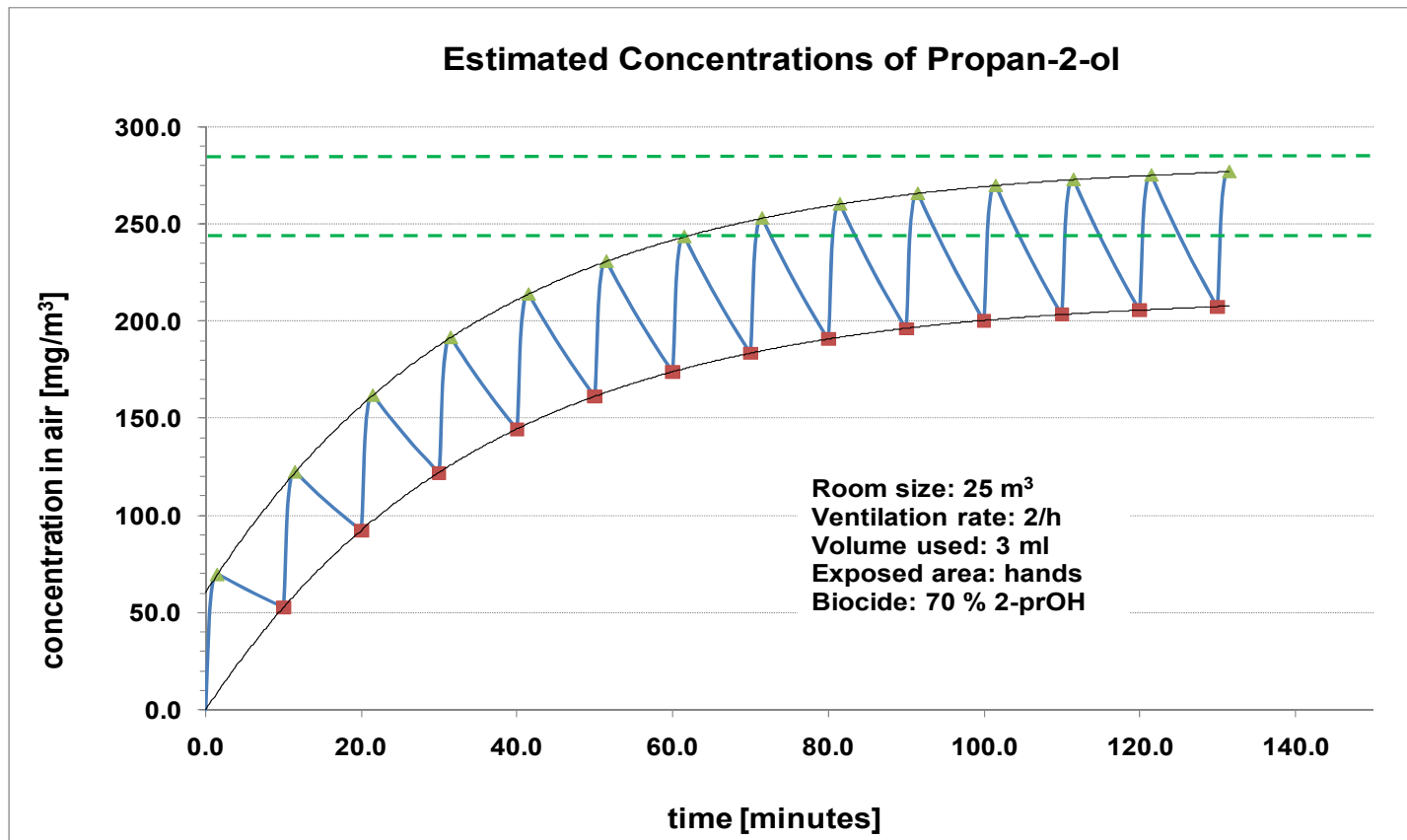
## Overview - different modes





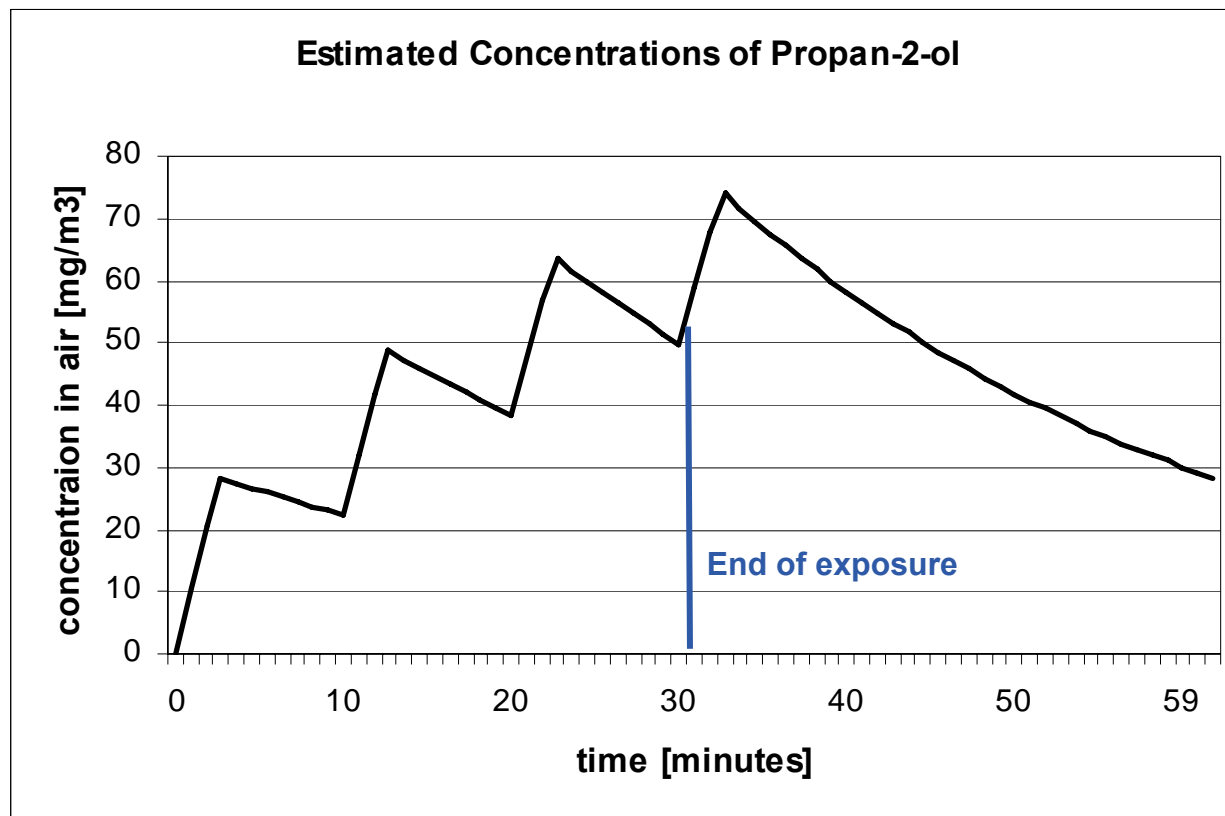
# Inhalation exposure – Results

## Results of worst case scenario



## Inhalation exposure - Results (2)

### Results of reasonable worst case scenario



## Inhalation exposure - Results (3)

### **Results of worst case scenario:**

8h-time weighted average concentration: 243 mg/m<sup>3</sup>

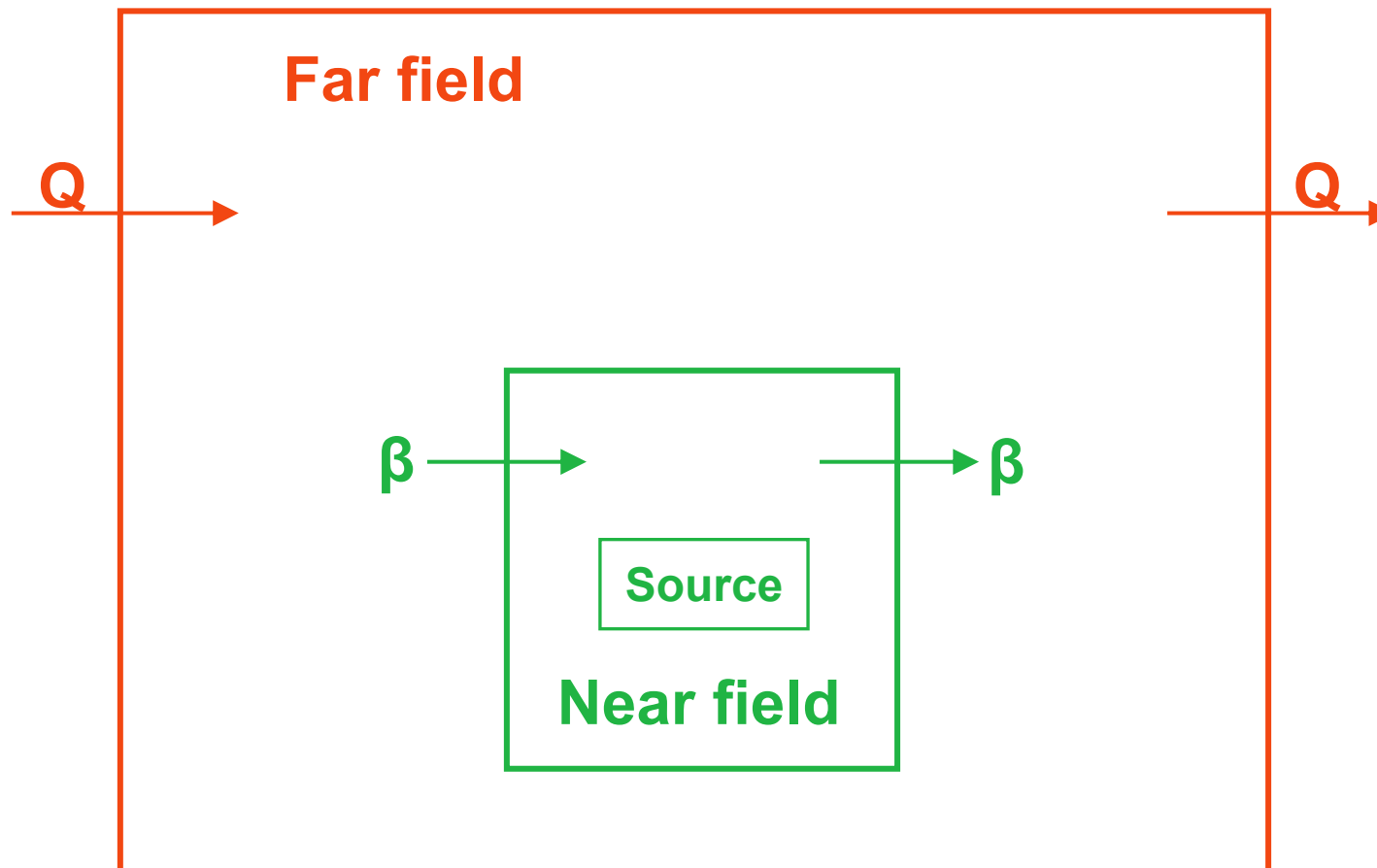
Exposure duration: 480 min

### **Results of reasonable worst case scenario:**

8h-time weighted average concentration: 43.7 mg/m<sup>3</sup>

Exposure duration: 372 min

## Inhalation exposure – Near field / far field



## Near field / far field (2)

### Near field:

$$V_N \cdot d C_N = G \cdot dt + \beta \cdot C_F \cdot dt - \beta \cdot C_N \cdot dt$$

### Far field:

$$V_F \cdot d C_F = \beta \cdot C_N \cdot dt - [\beta + Q] \cdot C_F \cdot dt$$

$V_N / V_F =$  Volume near field (8 m<sup>3</sup>) / far field (60 m<sup>3</sup>)

$C_N / C_F =$  Concentration near field / far field (mg/m<sup>3</sup>)

$G =$  constant mass emission rate (mg/min)

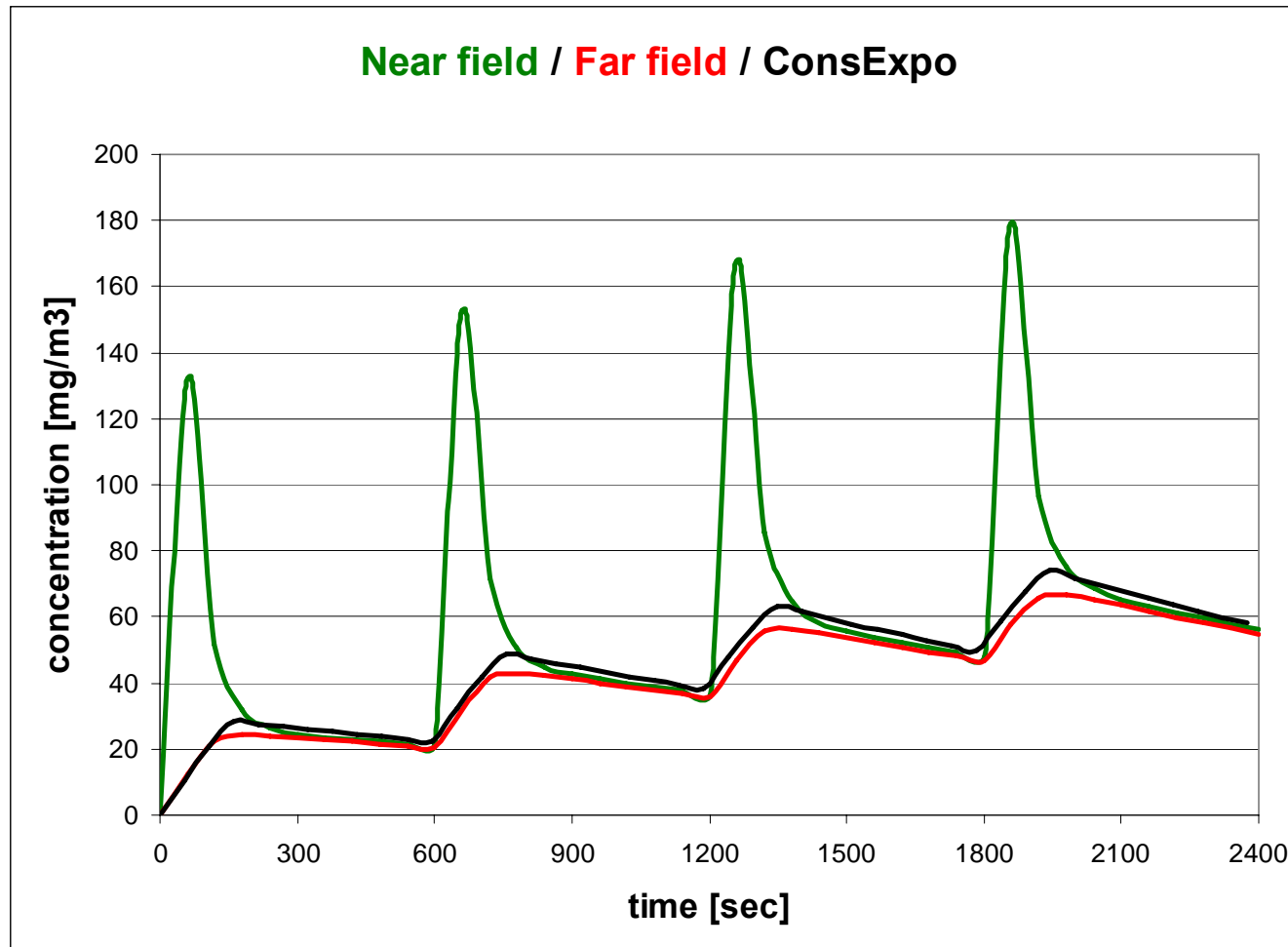
$\beta =$  airflow rate between near and far field (m<sup>3</sup>/min)

$Q =$  room supply air rate (m<sup>3</sup>/min)

$dt =$  infinitesimal time interval (min)

C.B. Keil „Mathematical Models for estimating occupational exposure to chemicals“, AIHA Press, 2000

# Near field / far field vs. ConsExpo



## Near field / far field vs. ConsExpo (2)

### Results

**ConsExpo**      **8-h TWA: 43.7 mg/m<sup>3</sup>**

**Near field**      **8-h TWA: 77.2 mg/m<sup>3</sup>**

**Far field**      **8-h TWA: 43.0 mg/m<sup>3</sup>**

## Assessment of hand disinfection by MS

MS	Active substance	Product amount [g]	Duration exposure	Frequency [events/day]	Room volume [m <sup>3</sup> ]	Ventilation rate
DE	Propanol-2	1.8	50 sec	48	60	2 / h
FR	Clorocresol	3	30 sec	4	15	2.5 / h
PT	OPP Hand Soap	1.5 x 10 <sup>-4</sup>	4 min	4	15	2.5 / h
FI	Glutar-aldehyde	2	---	28	---	---
AT	DCPP Soap	3	1 min	8	---	---
PL	MES – Sterillium	21	30 sec	36	---	---
SK	Active chlorine in situ	1.5	---	32	---	---



## Summary

- ConsExpo underestimates near field exposure
- ConsExpo is a good model to assess far field exposure
- More experience with ConsExpo is desirable
- Further harmonisation of defaults for disinfections is needed

# Thank you for your attention



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