

Impact of the Contamination Method on the Disinfection of N95 Respirators: Drops versus Aerosols

**Mirna Alameddine^{1*}, Oluchi Okoro¹, Loïc Wingert², Geneviève Marchand²,
Benoit Barbeau¹**

¹ *Department of Civil, Geological and Mining Engineering, Polytechnique Montréal, QC, H3C 3A7, Canada*

² *Department of Chemical and Biological Hazard Prevention, Institut de Recherche Robert-Sauvé en Santé et Sécurité du Travail, Montréal, QC H3A 3C2, Canada*

Supplementary Information

Table S1 Chemical composition of the solutions used in this study.

	Artificial Saliva		Artificial Saliva + Mucin		Phosphate Buffer Solution	
	Concentration (g L⁻¹)	Density (g cm⁻³)	Concentration (g L⁻¹)	Density (g cm³)	Concentration (g L⁻¹)	Density (g cm³)
MgCl ₂ .6H ₂ O	0.04	1.57	0.04	1.57	-	-
CaCl ₂	0.13	2.15	0.13	2.15	-	-
NaHCO ₃	0.42	2.20	0.42	2.20	-	-
0.2 M KH ₂ PO ₄	27.22	2.34	27.22	2.34	-	-
0.2 M K ₂ HPO ₄	34.84	2.44	34.84	2.44	-	-
NH ₄ Cl	0.11	1.53	0.11	1.53	-	-
KSCN	0.19	1.89	0.19	1.89	-	-
(NH ₂) ₂ CO	0.12	1.32	0.12	1.32	-	-
NaCl	0.88	2.16	0.88	2.16	8	2.16
KCl	1.04	1.98	1.04	1.98	0.2	1.98
Na ₂ HPO ₄	-	-	-	-	1.44	1.70
KH ₂ PO ₄	-	-	-	-	0.24	2.34
Mucin	-	-	1.70	1.01	-	-
Weighted Average		15.46		14.21		5.17

Table S2 Details of the contamination by nebulization.

	Value	Unit
Gas flow rate entering the nebulizer	4	L min ⁻¹
Liquid flow rate in the nebulizer	0.35	mL min ⁻¹
Volume of the solution to be nebulized	75	mL
Concentration of the solution to be nebulized	10 ⁶	CFUs mL ⁻¹
Gas flow rate through each coupon	5.8	L min ⁻¹
Time of nebulization	13	min
Liquid flow rate through each coupon during nebulization	0.08	L min ⁻¹
Volume of solution nebulized per coupon	0.33	mL

Table S3 Results of the Three Factor ANOVA test assessing the impact of the method of contamination (aerosols, droplet), mixing time (1 hr, overnight) and suspension (Artificial saliva, Artificial saliva + Mucin, PBS), on the level losses of spores as log CFU coupon⁻¹ during the contamination process.

Factor	Df	F value	p-value*
Method of contamination	1	22.711	6.97E-07
Mixing time	1	4.431	0.007
Suspension	2	0.521	0.377
Method of contamination x Mixing time	1	2.097	0.054
Method of contamination x Suspension	2	1.162	0.125
Mixing time x Suspension	2	0.722	0.264
Method of contamination x Mixing time x Suspension	2	1.950	0.164
Within	24		
Total	35		

Df = degree of freedom

*Highlighted are statistically significant factors with p-value ≤ 0.05

Table S4 Results of the Three Factor ANOVA test assessing the impact of the suspension (Artificial saliva, Artificial saliva + Mucin, PBS), means of contamination (aerosols, droplets) and UV dose on the level of respirator decontamination. $R^2 = 0.78$.

Factors	Df	SS	MSE	F value	p-value*
Suspension type	2	19.18	9.59	39.185	9.20e-10
Method of contamination	1	3.94	3.94	16.087	2.92e-04
UV dose	2	2.49	1.24	5.091	1.10e-02
Suspension \times Method	2	3.42	1.71	6.98	3.00e-03
Suspension \times UV dose	4	0.56	0.14	0.574	0.683
Method \times UV dose	2	0.11	0.057	0.232	0.794
Suspension \times Method \times UV dose	4	0.76	0.19	0.775	0.549
Residuals	36	8.81	0.24		

Df = degree of freedom, MSE = mean of squares, SS = sum of squares.

*Highlighted are statistically significant factors with p-value ≤ 0.05