CADR Nanoparticle REPORT

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Date: May 1, 2022
Test Requested By: Agentis Air
Test Type: Multi-Pass Efficiency

Scope
Customer provided a unit for multi-pass efficiency testing with KCl nanoparticles with range of 10-340 nanometer. Testing was performed in a large (945 ft^3) stainless-steel chamber.

Method
The Particles are generated with 0.01% KCl solution. The range of monitoring is set and SMPS collects data at one run per 2.5 minutes. Particles are neutralized prior to entering chamber to prevent agglomeration.

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Testing Approval
Al Vatine, CEO

Figure 1. Air Cleaner tested

Test Conditions
Environmental Conditions: 72 °F and 50% RH

Equipment
1007 ft^3 Stainless-Steel Test Chamber
SMPS manufactured by TSI company

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Figure 2. Test chamber

Cumulative Particle counts

	Cumulative Number Concentration of 10 nm < KCL Particles < 339 nm			ln [Cti/Ci]	
Time(min)	Natural Decay	Unit		Natural Decay	Unit
0	12479555	14438261.6		0	0
2	12278639	12379003.41		-0.016230651	-0.153879974
4	12177939	7474905.64		-0.024465701	-0.658330243
6	12176836	3679980.05		-0.024556279	-1.366974407
8	12175839	1945120.39		-0.024638159	-2.004557866
10	12175369	1088280.02		-0.024676761	-2.585283252
12	12169438	614990.97		-0.025164011	-3.156029433
14	12166869	356353.486		-0.025375135	-3.701713841
16	12152368	200726.019		-0.026567689	-4.275696129
18	12149369	122216.372		-0.026814503	-4.771844003
20	12148337	77248.4349		-0.026899449	-5.230610362
22	12140669	44190.7124		-0.027530846	-5.789122377
24	12136397	29311.7675		-0.027882783	-6.199647961
26	12135564	19038.9011		-0.027951422	-6.631152705
28	12129887	12937.6562		-0.02841933	-7.017494873
30	12125587	8137.7666		-0.028773889	-7.481121248

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Calculations:

INFORMATION FOR REPORT

These results are plotted in Figure 1. Particle decay follow the exponential decay function:

$$C_{t_i} = C_i e^{-kt_i} \qquad \text{(Equation 2)}$$

where C_{ti} is the concentration at time t_i, C_i is the concentration at time = 0 minutes, k is the decay rate constant, and t_i is the time. The decay rate constant is then found from the slope of the $\ln[C_{ti}/C_i]$ vs. t_i curve:

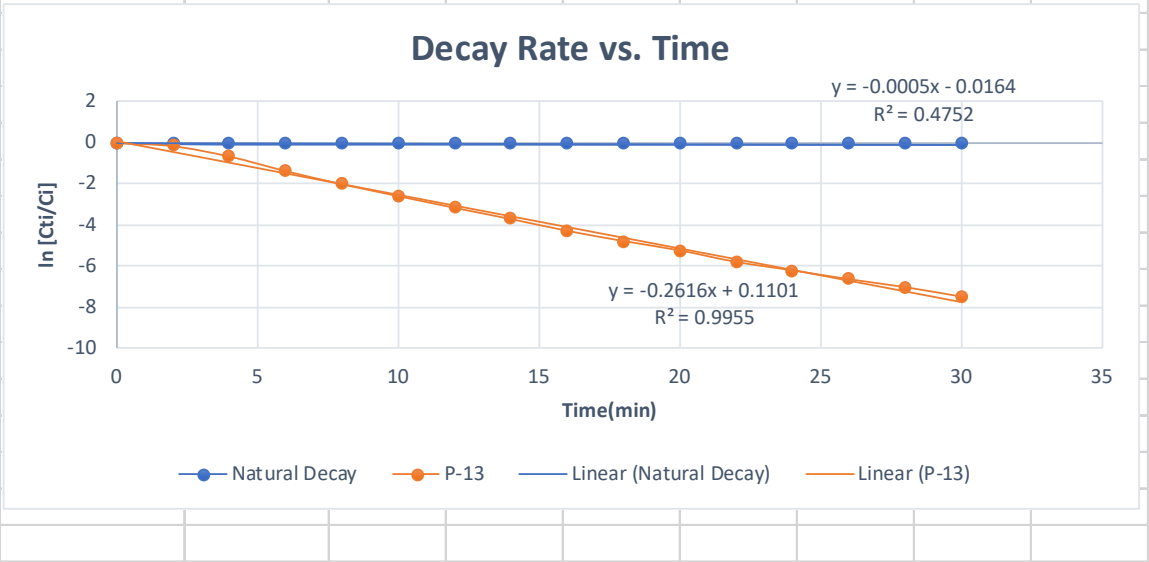
$$\ln\frac{C_{t_i}}{C_i} = -kt_i + b \qquad \text{(Equation 3)}$$

The following formula, modeled on the AHAM test CADR, was used to determine the CAR_{Nano} of the device with a test chamber volume (V) of 944.6 ft^3:

$$CAR_{Nano} = V\left(k_{device} - k_{natural\_decay}\right) \qquad \text{(Equation 4)}$$

P-14: **EXAMPLE CALCULATION FOR EACH DEVICE IN REPORT**

$$CAR_{Nano} = 944.6\ ft^3(0.0805 - 0.0221) = 55.165\ cfm$$



k_device	k_natural decay
0.5232	0.0975
CADR Nano=	402.11622

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