

Outline

```
import pandas as pd
import plotly.graph_objects as go

hz = [ 20, 25, 31.5, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315,
400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, ]

baseline_avg = [ 45.49287181, 40.66568046, 33.94880895,
37.23155284, 31.38887229, 28.35197503, 29.28974299,
26.33220283, 37.165359, 43.66022443, 54.51516369, 50.45691745,
50.99356958, 49.83150941, 67.40951159, 70.00501685,
67.77902619, 75.49177774, 77.92348053, 80.20338082,
81.63546427, 81.95696416, 83.24030148, 85.42212673, ]

mufflers = { "Big Blue Madness": [ 43.70239141, 37.5560101,
31.92418498, 31.48447721, 31.47827893, 30.09578477,
27.63178225, 26.10516917, 25.73102015, 21.77746263,
25.96869356, 34.15143549, 37.03642655, 28.40541866,
39.61574831, 45.02955925, 42.26895093, 47.55293161,
54.87190806, 58.63343347, 55.90151505, 52.66662972,
49.87563314, 51.11577295, ], "Mighty Mouse": [ 48.0428536,
35.78558672, 33.34859333, 32.44649252, 32.27546867,
30.58951292, 28.30478127, 29.93839987, 37.35621468,
36.48657907, 38.00879432, 43.30860007, 36.93134427,
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45.17753434, 55.58265324, 58.96009293, 57.69494395,
61.62885135, 61.3507888, 68.83839199, 68.89275873,
68.96135379, 73.13314976, 70.00355819,], “Quik Tube”: [
41.12273549, 35.36385892, 33.66737181, 32.71390614,
31.54627826, 30.1855735, 30.02805486, 24.33274908,
34.48921366, 33.41334527, 30.92504526, 33.87331242,
39.94918675, 45.59288562, 54.65196911, 52.96740822,
55.19708247, 60.82098016, 59.54817572, 71.56179128,
66.28138856, 66.11379663, 69.93147412, 74.19455923,], “The
Attenuator”: [43.63082677, 40.07741575, 32.99610717,
37.2982697, 31.07584439, 34.01478968, 26.86711979, 22.5824996,
31.50643297, 15.68032668, 23.97082791, 35.19950169,
42.67982993, 52.461884, 44.11427863, 55.43455334, 58.0828206,
55.48789234, 55.85947364, 58.23149763, 57.00456027,
59.71131675, 60.64753447, 60.70713176,], “The Blueberry
Muffler”: [40.32022681, 37.25776667, 35.91773671, 34.65011359,
32.42225263, 33.1853147, 29.5314618, 23.91160964, 40.7520755,
30.22005485, 28.97919625, 24.61922227, 30.65575868,
34.80923601, 42.45804816, 41.07165079, 50.49969774,

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50.75465815, 53.92174407, 55.00425964, 52.63915125,  
52.60256468, 52.12076564, 48.88258848, ], "The Decibilator": [  
42.45583956, 36.98755324, 34.66095679, 36.70770623,  
29.58271211, 31.18885543, 28.99815451, 22.49593893,  
44.14634196, 20.22261342, 21.72213292, 26.38179975,  
33.75565169, 38.48395442, 32.64437334, 51.11757542,  
50.00863569, 47.20286196, 57.72779209, 69.29273102,  
65.01440112, 71.66262036, 67.43942036, 69.88772872, ], "The  
Hush Puppy": [ 45.68536712, 39.01930039, 34.39824726,  
34.5987011, 29.16123651, 29.79621738, 28.81081312,  
21.69926572, 37.12424538, 27.74619273, 31.25902066,  
29.8338269, 32.52418309, 37.64403637, 46.52016175,  
39.37443434, 45.79485891, 53.40134189, 55.08814288,  
53.36515378, 47.42801573, 51.16284259, 58.75395634,  
61.80902253, ], }
```

```
insertion_loss = { name: [b - m for b, m in zip(baseline_avg, powers)]  
for name, powers in mufflers.items() }
```

```
fig = go.Figure()
```

```
for name, il in insertion_loss.items(): fig.add_trace(go.Scatter(x=hz,
```

```
y=il, mode="lines+markers", name=name))  
fig.update_layout( title="Insertion Loss vs Frequency for Different  
Mufflers", xaxis=dict(title="Frequency (Hz)", type="log"),  
yaxis=dict(title="Insertion Loss (dB)"), template="plotly_white",  
legend_title="Muffler", )  
fig.show()
```