• NO.9 bottle tone

ASAL Hosseinian

TEAM IRAN
9: bottle tone

Take an empty bottle and blow air across its mouth to produce a sound. Now fill the bottle with some water and study how the sound changes.
comprehension
What's the sound made in bottle?

When you blow on the edge of the bottle you are making a jet of air. If you are making a noise this jet of air could either be deflected into the bottle or over the top of it, and it only takes a small force to change between these two paths.

The air stream is sucked into the bottle, which pushes extra air into the bottle. Eventually the pressure inside the bottle gets high enough to push the jet outside again. Now the fast moving air of the jet sucks air out of bottle, reducing the pressure inside.
theory
Sin & cos

\[ \sin \theta \quad \cos \theta \]

\[ \sin \alpha : \frac{c}{a} \]
\[ \cos \alpha : \frac{b}{a} \]

\[ tga \rightarrow \frac{\sin \alpha}{\cos \alpha} \]
\[ \cot g \alpha \rightarrow \frac{\cos \alpha}{\sin \alpha} \]
When you compare this three shapes we get they're different is speed of hand.
T(Period)

\[ \lambda = \text{wavelength} \]
\[ y = \text{amplitude} \]
In the bottle we have wave

This formula is the relationship between the speed \( (v) \) of the wave, the wavelength \( (\lambda) \) and the period \( (T) \) or frequency \((f)\).

- it follows from \( \text{speed} = \frac{\text{distance}}{\text{time}} \).
- the wave travels one wavelength in one period, so wave speed \( v = \frac{\lambda}{T} \),
- \( v = \lambda f \) • this is the “Golden Rule” for waves

\[
v = \frac{\lambda}{T} = \lambda f \quad \text{speed of the wave}
\]
\[ l = n \frac{\lambda}{2} \]
\[ 2l \frac{n}{n} = \lambda \]
\[ f = \frac{v}{x} = n \frac{v}{2l} \]
EXPERIMENT
Different parameter

Depth

Temperature

Concentration

intake
WE NEED AIR IN SAME SIZE

1. We need balloon and straw.

2. We plug in Straw head balloon and tightly to the does not outside air.
Then we have air in balloon
and get the balloon and straw on the bottle. 
then free up head of the straw.
Then Record the sound
depth
Empty bottle

With straw:

With mouth:
4cm water

• With straw:

• With mouth:
8cm water

• With straw:

• With mouth:
12cm water

• With straw:

• With mouth:
16cm water

• With straw:

• With mouth:
result

When the height of the water going to be upper the frequency going to be upper too.

And when we had water in the bottle the frequency is upper.
• With straw:

• With mouth:
Result

When we had solid in bottle the frequency is lower than when we had liquid and gasses.
Different temperature
Warm water

With straw:

With mouth:
Cold water

With straw:

With mouth:
Result

Warm water had more frequency than cold water.
Concentration
thick

With straw:

With mouth:
diluted

With straw:

With mouth:
result

In the thick liquid the frequency is more than the diluted liquid.
intake
With more air

- With straw:

- With mouth:
With less air

With straw:

- With mouth:
result

When we had more air the frequency is more than when we had less air.
conclusion

Frequency in liquid is over then gasses and in gases over than solid.

When the height of the water going to be upper the frequency going to be upper too.

Warm water had more frequency than cold water.

In the thick liquid the frequency is more than the diluted liquid.

When we had more air the frequency is more than when we had less air.
references

David-Halliday-Robert-Resnick-Jearl-Walker-10ed

physics.stackexchange.com

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