How Does Sonication Work?

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Sonication is the act of converting an electrical signal into a physical vibration, for various purposes. Sonication is typically performed to disrupt cell membranes and release cellular contents for the purpose of further evaluation. Sonication is also used to break apart the cells and release DNA proteins for examination. The ultrasonic electric generator is the main part of a sonication device. It can create a signal (usually around 20 KHz), which could drive a transducer to convert the electric signal into physical vibration through piezoelectric crystals or crystals. Sonicator carefully preserves and amplifies this vibration, molecular in origin until it is passed through to the probe. The vibration will be transmitted to the sonicated solution. This robe, carefully constructed, could move constantly with the vibration. Although the amplitude can be controlled by the operator and is chosen based on the qualities of the solution being sonicated, the probe still moves up and down rapidly. The rapid movement of the probe leads to a phenomenon called cavitation. When the vibrations create a large number of bubbles in the solution, cavitation occurs, pockets of space wedged between the molecules that form and then collapse constantly under the weight of the solution being sonicated. Powerful waves of vibration occurs when thousands of these bubbles forming and collapsing constantly, which can cycle into the solution and break apart the cells. Different sonification process needs different-sized probe tips.

- Although a very small tip has a limited area of effect based around the probe itself, it will create excellent cavitation effects and easily disrupt surrounding cells.
- Larger tips can reach a greater quantity of the solution, while its reaction intensity is relatively low.

For cell disruptor, sonication is a strong process, for it sometimes is too strong for the cells and proteins in question. If necessary, scientists had better choose a traditional process such as enzyme digestion (disruption by chemical reaction) or grinding with a material such as sand for a more delicate treatment.
