Sample Rate

In audio production, a sample rate (or "sampling rate") defines how many times per second a sound is sampled. Technically speaking, it is the frequency of samples used in a digital recording.

The standard sample rate used for audio CDs is 44.1 kilohertz (44,100 hertz). That means each second of a song on a CD contains 44,100 individual samples. When an analog sound, such as a vocal performance, is sampled at a rate of tens of thousands of times per second, the digital recording may be nearly indistinguishable from the original analog sound.

CDs use a sample rate of 44.1 KHz because it allows for a maximum audio frequency of 22.05 kilohertz. The human ear can detect sounds from roughly 20 hertz to 20 kilohertz, so there is little reason to record at higher sample rates. However, because digital audio recordings are estimations of analog audio, a smoother sound can be gained by increasing the sample rate above 44.1 KHz. Examples of high sample rates include 48 KHz (used for DVD video), 88.2 KHz (2x the rate of CD audio), and 96 KHz (used for DVD-Audio and other high definition audio formats).

While audio aficionados may appreciate higher sample rates, it is difficult for most people to perceive an improvement in audio quality when the sample rate is higher than 44.1 Khz. A more effective way to improve the quality of digital audio is to increase the bit depth, which determines amplitude range of each sample. 16-bit audio, used in audio CDs, provides 2^{16} or 65,536 possible amplitude values. 24-bit audio, used in high definition formats, can store 2^{24} or 16,777,216 possible amplitude values – 256 times more than 16-bit audio.

NOTE: Many DAW programs support sample rates up to 192 KHz. Recording at extremely high sample rates allows sound engineers to preserve the audio quality during the mixing and editing process. This can improve the end result of a song or audio clip even if the final version is saved with a sample rate of 44.1 Hz.

https://techterms.com/definition/sample_rate Updated: August 22, 2015