

Propagation of Sound Waves

Fundamentals of Physics
For revision for competitive
examinations

Production of Sound

(1) Sound is a form of energy that produces sensation of hearing in the ears.

It needs the medium of air to be heard

(2) It is produced by vibration and needs the medium of air and water, to travel and be heard by the ear.

Light waves can travel in a vacuum , but sound waves cannot.

(6) Wave velocity is the distance travelled by a wave in one second . The sound energy is transferred from one point to another by the wave motion.

Wave velocity = Frequency x Wavelength

(3) The medium for sound waves must be elastic and frictionless, and have inertia.

Inertia is needed for particles to store sound energy

(5) Sound vibrations make a periodic disturbance, at a point in the medium. Wave length is the distance travelled by the sound wave in one period of time. It is denoted by Lambda.

Amplitude is the maximum displacement of particles of the medium on either side of the mean position, and is measured in metre.

Time period is the period taken by a particle of medium to complete its one vibration

(4) Speed of sound in different media varies. It is **more in solids** , less in liquids, and **least in gases**. Speed of light is a million times greater than the speed of sound in air. The **density, temperature, humidity** and **direction** of wind , affect the speed of sound in gases.

Range of Hearing and Ultrasound

(4.2) Light can travel in vacuum , but sound needs the medium of air.

(4.3) Speed of light (3×10^8 m s⁻¹) is about a million times greater than the speed of sound (330 m s⁻¹)



(4.1) The speed of light decreases in an optically denser medium such as water and glass. The speed of Sound is more in solids , less in liquids and least in



(3) Frequency of more than 20,000 Hz is called Ultra sound.

Ultrasonic is the term used for ultrasound frequencies of 20 kHz.
Supersonic is for objects that travel at a speed greater than the speed of sound in air – concord jet planes.



(1) Human ear : 20 Hz to 20,000 Hz = audible range. It is most sensitive in the range of 2000 Hz to 3000 Hz.

The speed of sound in air is 330m s⁻¹.



(2) Frequency of less than 20 Hz is called infrasonic sound .
Elephants and Whales can produce infrasonic sounds.