

Sound is a form of energy generated from different sources which produces a sensation of hearing in our ears. It is produced by a vibrating object and requires a material medium for its propagation. Learn more about sound right here with sound notes for class 9.

Topics Covered In Chapter Sound

Production Of Sound

Propagation Of Sound

- Sound Needs A Medium To Travel
- Sound Waves Are Longitudinal Waves
- Characteristics Of A Sound Wave
- Speed Of Sound In Different Media

Reflection Of Sound

- Echo
- Reverberation
- Uses Of Multiple Reflection Of Sound

Range Of Hearing

Applications Of Ultrasound

- Sonar

Structure Of Human Ear

Introduction To The chapter

Sound is a form of energy which enables the ears to hear. Sound can be transformed from one to another form. It is produced due to the vibration of objects. For example, stretched strings of a guitar vibrate to produce sound. Medium is a matter or substance through which sound is transmitted which can either be solid, liquid or gas. Sound moves through a medium from the point of generation to the listener.

Production and Propagation of Sound

When an object vibrates, particles of the medium are set to vibrate. They do not travel all the way from the vibrating object to the ear. The particle of the medium in contact with the vibrating object is displaced first from its equilibrium position which then exerts a force on the adjacent particle. Hence the adjacent particle is displaced from its place of rest after which it comes back to its original position. The process continues until it reaches the ear. Hence, the disturbance created by a source of sound travels through the medium and not the particles of the medium.

A wave is a disturbance that moves through a medium when the particles of the medium set neighbouring particles into motion. Sound waves are characterised by the motion of particles in the medium and are called mechanical waves.

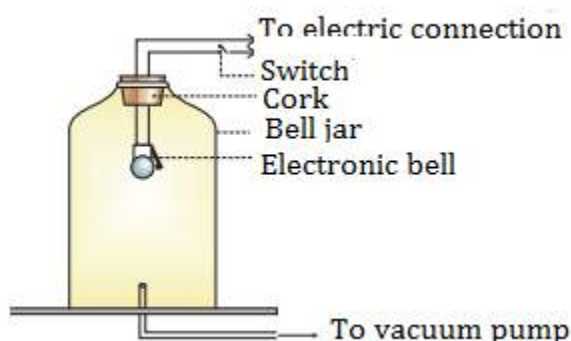
Compression - when a vibrating object moves forward, it pushes and compresses the air in front to create a region of high pressure which is known as compression

Rarefaction - When a vibrating object moves backwards, it creates a region of low pressure known as rarefaction.

Sound Needs A Medium To Travel

Sound is a mechanical wave which requires a material medium such as air, water, steel etc to propagate, hence it cannot travel through a vacuum which can be demonstrated through the bell jar experiment.

- Set up has an electric bell and an airtight glass bell jar where the bell is suspended inside the airtight bell jar
- The bell jar is connected to a vacuum pump, where bell is heard when the switch is pressed
- When the vacuum pump is started, as the air in the jar is pumped out eventually, the sound becomes fainter though the same current is passing through the bell and later on, when less air is left inside the bell jar, a feeble sound is heard

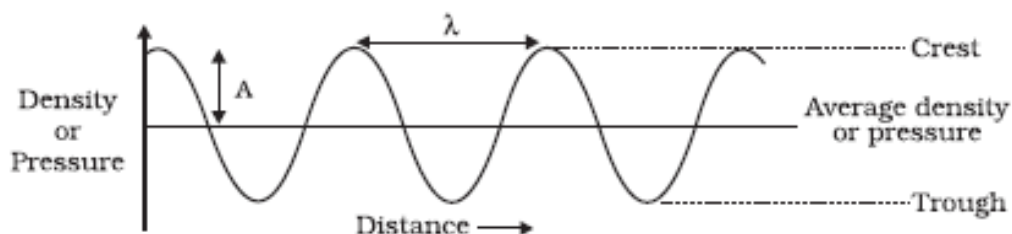


Characteristics Of A Wave

A sound wave can be described by its:

- Frequency
- Amplitude
- Speed

Some Important Terminologies Associated With Sound



- Compressions - regions where density, as well as pressure, is high. It is here where the particles are crowded together and represented by the upper portion of the curve where maximum compression takes place
- Rarefactions - low pressure regions where particles are spread apart and are represented by the lower portion of the curve
- Crest - peak of the wave
- Trough - valley of the wave
- Wavelength - the distance between two consecutive compressions (C) or two consecutive rarefactions (R). It is represented by λ (lambda) and its S.I. unit is metre (m)
- One oscillation - change in density from the maximum value to the minimum value and then again to the maximum value makes one complete oscillation
- Frequency of sound wave - number of one oscillation per unit time. It can also be calculated if we can count the number of compressions or rarefactions crossing per unit time. It is represented by ν (nu) and its S.I. unit is Hertz (Hz). It is given by $\nu = 1/T$
- Time period of wave - time taken by two consecutive compressions or rarefactions to cross a fixed point or time taken to complete one oscillation. It is represented by T and its S.I. unit is second (s).
- Amplitude of wave - the magnitude of the maximum disturbance in the medium on either side of the mean value. It is represented by 'A'.
- Speed of sound - it is the distance which a point on a wave such as compression or rarefaction travels per unit time.
- Intensity of sound - it is the amount of sound energy passing each second through unit area. It is sometimes referred to as loudness or intensity, but they are not the same