

Microphones and loudspeaker

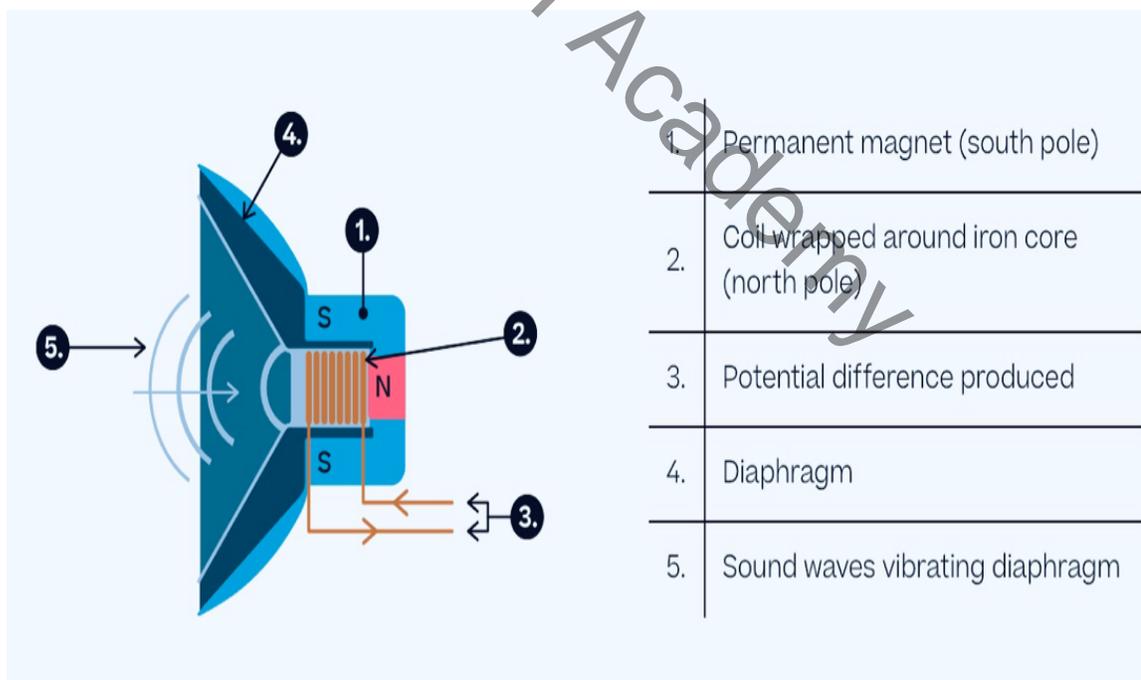
Microphones

► The microphone is a device that converts sound waves into electrical signals. Microphones use the generator effect to induce a changing current from the pressure variations of sound waves.

► Working of Microphones:

In a moving-coil microphone:

1. pressure variations in sound waves cause the flexible diaphragm to vibrate
2. the vibrations of the diaphragm cause vibrations in the coil
3. the coil moves relative to a permanent magnet, so a potential difference is induced in the coil
4. the coil is part of a complete circuit, so the induced potential difference causes a current to flow around the circuit
5. the changing size and direction of the induced current matches the vibrations of the coil
6. the electrical signals generated match the pressure variations in the sound waves

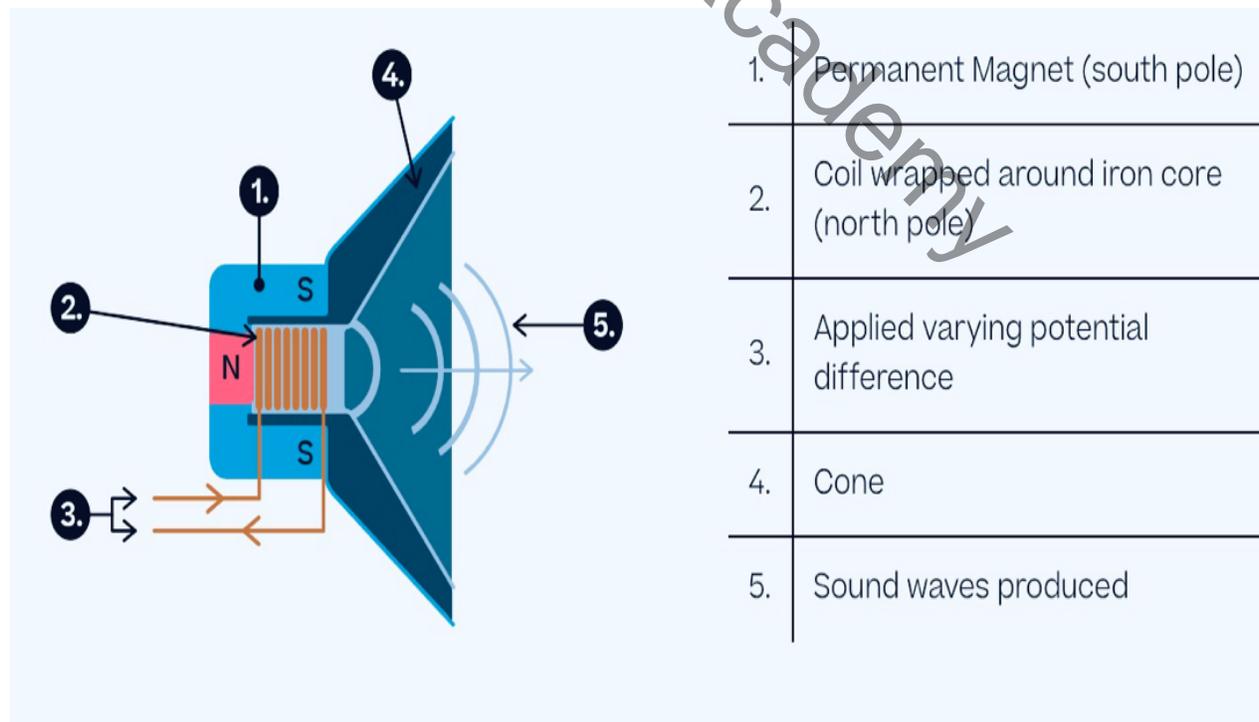


Loudspeakers & Headphones

- Headphones, which contain small loudspeakers, use the reverse effect to microphones - the motor effect. In these devices, variations in an electric current cause variations in the magnetic field produced by an electromagnet.
- This causes a cone to move, which creates pressure variations in the air and forms sound waves.
- **Working of Loudspeaker**

A loudspeaker converts electrical signals into sound waves. Alternating current supplied to the loudspeaker creates sound waves in the following way:

1. a current in the coil creates a magnetic field
 2. the magnetic field interacts with the permanent magnet generating a force, which pushes the cone outwards
 3. the current is made to flow in the opposite direction
 4. the direction of the magnetic field reverses
 5. the force on the cone now pulls it back in
 6. repeatedly alternating the current direction makes the cone vibrate in and out
 7. the cone vibrations cause pressure variations in the air - which are sound waves
- To make a loudspeaker cone vibrate correctly, the electric current must vary in the same way as the desired sound.



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