

## 12.7: End of Chapter Key Terms

### Definition: Magnetism

- **Magnetism:** A physical phenomenon produced by the motion of electric charges, resulting in attractive and repulsive forces between objects.
- **Magnet:** An object that produces a magnetic field, with a north and south pole.
- **Magnetic Field:** A field around a magnet where magnetic forces can be detected, represented by field lines.
- **Magnetic Pole:** One of two ends of a magnet where the magnetic force is strongest; includes the north pole and south pole.
- **Magnetic Flux:** A measure of the amount of magnetic field passing through a given area, measured in Weber (Wb).
- **Magnetic Flux Density:** The amount of magnetic flux through a unit area perpendicular to the direction of magnetic flow, measured in Tesla (T).
- **Electromagnet:** A magnet created by electric current flowing through a coil of wire, often wrapped around a ferromagnetic core.
- **Ferromagnetic Material:** A material, such as iron, cobalt, or nickel, that can be magnetized because of its high magnetic permeability.
- **Permanent Magnet:** A magnet that retains its magnetic properties for a long period of time without the need for external power.
- **Temporary Magnet:** A magnet that behaves like a permanent magnet when in the presence of a magnetic field but loses its magnetism when the field is removed.
- **Domain:** A region within a ferromagnetic material where the magnetic moments of atoms are aligned in the same direction.
- **Curie Temperature:** The temperature above which a ferromagnetic material loses its permanent magnetism and becomes paramagnetic.
- **Paramagnetic Material:** A material that is weakly attracted by a magnetic field and does not retain magnetic properties when the external field is removed.
- **Diamagnetic Material:** A material that is weakly repelled by a magnetic field and does not retain magnetic properties.
- **Magnetic Permeability:** A measure of how easily a material can become magnetized, indicating the ability to support the formation of a magnetic field within itself.
- **Gauss's Law for Magnetism:** A fundamental law stating that the net magnetic flux through a closed surface is zero, indicating that magnetic monopoles do not exist.
- **Magnetization:** The process of aligning the magnetic moments of a material to produce a magnetic field.
- **Hysteresis:** The lag between changes in the magnetization of a material and changes in the external magnetic field, often represented by a hysteresis loop.
- **Electromagnetic Induction:** The process of generating an electric current by changing the magnetic field within a coil of wire.
- **Faraday's Law of Induction:** A law stating that the induced electromotive force (EMF) in a coil is proportional to the rate of change of magnetic flux through the coil.
- **Lenz's Law:** A law stating that the direction of an induced current is such that it opposes the change in magnetic flux that caused it.
- **Inductor:** A passive electronic component that stores energy in its magnetic field, typically a coil of wire.
- **Transformer:** A device that uses electromagnetic induction to increase or decrease the voltage of alternating current (AC) in a circuit.
- **Magnetic Declination:** The angle between geographic north and the direction a compass needle points, varying with location.
- **Magnetic Inclination:** The angle between the horizontal plane and the Earth's magnetic field lines, varying with latitude.
- **Geomagnetic Field:** The magnetic field that extends from the Earth's interior into space, protecting the planet from solar wind and cosmic radiation.

- **Magnetosphere:** The region around Earth dominated by its magnetic field, which deflects charged particles from the solar wind.
- **Solenoid:** A coil of wire that generates a magnetic field when an electric current passes through it, often used to create uniform magnetic fields.
- **Toroid:** A donut-shaped coil of wire that generates a magnetic field within the core of the coil when an electric current passes through it.
- **Hall Effect:** The production of a voltage difference across an electrical conductor when a magnetic field is applied perpendicular to the current.
- **Magnetic Levitation:** The suspension of an object in the air using magnetic forces to counteract gravitational forces.
- **Magnetoresistance:** The change in electrical resistance of a material in response to an applied magnetic field.
- **Magnetic Resonance Imaging (MRI):** A medical imaging technique that uses strong magnetic fields and radio waves to generate detailed images of the body.
- **Spintronics:** A field of technology that exploits the intrinsic spin of electrons and their associated magnetic moment, in addition to their charge.
- **Magnetic Recording:** The process of storing data by magnetizing a medium, used in devices like hard drives and magnetic tapes.

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