Chapter -10

Fun with Magnets

2marks:

1. It was observed that a pencil sharpener gets attracted by both the poles of a magnet although its body is made of plastic. Name a material that might have been used to make some part of it.

Answer:

Iron might have been used to make some part of it.

2. Column I shows different positions in which one pole of a magnet is placed near that of the other. Column II indicates the resulting action between them for each situation. Fill in the blanks.

Column – I	**Column – II**
N-N	**_____**
N-___	**Attraction**
S-N	**_____**

___-S	**Repulsion**

Answer:

Column – I	Column – II
N-N	**Repulsion**
N- **S**	Attraction
S-N	**Attraction**
S– S	Repulsion

3. Write any two properties of a magnet.

Answer:

Properties of a magnet are as follows

- It attracts objects made of Nickel, Cobalt and Iron.
- Like poles of two magnets repel each other and opposite poles attract each other.

4. Where are poles of a bar magnet located?

Answer:

On two ends of a bar magnet.

5. A bar magnet has no markings to indicate its poles. How would you find out near which end is its north pole is located?

Answer:

A bar magnet is hung in the air, and the end pointing to the north is the north pole of the magnet.

6. You are given an iron strip. How will you make it into a magnet?

Answer:

Take a bar magnet and keep in contact with one of its poles with one edge of the bar of iron.

- Without lifting the bar magnet, move it along the length of the iron bar till you reach the other end.
- Lift the magnet and bring the pole (the same pole you started with) to the same point of the iron bar from which we began.
- Move the magnet again along the iron bar in the same direction as you did before.
- Repeat this process for about 30-40 times.

7. How is a compass used to find directions?

Answer:

A compass always shows north and south directions; by keeping this as a reference, we can always find east and west directions also.

8.How can you show that like poles of magnets repel each other?

Answer:

To demonstrate that like poles of magnets repel each other, perform the following experiment. Take two bar magnets and suspend them freely. Bring the north pole of one magnet close to the north pole of the other magnet.

5marks:

1.Explain the concept of magnetic field lines.

Answer:

Magnetic field lines are imaginary lines used to represent the magnetic field around a magnet. They are drawn from the north pole to the south pole outside the magnet and from the south pole to the north pole inside the magnet. The density of these lines indicates the strength of the magnetic field, and the direction of the lines shows the direction in which a north pole would move if placed at that point.

2.Describe the properties of a bar magnet.

Answer:

A bar magnet has two poles, namely the north pole and the south pole. The magnetic field lines emerge from the north pole and enter the south pole. The strength of the magnetic field is concentrated near the poles. The magnet has the property of attracting magnetic substances like iron, and it can also repel another magnet if the like poles are brought close to each other.

3.Explain the process of magnetization.

Answer:

Magnetization is the process of aligning the magnetic domains in a material to make it a magnet. When a material is rubbed against a magnet or exposed to a strong magnetic field, the magnetic domains

within the material align in a specific direction, resulting in the material becoming a magnet. This process is commonly used to create temporary magnets.

4.Differentiate between a temporary magnet and a permanent magnet.

Answer:

A temporary magnet is a material that becomes magnetized in the presence of a magnetic field but loses its magnetism when the field is removed. An example is soft iron. On the other hand, a permanent magnet, like a bar magnet or a refrigerator magnet, retains its magnetism even after the external magnetic field is removed. This is because the magnetic domains in a permanent magnet are naturally aligned.

5.Explain the construction and working of a compass.

Answer:

A compass consists of a small, lightweight magnet that is free to rotate. The magnet aligns itself with the Earth's magnetic field, with one end pointing towards the magnetic north pole. The compass needle has a marked end, usually red, which indicates the north direction. The construction involves a thin, pointed needle mounted on a pivot, allowing it to rotate freely. The working principle relies on the interaction between the Earth's magnetic field and the magnetic needle.

6.How does the Earth act like a magnet? Explain the magnetic poles of the Earth.

Answer:

The Earth acts like a magnet because of the movement of molten iron and nickel in its outer core. This movement generates a magnetic field. The magnetic north pole is located near the geographic north pole, and the magnetic south pole is located near the geographic south pole. The Earth's magnetic field lines emerge from the magnetic south pole and enter the magnetic north pole. Compass needles align with these magnetic field lines, pointing towards the magnetic north pole.

7.Describe the factors affecting the strength of a magnet.

Answer:

The strength of a magnet is influenced by various factors. One factor is the material used; some materials have a higher magnetic permeability and retain their magnetism better than others. The shape of the magnet also plays a role; longer and narrower magnets generally have stronger fields. Temperature can affect magnetism, as heating a magnet can cause it to lose its magnetic properties. Finally, the external magnetic field can either strengthen or weaken a magnet, depending on its direction relative to the magnet.

8.Explain the applications of magnets in everyday life.

Answer:

Magnets find numerous applications in everyday life. They are used in electric motors, generators, and transformers. Magnets are crucial in various electronic devices such as speakers, headphones, and hard drives. Magnetic strips are used in credit cards and ID cards. Magnets are also employed in medical equipment like MRI machines. In the kitchen, magnets are used in refrigerator doors and as closures for cabinets. Their applications extend to transportation, where they are used in maglev trains and magnetic levitation systems.

9.Discuss the importance of magnets in the generation of electricity.

Answer:

Magnets play a vital role in the generation of electricity through electromagnetic induction. When a conductor, such as a coil of wire, moves in a magnetic field, an electromotive force (EMF) is induced, creating an electric current. This phenomenon is the basis for the functioning of electric generators. By rotating a coil of wire within a magnetic field, electricity can be generated. This process is widely used in power plants to produce electrical energy for various applications.

10.Compare and contrast the magnetic properties of ferromagnetic, paramagnetic, and diamagnetic materials.

Answer:

Ferromagnetic materials, like iron and cobalt, can be strongly magnetized and retain their magnetization. Paramagnetic materials, such as aluminium, become weakly magnetized in the presence of an external magnetic field but lose their magnetism when the field is removed. Diamagnetic materials, like copper, are weakly repelled by a magnet. They acquire a very weak, induced magnetic moment opposite to the applied field but lose it when the external field is removed. These distinctions arise from differences in the behaviour of the atomic magnetic moments within each type of material.

2. State whether the following statements are true or false:

(i) A cylindrical magnet has only one pole.

(ii) Artificial magnets were discovered in Greece.

(iii) Similar poles of a magnet repel each other.

(iv) Maximum iron filings stick in the middle of a bar magnet when it is brought near them.

(v) Bar magnets always point towards North-South direction.

(vi) A compass can be used to find East-West direction at any place.

(vii) Rubber is a magnetic material.

Answer:

i) False

ii) False

iii) True

iv) False

v) True (Freely suspended bad magnet)

vi) True

vii) False

10. A magnet was brought from different directions towards a toy boat that has been floating in water in a tub. The effect observed in each case is stated in Column I. Possible reasons for the observed effects are mentioned in Column II. Match the statements given in Column I with those in Column II.

Column I	**Column II**
Boat gets attracted towards the magnet	**Boat is fitted with a magnet with a north pole towards its head**
Boat is not affected by the magnet	**Boat is fitted with a magnet with a south pole towards its head**

Boat moved towards the magnet when the north pole was brought near its head	**Boat has a small magnet fixed along its length**
Boat moves away from the magnet when the north pole is brought near its head	**Boat is made up of magnetic material**
Boat floats without changing its direction	**Boat is made up of non-magnetic material**

Answer:

Column I	**Column II**
Boat gets attracted towards the magnet	Boat is made up of magnetic material
Boat is not affected by the magnet	Boat is made up of non-magnetic material
Boat moved towards the magnet when the north pole was brought near its head	Boat is fitted with a magnet with the south pole towards its head
Boat moves away from the magnet when the north pole is brought near its head	Boat is fitted with a magnet with a north pole towards its head
Boat floats without changing its direction	Boat has a small magnet fixed along its length

1. Fill in the blanks in the following

(i) Artificial magnets are made in different shapes such as _____, _____ and _____.

(ii) The materials which are attracted towards a magnet are called_____.

(iii) Paper is not a _____ material.

(iv) In the olden days, sailors used to find direction by suspending a piece of _____.

(v) A magnet always has _____ poles.

(vi) Magnetic field lines emerge from the _____ pole and enter the _____ pole of a magnet.

(vii) The process of aligning the magnetic domains in a material to make it a magnet is called _____.

(viii) A compass needle aligns itself with the _____ magnetic field and points towards the _____ direction.

(ix) Heating a magnet can cause it to lose its magnetic properties due to the effect of _____.

Answer:

(i) Artificial magnets are made in different shapes such as **bar magnet**, **horse shoe** and **cylindrical.**

(ii) The materials which are attracted towards a magnet are called **magnetic.**

(iii) Paper is not a **magnetic** material.

(iv) In the olden days, sailors used to find direction by suspending a piece of **magnet**.

(v) A magnet always has **two** poles.

(vi) Magnetic field lines emerge from the **north** pole and enter the **south** pole of a magnet.

(vii) The process of aligning the magnetic domains in a material to make it a magnet is called **magnetization.**

(viii) A compass needle aligns itself with the **Earth's** magnetic field and points towards the **north** direction.

(ix) Heating a magnet can cause it to lose its magnetic properties due to the effect of **temperature.**

Multiple choice:

1.What is the property of a magnet to attract magnetic materials called?

A) Magnetization

B) Magnetic induction

C) Magnetic attraction

D) Magnetic repulsion

Answer:

C) Magnetic attraction

2.What is the reason behind a compass needle aligning itself with the Earth's magnetic field?

A) Gravitational force

B) Electrostatic force

C) Magnetic force

D) Nuclear force

Answer:

C) Magnetic force

3. Which of the following materials can be easily magnetized?

A) Copper

B) Aluminium

C) Iron

D) Silver

Answer:

C) Iron

4.What happens when like poles of magnets are brought close to each other?

A) They attract each other

B) They repel each other

C) They rotate

D) They remain unaffected

Answer:

B) They repel each other

5.Which type of magnet loses its magnetism when the external magnetic field is removed?

A) Permanent magnet

B) Temporary magnet

C) Electromagnet

D) Ferromagnet

Answer:

B) Temporary magnet

6.The magnetic field lines around a bar magnet flow from:

A) South to North inside the magnet

B) North to South inside the magnet

C) South to North outside the magnet

D) North to South outside the magnet

Answer:

C) South to North outside the magnet

7. What is the process of aligning the magnetic domains in a material to make it a magnet called?

A) Magnetization

B) Demagnetization

C) Magnetic induction

D) Magnetic reversal

Answer:

A) Magnetization

8.Which of the following is an application of magnets in everyday life?

A) Cooking

B) Transportation

C) Reading

D) Sleeping

Answer:

B) Transportation

9.What is the magnetic property exhibited by materials like aluminium in the presence of an external magnetic field?

A) Ferromagnetism

B) Para magnetism

C) Diamagnetism

D) Antiferromagnetism

Answer:

B) Para magnetism

10.What is the primary reason for the Earth acting like a magnet?

A) Rotation of the Earth

B) Movement of molten iron and nickel in the outer core

C) Gravitational forces

D) Presence of magnetic rocks on the surface

Answer:

B) Movement of molten iron and nickel in the outer core

Summary:

"Fun with Magnets" is an introduction to the captivating world of magnets and magnetism. Magnets, characterized by their ability to attract certain materials like iron, exhibit distinct properties such as having north and south poles. The concept of magnetic field lines, invisible forces surrounding magnets, is explored, emphasizing their emergence from the north pole and entry into the south pole. The chapter introduces two primary types of magnets—permanent magnets, which retain their magnetism, and temporary magnets, which can be magnetized temporarily. The process of magnetization, involving the alignment of magnetic domains in a material, is explained, demonstrating how rubbing a magnetic material with a magnet can induce temporary magnetization.

The importance of magnets in everyday life is underscored through applications in electric motors, generators, and various household items. Students learn about the Earth's magnetism, where the planet itself acts as a giant magnet with north and south poles, influencing the alignment of compass needles. The chapter also delves into factors affecting magnetism, including material, shape, temperature, and external magnetic fields. By covering these fundamental concepts, "Fun with Magnets" lays the groundwork for a deeper understanding of magnetism's applications and principles in future studies.