



Second
Semester
2024/2025

Lesson 1
Chemical
Substances

Unit 1

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PREP 1

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science



Question 1 Choose the correct answer from the following options:

Question 1: Which of the following is a characteristic electron configuration of the last energy level in most metals?

- A) 1, 2, or 3 electrons
- B) 5, 6, or 7 electrons
- C) 8 electrons
- D) 4 electrons

Question 2: Which of the following statements is true regarding the physical state of metals and nonmetals?

- A) All metals are liquids except mercury, which is a solid.
- B) All metals are solids except mercury, which is a liquid.
- C) Nonmetals are only gases.
- D) Nonmetals are either solids or liquid, except bromine, which is a gas.

Question 3: Which property is most likely to be observed in a metallic element compared to a nonmetallic element?

- A) Metallic luster
- B) Brittle texture
- C) Non-conductive nature
- D) Low density

Question 4: Which of the following properties is typically found in metals but not in nonmetals?

- A) Ductility
- B) Malleability
- C) Formability
- D) All of the above

Question 5: Which of the following metals is known for its metallic luster and ductility?

- A) Carbon
- B) Sulfur
- C) Sodium
- D) Graphite





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Question 6: What is a common characteristic of nonmetals like carbon and sulfur?

- A) High thermal conductivity
- B) Metallic luster
- C) Brittleness and opacity
- D) High electrical conductivity

Question 7: Which of the following is an exception among nonmetals due to its use in dry cells and ability to conduct electricity?

- A) Sulfur
- B) Carbon in the form of graphite
- C) Sodium
- D) Copper

Question 8: How do metals typically differ from nonmetals in terms of physical properties?

- A) Metals are brittle and non-lustrous.
- B) Nonmetals have high melting points.
- C) Metals are good electrical and thermal conductors.
- D) Nonmetals are ductile and malleable.

Question 9: Which of the following best describes the appearance of most metals compared to nonmetals?

- A) Transparent
- B) Opaque with no luster
- C) Shiny with metallic luster
- D) Always liquid at room temperature

Question 10: Which property is characteristic of metals that helps in their usage in wiring and cookware?

- A) Solubility in water
- B) Brittleness
- C) Thermal conductivity
- D) Insulation properties

Question 11: Among the following, which is not a characteristic feature of metals?

- A) Malleability
- B) Ductility
- C) Ability to form alloys
- D) High electrical resistance





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Question 12 : What property of metals allows them to be drawn into wires?

- A) Ductility
- B) Opacity
- C) Brittleness
- D) Poor thermal conductivity

Question 13 : What is the arrangement of atoms in solid metals known as?

- A) Covalent lattice
- B) Ionic lattice
- C) Molecular lattice
- D) Metallic crystal lattice

Question 14: In the structure of a metallic crystal lattice, what role do the valence electrons play?

- A) They are tightly bound to individual atoms.
- B) They move freely within the lattice.
- C) They are completely absent.
- D) They form covalent bonds between metal ions.

Question 15: What term describes the force of attraction in a metallic bond?

- A) The attraction between neutral atoms.
- B) The attraction between positive metal ions and a cloud of free-moving valence electrons.
- C) The repulsive force between negative ions.
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Question 16: In metallic bonds, the metal atoms are:

- A) Neutral.
- B) Charged as cations.
- C) Charged as anions.
- D) Not present as individual entities.

Question 17: What is responsible for the high melting points and hardness of metals?

- A) Metallic bonds
- B) Covalent bonds
- C) Hydrogen bonds
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Question 18: How does the number of valence electrons affect the hardness of metals?

- A) Hardness decreases with an increase in valence electrons.
- B) Hardness increases with an increase in valence electrons.
- C) The number of valence electrons has no effect on hardness.
- D) Hardness is only affected by atomic mass.

Question 19: Which property of metals is directly influenced by metallic bonds?

- A) Solubility in water
- B) Electrical insulation
- C) High melting points
- D) Low density

Question 20: Why are pure metals often combined to form alloys for industrial use?

- A) Pure metals are too hard.
- B) Pure metals are soft and unsuitable for most industrial applications.
- C) Pure metals are too expensive.
- D) Pure metals are non-conductive.

Question 21 : What is an alloy?

- A) A pure metallic element
- B) A compound of a metal and a nonmetal
- C) A mixture of two or more metals or metals with nonmetals, which does not have a molecular formula
- D) A synthetic metal

Question 22: Which metals primarily compose bronze, an alloy used in jewelry and statues?

- A) Copper and zinc
- B) Copper and nickel
- C) Copper (95%) and tin (5%)
- D) Copper and silver





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Question 23: What is a characteristic feature of bronze compared to pure copper?

- A) Bronze is softer than copper.
- B) Bronze rusts more easily than copper.
- C) Bronze has a lower melting point than copper
- D) Bronze is harder than copper and does not rust.

Question 24: How are alloys typically expressed in terms of composition?

- A) As mixtures, usually not expressed in molecular formulas
- B) As homogeneous mixtures without fixed ratios.
- C). Using molecular formulas.
- D) Through their crystalline structures.

Question 25: What is the primary application of bronze alloy ?

- A) Electrical wiring.
- B) Aerospace components.
- C) Jewelry, medals, and statues.
- D) Automotive parts.

Question 26: What is the process of converting waste materials into new usable substances known as?

- A) Composting
- B) Digestion
- C) Reprocessing
- D) Recycling

Question 27: Why are metals like copper, aluminum, and iron commonly recycled?

- A) They are abundant in the earth's crust.
- B) It is easy to extract them from their ores.
- C) Recycling is often more expensive than extraction.
- D) Their percentage in the earth's crust decreases, and recycling is cheaper than extracting from ores.

Question 28: Which of the following is a reason for recycling metals rather than extracting them from ores?

- A) Recycling requires more energy.
- B) Metals are unlimited in ores.





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C) It is difficult and costly to extract them from their ores.

D) Extracted metals are purer.

Question 29: All the following are properties of the sodium element, except

- a) a metal.
- b) has metallic luster.
- c) bad electrical conductor.
- d) formable.

Question 30: Which of the following is the correct arrangement of the hardness of sodium 11Na, magnesium 12Mg, and aluminum 13Al?

- a) $\text{Na} > \text{Mg} > \text{Al}$
- b) $\text{Al} > \text{Mg} > \text{Na}$
- c) $\text{Mg} > \text{Na} > \text{Al}$
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Question 31: Element (X) its boiling point is 2807°C and its melting point is 1064°C .

Which of the following is a property of element (X)?

- a) Bad electrical conductor.
- b) Brittle.
- c) Ductile.
- d) Opaque.

Question 32: Which of the following questions helps in the classification of some elements to metals and nonmetals?

- a) Is it solid?
- b) Is it liquid?
- c) Is it colored?
- d) Is it brittle?

Question 33: What is the common property of both sodium and copper?

- a) Colour.
- b) Density.
- c) Melting point.
- d) Physical state.

Question 2

Comparison between Metals and Nonmetals:





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Question 3

Explain the process of recycling and its importance in the context of metals

Answer:

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Question 4





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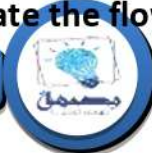
Question 2

Comparison between Metals and Nonmetals:

1. Electrical Conductivity:

○ Metals:

- Metals are excellent conductors of electricity. This property is due to the presence of free electrons within the metallic bond structure that facilitate the flow of electric current.





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○ **Nonmetals:**

- Nonmetals generally have poor electrical conductivity. Many nonmetals are insulators, although there are exceptions like graphite, a form of carbon that can conduct electricity due to its unique structure.

2. Malleability, Ductility, and Formability:

○ **Metals:**

- Metals are typically malleable, meaning they can be hammered or rolled into thin sheets without breaking. They are also ductile, which allows them to be drawn into wires. This deformability is linked to the ability of metal atoms within the crystal lattice to slide past one another under stress without losing their cohesive bond.

○ **Nonmetals:**

- Nonmetals are usually brittle and lack the malleability and ductility of metals. When subjected to stress, nonmetals are more likely to shatter or break rather than deform.

3. Metallic Luster:

○ **Metals:**

- Most metals possess a distinctive shiny, metallic luster due to their ability to reflect light from their surface. This reflective quality is characteristic of metals and is often used as a key identifier.

○ **Nonmetals:**

- Nonmetals do not generally exhibit metallic luster; they tend to have a duller appearance. Some may be shiny, but their shine is different from the metallic luster of metals and is not due to the same physical properties.





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Question 3

Explain the process of recycling and its importance in the context of metals

Answer:

Recycling refers to the process of converting waste materials into new, usable substances. This process is especially critical for metals such as copper, aluminum, and iron, which are increasingly important in industrial applications but are becoming less abundant in the Earth's crust. Recycling metals is more economical and energy-efficient than extracting them from ores, as the extraction process often requires significant amounts of energy and can lead to environmental degradation.

Question 4

Discuss the properties of alloys and how they differ from their constituent elements, using bronze as an example.

Answer: Alloys are mixtures composed of two or more elements, at least one of which is a metal, and they exhibit properties that are different from those of their constituent elements. Alloys are created to enhance certain qualities such as strength, ductility, corrosion resistance, and melting point, tailored to specific industrial needs. For example, bronze is an alloy primarily made of copper and tin, typically containing about 95% copper and 5% tin.

