CBSE CLASS X

Science (086)

QUESTION PAPER

AI-generated question paper

Code: NAWET9 **Questions: 34** **Maximum Marks: 72** **Generated: 2026-06-25 17:41**

SELECTIONS USED

Subject	Science
Lessons	3 Metals and Non-metals
Level of understanding	Exam-ready
Question selection	CBSE board paper, whole lesson (~80 marks across Sections A-E)
Model	claude-sonnet-4-6

Composition — Difficulty: 10 straightforward · 18 medium · 6 deep | Types: 13 MCQ · 6 Short · 5 Very short · 4 Assertion–reason · 3 Long · 3 Case-based | Sections: A 17Q/17m · B 5Q/10m · C 6Q/18m · D 3Q/15m · E 3Q/12m

Q1. straightforward exam-ready **[1]**

Gold is preferred for making jewellery because it:
(A) is the most malleable of all metals
(B) does not react with oxygen even at high temperatures
(C) is the best conductor of electricity
(D) has the highest density among metals

A is the most malleable of all metals
B does not react with oxygen even at high temperatures
C is the best conductor of electricity
D has the highest density among metals

◆ **Metals and Non-metals**

Q2. straightforward exam-ready **[1]**

When calcium reacts with cold water, a gas is evolved which makes the metal float on the surface. The gas evolved is:
(A) Oxygen
(B) Carbon dioxide
(C) Hydrogen
(D) Nitrogen

A Oxygen
B Carbon dioxide
C Hydrogen
D Nitrogen

◆ **Metals and Non-metals**

Q3. straightforward exam-ready **[1]**

In electrolytic refining of copper, which component is used as the anode?
(A) Pure copper strip
(B) Impure copper block
(C) Copper sulphate solution
(D) Carbon rod

A Pure copper strip
B Impure copper block
C Copper sulphate solution
D Carbon rod

◆ **Metals and Non-metals**

Q4. straightforward exam-ready **[1]**

Which of the following non-metals is a liquid at room temperature?
(A) Sulphur
(B) Iodine
(C) Bromine
(D) Phosphorus

A Sulphur
B Iodine
C Bromine
D Phosphorus

◆ **Metals and Non-metals**

Q5. straightforward exam-ready **[1]**

Aqua regia is a mixture of concentrated hydrochloric acid and concentrated nitric acid in the ratio of:
(A) 1:3
(B) 3:1
(C) 1:1
(D) 2:1

A 1:3 ($HCl : HNO_3$)
B 3:1 ($HCl : HNO_3$)
C 1:1 ($HCl : HNO_3$)
D 2:1 ($HCl : HNO_3$)

◆ **Metals and Non-metals**

Q6. straightforward exam-ready **[1]**

The process of converting a sulphide ore into its oxide by heating strongly in the presence of excess air is called:
(A) Calcination
(B) Smelting
(C) Roasting
(D) Refining

A Calcination
B Smelting
C Roasting
D Refining

◆ **Metals and Non-metals**

Q7. straightforward exam-ready **[1]**

Which of the following metals does NOT react with dilute hydrochloric acid?
(A) Zinc
(B) Iron
(C) Copper
(D) Magnesium

A Zinc
B Iron
C Copper
D Magnesium

◆ **Metals and Non-metals**

Q8. straightforward exam-ready **[1]**

An alloy of lead and tin is used for welding electrical wires. This alloy is known as:
(A) Brass
(B) Bronze
(C) Solder
(D) Steel

A Brass
B Bronze
C Solder
D Steel

◆ **Metals and Non-metals**

Q9. medium exam-ready **[1]**

Which of the following conditions is essential for iron to rust?
(A) Presence of air alone
(B) Presence of water alone
(C) Presence of both air and water
(D) Presence of carbon dioxide alone

A Presence of air alone
B Presence of water alone
C Presence of both air and water
D Presence of carbon dioxide alone

◆ **Metals and Non-metals**

Q10. medium exam-ready **[1]**

Which of the following correctly represents the order of decreasing reactivity of metals?
(A) Na > Ca > Mg > Al > Zn
(B) Al > Mg > Ca > Na > Zn
(C) Zn > Al > Mg > Na > Ca
(D) Ca > Na > Al > Mg > Zn

A Na > Ca > Mg > Al > Zn
B Al > Mg > Ca > Na > Zn
C Zn > Al > Mg > Na > Ca
D Ca > Na > Al > Mg > Zn

◆ **Metals and Non-metals**

Q11. medium exam-ready **[1]**

Ionic compounds do not conduct electricity in the solid state, but do so in the molten state. What is the primary reason for this?

(A) Solid ionic compounds have no ions

(B) Ions are mobile in the molten state but are rigidly held in solid state

(C) Molten ionic compounds generate new electrons

(D) The melting process creates covalent bonds

A Solid ionic compounds have no ions

B Ions are mobile in the molten state but are rigidly held in solid state

C Molten ionic compounds generate new electrons

D The melting process creates covalent bonds

◆ **Metals and Non-metals**

Q12. medium exam-ready **[1]**

A copper wire is placed in a solution of silver nitrate. After some time, a shiny deposit appears on the copper wire and the solution turns blue. Which of the following conclusions is correct?

(A) Copper is less reactive than silver

(B) Copper is more reactive than silver

(C) Silver is more reactive than copper

(D) Both metals have equal reactivity

A Copper is less reactive than silver

B Copper is more reactive than silver

C Silver is more reactive than copper

D Both metals have equal reactivity

◆ **Metals and Non-metals**

Q13. medium exam-ready **[1]**

Highly reactive metals such as sodium, magnesium and calcium are extracted by electrolysis of their molten chlorides rather than by reduction with carbon. The best reason for this is:

(A) Carbon is too expensive

(B) These metals have greater affinity for oxygen than carbon does

(C) Electrolysis is a cheaper process

(D) Their chlorides do not melt easily

A Carbon is too expensive

B These metals have greater affinity for oxygen than carbon does

C Electrolysis is a cheaper process

D Their chlorides do not melt easily

◆ **Metals and Non-metals**

Q14. medium exam-ready **[1]**

Assertion (A): Aluminium metal is highly reactive, yet it is widely used for making cooking utensils.
Reason (R): Aluminium develops a thin, stable oxide layer on its surface when exposed to air, which protects it from further corrosion.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is NOT the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

A Both A and R are true, and R is the correct explanation of A.
B Both A and R are true, but R is NOT the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

◆ **Metals and Non-metals**

Q15. medium exam-ready **[1]**

Assertion (A): Hydrogen gas is not evolved when a metal reacts with dilute nitric acid.
Reason (R): Nitric acid is a strong oxidising agent that oxidises the hydrogen produced to water.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is NOT the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

A Both A and R are true, and R is the correct explanation of A.
B Both A and R are true, but R is NOT the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

◆ **Metals and Non-metals**

Q16. straightforward exam-ready **[1]**

Assertion (A): Ionic compounds generally have high melting and boiling points.
Reason (R): A large amount of energy is needed to overcome the strong electrostatic forces of attraction between oppositely charged ions.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is NOT the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

A Both A and R are true, and R is the correct explanation of A.
B Both A and R are true, but R is NOT the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

◆ **Metals and Non-metals**

Q17. deep exam-ready **[1]**

Assertion (A): Carbon cannot be used to reduce sodium oxide or aluminium oxide to their respective metals.
Reason (R): Sodium and aluminium have greater affinity for oxygen than carbon does at high temperatures, so carbon cannot displace them from their oxides.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is NOT the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

A Both A and R are true, and R is the correct explanation of A.
B Both A and R are true, but R is NOT the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

◆ Metals and Non-metals

Q18. medium exam-ready **[2]**

Zinc oxide reacts with both dilute hydrochloric acid and with sodium hydroxide solution. Write the balanced chemical equations for both reactions. What does this dual behaviour indicate about the chemical nature of zinc oxide?

◆ Metals and Non-metals

Q19. medium exam-ready **[2]**

Magnesium does not react with cold water but reacts with hot water and also with steam. What products are formed in each case? Write the equation for the reaction of magnesium with steam.

◆ Metals and Non-metals

Q20. straightforward exam-ready **[2]**

Define the term 'gangue'. Why is it necessary to remove gangue before extracting a metal from its ore?

◆ Metals and Non-metals

Q21. medium exam-ready **[2]**

What is galvanisation? Why does a galvanised iron article remain protected against rusting even if its zinc coating is scratched?

◆ Metals and Non-metals

Q22. medium exam-ready **[2]**

State one physical property each that makes (i) iodine an exception among non-metals and (ii) graphite an exception among non-metals.

◆ Metals and Non-metals

Q23. medium exam-ready **[3]**

Distinguish between roasting and calcination. Give one example of each, with the relevant chemical equation.

◆ Metals and Non-metals

Q24. medium exam-ready **[3]**

The thermit reaction is used to join railway tracks. Write the chemical equation for this reaction and explain why the iron produced is in the molten state.

◆ Metals and Non-metals

Q25. deep exam-ready **[3]**

Four metals P, Q, R and S were tested with cold water, hot water and steam. P reacted vigorously with cold water producing fire; Q reacted only with steam; R did not react with water at all; and S reacted with hot water but not violently. Arrange P, Q, R and S in decreasing order of reactivity. Identify one metal from the activity series that could correspond to each of P, Q and R.

◆ Metals and Non-metals

Q26. medium exam-ready **[3]**

Pure gold is described as 24 carat gold and is considered too soft for making jewellery. Explain why it is alloyed and what 22 carat gold means. Also state one general effect alloying has on the electrical conductivity and melting point of a pure metal.

◆ Metals and Non-metals

Q27. medium exam-ready **[3]**

Explain why copper articles develop a green coating on their surface over time. Also explain the chemical nature of the substance that tarnishes silver articles and that which tarnishes copper articles.

◆ Metals and Non-metals

Q28. medium exam-ready **[3]**

State any three general physical properties of ionic compounds. Explain why ionic compounds dissolve readily in water but not in non-polar solvents such as petrol or kerosene.

◆ Metals and Non-metals

Q29. deep exam-ready **[5]**

(a) What is the reactivity series of metals? On the basis of the reactivity series, explain how metals are grouped for the purpose of extraction from their ores.
(b) Write the steps involved in the extraction of a metal of medium reactivity from its sulphide ore, giving an example with relevant equations.
(c) Why can carbon not be used to reduce the oxides of metals like sodium and magnesium? How are these metals extracted?

◆ Metals and Non-metals

Q30. deep exam-ready **[5]**

(a) Describe the chemical properties of metals with respect to their reactions with (i) oxygen, (ii) water, and (iii) dilute acids. Give one example with a balanced equation for each.
(b) Explain why hydrogen gas is NOT evolved when copper reacts with dilute nitric acid, whereas it IS evolved when magnesium reacts with very dilute nitric acid.

◆ Metals and Non-metals

Q31. deep exam-ready **[5]**

(a) Compare the physical properties of metals and non-metals under the following heads: (i) physical state at room temperature, (ii) malleability and ductility, (iii) electrical conductivity.
(b) When magnesium burns in air, the ash formed dissolves in water to give a solution that turns red litmus blue. When sulphur burns and the fumes dissolve in water, the solution turns blue litmus red. What does this indicate about the general nature of metal and non-metal oxides? Write the equations for the formation of these oxides.
(c) Name one metal and one non-metal that are exceptions to these general rules for electrical conductivity.

◆ Metals and Non-metals

Q32. medium exam-ready **[4]**

Read the following and answer the questions that follow:

Ramesh is a jeweller who works with different metals daily. He notices that iron tools rust quickly if left damp, while his gold and silver ornaments stay shiny for years. Old copper bangles develop a green coating, which disappears when dipped in dilute acid. To make jewellery more durable, pure gold is mixed with copper or silver before shaping.

(i) Gold and silver resist corrosion under normal conditions while iron rusts. What does this tell you about the relative positions of these metals in the reactivity series? (1 mark)
(ii) What is the green coating on copper bangles? Why does it dissolve in dilute acid? (1 mark)
(iii) What is the term for the mixture obtained by combining gold with copper or silver? State one advantage of making this mixture over using pure gold. (1 mark)
(iv) A student claims that iron will rust if kept in completely dry air. Is this claim correct? Justify your answer. (1 mark)

◆ **Metals and Non-metals**

Q33. medium exam-ready **[4]**

Read the following and answer the questions that follow:

In a school laboratory, a teacher demonstrated the extraction of metals using different methods. For metal X (found as its sulphide ore), she first heated it strongly in excess air, then reduced the product with carbon to obtain the metal. For metal Y, she showed that simply heating its oxide in a test tube was sufficient to obtain the metal as droplets. For metal Z (a very reactive metal), she performed electrolysis of its molten chloride to deposit it at one of the electrodes.

(i) What is the name of the process used to convert the sulphide ore of metal X into its oxide? Write a general equation for this conversion. (1 mark)
(ii) What does the extraction of metal Y by heating alone tell you about its position in the activity series? Name one such metal. (1 mark)
(iii) At which electrode is metal Z deposited during electrolysis? Write the half-reaction that occurs at that electrode. (1 mark)
(iv) During the electrolytic refining of a metal, an impure residue settles at the bottom of the electrolytic cell. What is this residue called, and what does it contain? (1 mark)

◆ **Metals and Non-metals**

Q34. deep exam-ready **[4]**

Read the following and answer the questions that follow:

Preeti observed that when she added a clean iron nail to a blue solution of copper sulphate, the solution gradually turned light green and a reddish-brown deposit appeared on the iron nail. Her teacher explained that a metal higher in the activity series displaces a metal lower down from its salt solution, and that this principle is used to compare the reactivity of metals.

(i) Write the balanced chemical equation for the reaction that occurred when the iron nail was placed in copper sulphate solution. Name the type of reaction. (1 mark)
(ii) Why did the blue colour of the copper sulphate solution fade and turn light green? (1 mark)
(iii) If Preeti places a copper wire in a solution of iron sulphate ($FeSO_4$), what will she observe? Give a reason based on the activity series. (1 mark)
(iv) Using the same principle of displacement, predict whether zinc can displace copper from copper sulphate solution. Write the balanced equation if the reaction occurs, or justify why it does not. (1 mark)

◆ **Metals and Non-metals**

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