

KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD
FIRST SUMMATIVE ASSESSMENT (SA-1) / HALF-YEARLY EXAMINATION — 2026-27

Class: X (SSLC) Subject: Science

Time: 3 Hours 15 Minutes (including 15 minutes for reading the question paper)

Max. Marks: 80

ANSWER KEY / SCHEME OF VALUATION

Scheme of Valuation — Notes

- Award marks as per the value points listed. Equivalent correct points/expressions may be given full credit.
- Where a question carries an internal choice, evaluate only the part attempted by the candidate.
- For numerical problems, award part marks for correct method/steps even if the final answer is not reached, as indicated.

PART – A

Answer ALL the questions. Each question carries 1 mark.

1. Rusting of iron is an example of a/an: [1]

- (a) physical change
- (b) oxidation reaction
- (c) reduction reaction
- (d) acid-base reaction

Ans: (b) oxidation reaction

2. The pH of a neutral solution is: [1]

- (a) 0
- (b) 7
- (c) 14
- (d) greater than 7

Ans: (b) 7

3. Which of the following is commonly used as an antacid? [1]

- (a) Sodium hydroxide
- (b) Milk of magnesia
- (c) Hydrochloric acid
- (d) Sodium chloride

Ans: (b) Milk of magnesia

4. Metals react with dilute acids to produce: [1]

- (a) oxygen gas
- (b) hydrogen gas
- (c) chlorine gas
- (d) nitrogen gas

Ans: (b) hydrogen gas

5. The most reactive metal among the following is: [1]

- (a) Copper
- (b) Gold
- (c) Sodium
- (d) Silver

Ans: (c) Sodium

6. The general formula for the homologous series of alkanes is: [1]

- (a) C_nH_{2n+2}

- (b) C_nH_{2n}
 - (c) C_nH_{2n-2}
 - (d) C_nH_{2n+1}
- Ans: (a) C_nH_{2n+2}

7. Which of the following is a means of vegetative propagation in plants? [1]

- (a) Seed
 - (b) Spore
 - (c) Eye/bud of potato
 - (d) Zygote
- Ans: (c) Eye/bud of potato

8. The hormone responsible for increasing heartbeat during an emergency ('fight or flight' response) is: [1]

- (a) Insulin
 - (b) Adrenaline
 - (c) Thyroxine
 - (d) Testosterone
- Ans: (b) Adrenaline

PART – B

Answer ALL the questions. Each question carries 2 marks.

1. Write a balanced chemical equation for the reaction between zinc metal and dilute sulphuric acid. [2]

Ans: $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2\uparrow$

2. What is a combination reaction? Give one example with a balanced equation. [2]

Ans: A reaction in which two or more substances combine to form a single new substance.

Ans: Example: $CaO + H_2O \rightarrow Ca(OH)_2$

3. Why should a magnesium ribbon be cleaned with sandpaper before burning it in air? [2]

Ans: Magnesium reacts with atmospheric oxygen/moisture to form a layer of magnesium oxide/carbonate on its surface, which prevents it from burning properly; cleaning removes this layer so the metal burns freely.

4. State two physical properties of metals that make them suitable for making cooking utensils. [2]

Ans: Metals are good conductors of heat.

Ans: Metals are malleable and can be beaten into thin sheets/shaped easily; they also have high melting points.

5. Write the structural formulae of ethanol and ethanoic acid. [2]

Ans: Ethanol: CH_3-CH_2-OH

Ans: Ethanoic acid: CH_3-COOH

6. What is a homologous series? Give one example. [2]

Ans: A series of compounds with the same general formula and similar chemical properties, in which each successive member differs from the previous one by a $-CH_2-$ unit.

Ans: Example: the alkane series — methane, ethane, propane, ...

7. Name the organ where complete digestion of food takes place in humans. Why is it considered so? [2]

Ans: The small intestine.

Ans: It receives bile, pancreatic juice and intestinal juice, which complete the digestion of carbohydrates, proteins and fats, and it is also the site of absorption of digested food.

8. Mention one difference between a nervous response and a hormonal (chemical) response in the human body. [2]

Ans: A nervous response is fast and short-lived and travels through nerves as electrical impulses, whereas a hormonal response is slower, longer-lasting and travels through the bloodstream.

PART – C

Answer ALL the questions. Each question carries 3 marks.

1. What is a redox reaction? Identify the substance oxidised and the substance reduced in the reaction:
 $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$. [3]

Ans: A reaction in which oxidation and reduction occur simultaneously is called a redox reaction.

Ans: H_2 is oxidised to H_2O (gain of oxygen); CuO is reduced to Cu (loss of oxygen).

2. Describe the reaction of quicklime with water. Name the type of reaction and write the balanced equation. [3]

Ans: Quicklime (calcium oxide) reacts vigorously with water to form calcium hydroxide, releasing a large amount of heat.

Ans: $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{heat}$.

Ans: This is a combination reaction (also exothermic).

3. Why do ionic compounds have high melting and boiling points? Explain briefly. [3]

Ans: Ionic compounds are held together by strong electrostatic forces of attraction between the oppositely charged ions arranged in a rigid crystal lattice.

Ans: A large amount of energy is required to overcome these forces, so they have high melting and boiling points.

4. Explain the process of electrolytic refining of an impure metal (in brief). [3]

Ans: The impure metal is made the anode and a thin strip of pure metal is made the cathode in a solution of the metal salt (electrolyte).

Ans: On passing current, the impure metal dissolves from the anode and pure metal deposits on the cathode.

Ans: Insoluble impurities settle at the bottom as 'anode mud'.

5. How would you distinguish between ethanol and ethanoic acid using two simple chemical tests? [3]

Ans: Litmus test: ethanoic acid turns blue litmus red; ethanol has no effect on litmus.

Ans: Sodium carbonate test: ethanoic acid reacts with Na_2CO_3 to give brisk effervescence of CO_2 ; ethanol shows no reaction.

6. Explain the process of photosynthesis, mentioning the raw materials required, the site of the reaction and the balanced equation. [3]

Ans: Raw materials: carbon dioxide and water (in the presence of sunlight and chlorophyll).

Ans: Site: chloroplasts of green leaves.

Ans: $6\text{CO}_2 + 6\text{H}_2\text{O} \xrightarrow{\text{sunlight, chlorophyll}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$

7. List, in correct sequence, the main parts of the human alimentary canal. [3]

Ans: Mouth $\rightarrow$ oesophagus $\rightarrow$ stomach $\rightarrow$ small intestine $\rightarrow$ large intestine $\rightarrow$ rectum $\rightarrow$ anus.

8. Distinguish between tropic movement and nastic movement in plants, with one example of each. [3]

Ans: Tropic movements are directional, growth-related movements in response to a stimulus, e.g., phototropism (shoot bending towards light).

Ans: Nastic movements are non-directional movements independent of the direction of the stimulus, e.g., the folding of leaves of the touch-me-not (*Mimosa pudica*) plant on touching.

PART – D

Answer ALL the questions. Each question carries 4 marks.

1. With the help of a labelled diagram, describe the process of electrolytic refining of copper. [4]

Ans: Set-up: a block of impure copper as anode, a strip of pure copper as cathode, dipped in a solution of acidified copper sulphate.

Ans: On passing electric current: impure copper at the anode dissolves into the solution as Cu^{2+} ions; an equivalent amount of pure copper deposits on the cathode.

Ans: The insoluble impurities (like silver, gold) settle down below the anode as anode mud.

Ans: (Candidates should draw and label: anode, cathode, electrolyte, battery, direction of current.)

2. What are esters? Describe, with a chemical equation, how an ester is prepared in the laboratory. State one use of esters. [4]

Ans: Esters are sweet-smelling compounds formed by the reaction of an alcohol with a carboxylic acid (esterification), usually in the presence of a little concentrated sulphuric acid as a catalyst.

Ans: $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \rightarrow (\text{conc. H}_2\text{SO}_4) \rightarrow \text{CH}_3\text{COOC}_2\text{H}_5$ (ethyl ethanoate) + H_2O

Ans: Use: esters are used in making perfumes and as flavouring agents.

3. Explain, with the help of a flow diagram, the pathway of a reflex arc, taking the example of a person accidentally touching a hot object. [4]

Ans: Receptor (skin) $\rightarrow$ sensory neuron $\rightarrow$ relay neuron in the spinal cord $\rightarrow$ motor neuron $\rightarrow$ effector (muscle).

Ans: The information travels to the spinal cord and the motor response (withdrawing the hand) is generated immediately without waiting for the brain to process the sensation fully, making the reflex fast and protective.

4. Give reasons: (i) Sodium chloride does not conduct electricity in the solid state but does so in the molten/aqueous state. (ii) Ionic compounds are generally soluble in water. (iii) Ionic compounds have high melting points. (iv) Ionic compounds are brittle. [4]

Ans: (i) In the solid state the ions are held rigidly in a lattice and cannot move; in the molten/aqueous state the ions become free to move and can conduct electricity.

Ans: (ii) Water molecules (being polar) surround and separate the oppositely charged ions, weakening the electrostatic forces and dissolving the ionic compound.

Ans: (iii) Strong electrostatic forces of attraction between ions in the crystal lattice require a large amount of energy to break, giving high melting points.

Ans: (iv) A slight displacement of ion layers brings like charges opposite each other, causing repulsion, so the crystal breaks/shatters — hence ionic compounds are brittle.

5. Explain double displacement reaction with a suitable example. Also explain what is meant by a precipitation reaction, with an example. [4]

Ans: A double displacement reaction is one in which two compounds react by an exchange of ions to form two new compounds.

Ans: Example: $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 \downarrow + 2\text{NaCl}$

Ans: A precipitation reaction is a reaction that produces an insoluble solid (precipitate); in the above example, BaSO_4 is formed as a white insoluble precipitate.

6. Name the three main parts of the human brain and write one function of each. [4]

Ans: Forebrain: controls thinking, memory, intelligence and voluntary actions; also has centres for hearing, smell, sight and touch.

Ans: Midbrain: controls involuntary actions such as the movement of the eyeball.

Ans: Hindbrain (cerebellum, pons, medulla): the cerebellum maintains posture and balance; the medulla controls involuntary actions like blood pressure, salivation and vomiting.

PART – E

Answer the following question. It carries 8 marks.

1. Explain the reactivity series of metals. Describe, with an activity involving displacement reactions, how metals can be arranged in order of their reactivity, and explain how this series is useful in understanding the extraction of metals. [8]

Ans: Reactivity series: an arrangement of metals in decreasing order of their reactivity — e.g., $\text{K} > \text{Na} > \text{Ca} > \text{Mg} > \text{Al} > \text{Zn} > \text{Fe} > \text{Pb} > (\text{H}) > \text{Cu} > \text{Ag} > \text{Au}$.

Ans: Activity: take four test tubes with solutions of copper sulphate, iron sulphate, zinc sulphate and silver nitrate. Place a piece of zinc metal in each. Zinc displaces copper, iron and silver from their salt solutions (as it is more reactive) but not other more reactive metals — this can be repeated with iron and copper strips to rank the metals by observing which displaces which.

Ans: Observation: a more reactive metal displaces a less reactive metal from its salt solution, e.g., $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$.

Ans: Use in extraction: metals low in the reactivity series (like gold, silver, copper) are found in the free state or are easily extracted by heating; metals in the middle (like iron, zinc) are extracted by reduction of their oxides with carbon; highly reactive metals (like sodium, potassium, calcium, magnesium, aluminium) are extracted by the electrolytic reduction of their molten compounds, since chemical reduction is not sufficient to displace them from their compounds.