Jharkhand Polytechnic Chemistry

Sample Paper – 1

Duration: 50 Minutes **Maximum Marks: 50**

Instructions

- This paper contains **50** Multiple Choice Questions (Single Correct Answer), modelled on the Chemistry section of the **Jharkhand Polytechnic (PECE)** entrance examination conducted by JCECEB.
- Each correct answer carries **+1 mark**. There is **a negative marking of 0.25 mark** for every wrong answer. Unattempted questions carry **no penalty**.
- Only **one** option is correct. Choose carefully.
- This is an offline OMR based test. Darken the correct bubble fully with a blue or black ball pen.
- Use of mobile phones, calculators, or electronic gadgets is strictly prohibited.

Q1. The smallest particle of an element that takes part in a chemical reaction is the:

(A) molecule

(B) atom

(C) electron

(D) proton

Q2. Which one of the following is a compound?

(A) Air

(B) Brass

(C) Water

(D) Oxygen

Q3. The atomic number of an element is equal to the number of:

(A) protons

(B) neutrons

(C) protons and neutrons together

(D) electrons and neutrons together

Q4. An atom contains 11 protons and 12 neutrons. Its mass number is:

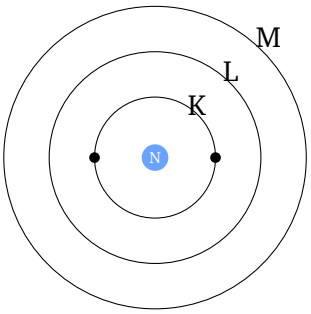
(A) 11

(B) 12

(C) 1

(D) 23

Q5. The figure shows the shells of an atom. The maximum number of electrons that the innermost K shell (first shell) can hold is:



(A) 1

(B) 2

(C) 8

(D) 18

Q6. Isotopes of an element have the same number of _____ but a different number of neutrons:

(A) protons

(B) neutrons

(C) nucleons

(D) molecules

Q7. The electric charge present on a neutron is:

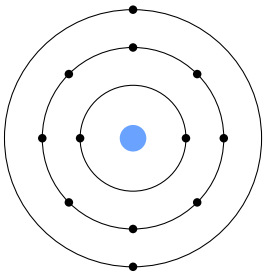
(A) positive

(B) negative

(C) zero (no charge)

(D) twice that of a proton

Q8. The electronic configuration of a magnesium atom ($Z = 12$), shown below, is:



(A) $2, 8$

(B) $2, 10$

(C) $8, 4$

(D) $2, 8, 2$

Q9. Which subatomic particle was discovered by J. J. Thomson?

(A) proton

(B) electron

(C) neutron

(D) positron

Q10. The modern periodic table arranges elements in order of increasing:

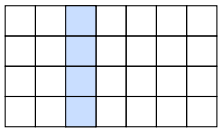
(A) atomic number

(B) atomic mass

(C) valency

(D) density

Q11. In the periodic table shown below, the highlighted vertical column is called a:



(A) period

(B) series

(C) group

(D) shell

Q12. The total number of horizontal rows (periods) in the modern periodic table is:

(A) 18

(B) 8

(C) 5

(D) 7

Q13. Elements placed in the same group of the periodic table have the same number of:

(A) shells

(B) valence electrons

(C) neutrons

(D) protons

Q14. Which one of the following is a noble (inert) gas?

(A) Argon

(B) Oxygen

(C) Nitrogen

(D) Chlorine

Q15. A chemical reaction in which a substance combines with oxygen is called:

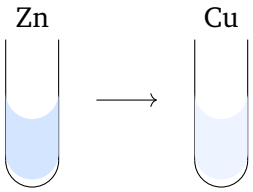
(A) reduction

(B) displacement

(C) decomposition

(D) oxidation

Q16. In the reaction $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$ (shown), the reaction type is:



(A) combination

(B) decomposition

(C) displacement

(D) double displacement

Q17. When a chemical equation is correctly balanced, the number of atoms of each element is:

(A) equal on both sides

(B) greater on the left side

(C) greater on the right side

(D) zero on both sides

Q18. The rusting of iron in moist air is an example of:

(A) reduction

(B) oxidation

(C) neutralisation

(D) sublimation

Q19. The breaking down of a compound by passing electricity through it is called:

(A) photolysis

(B) thermal decomposition

(C) combustion

(D) electrolysis

Q20. When a dilute acid reacts with an active metal, the gas usually evolved is:

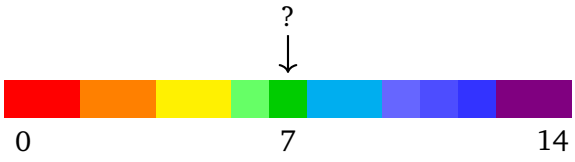
(A) oxygen

(B) carbon dioxide

(C) hydrogen

(D) chlorine

Q21. On the pH scale shown below, the pH of a neutral solution at 25°C is:



(A) 7

(B) 0

(C) 14

(D) 1

Q22. When dipped in an acidic solution, blue litmus paper turns:

(A) blue

(B) red

(C) green

(D) colourless

Q23. Which one of the following is a strong base?

(A) acetic acid

(B) citric acid

(C) carbonic acid

(D) sodium hydroxide

Q24. The chemical name of common table salt is:

(A) sodium carbonate

(B) sodium bicarbonate

(C) sodium chloride

(D) calcium chloride

Q25. A solution having pH $= 2$ is:

(A) strongly acidic

(B) neutral

(C) weakly basic

(D) strongly basic

Q26. The reaction between an acid and a base to form salt and water is called:

(A) oxidation

(B) neutralisation

(C) displacement

(D) combustion

Q27. Which one of the following metals is the best conductor of electricity?

(A) iron

(B) aluminium

(C) gold

(D) silver

Q28. Which one of the following non-metals is a liquid at room temperature?

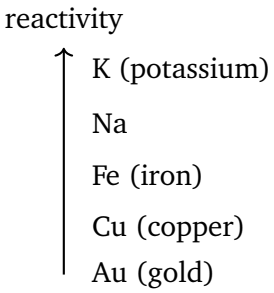
(A) carbon

(B) sulphur

(C) bromine

(D) iodine

Q29. Using the activity series shown below, the most reactive metal among the options is:



(A) potassium

(B) copper

(C) gold

(D) iron

Q30. The process of coating iron with a layer of zinc to prevent it from rusting is called:

(A) alloying

(B) galvanisation

(C) electrolysis

(D) annealing

Q31. Which one of the following is an alloy?

(A) copper

(B) iron

(C) brass

(D) zinc

Q32. Non-metals generally form oxides that are:

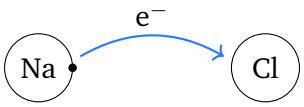
(A) basic in nature

(B) neutral only

(C) amphoteric

(D) acidic in nature

Q33. A chemical bond formed by the complete transfer of electrons from one atom to another, as shown, is called a/an:



(A) ionic bond

(B) covalent bond

(C) metallic bond

(D) hydrogen bond

Q34. A covalent bond is formed between two atoms by the _____ of electrons:

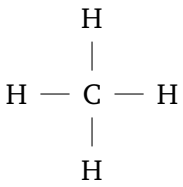
(A) transfer

(B) sharing

(C) removal

(D) gaining

Q35. From the structure of a methane (CH_4) molecule shown below, the number of covalent bonds present is:



(A) 1

(B) 2

(C) 4

(D) 3

Q36. The compound sodium chloride (NaCl) is held together by a/an:

(A) covalent bond

(B) metallic bond

(C) hydrogen bond

(D) ionic bond

Q37. The valency of carbon in its compounds is:

(A) 4

(B) 2

(C) 1

(D) 3

Q38. The molecular formula of methane is:

(A) C_2H_6

(B) CH_4

(C) C_2H_4

(D) CH_3OH

Q39. The functional group present in all alcohols is:

(A) $-COOH$

(B) $-CHO$

(C) $-OH$

(D) $>C=O$

Q40. The member of the alkane series that comes immediately after ethane (C_2H_6) is:

(A) methane

(B) ethene

(C) butane

(D) propane

Q41. In the structure shown below, the two carbon atoms are joined by sharing two pairs of electrons. This bond is a:

C ═══ C

(A) single bond

(B) double bond

(C) triple bond

(D) ionic bond

Q42. The general molecular formula of the alkane (saturated hydrocarbon) series is:

(A) C_nH_{2n+2}

(B) C_nH_{2n}

(C) C_nH_{2n-2}

(D) C_nH_n

Q43. The acid present in vinegar is:

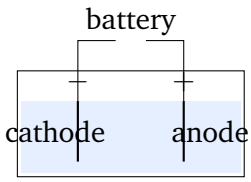
(A) citric acid

(B) formic acid

(C) acetic acid

(D) lactic acid

Q44. During the electrolysis of acidified water (apparatus shown), the gas collected at the cathode is:



(A) oxygen

(B) chlorine

(C) carbon dioxide

(D) hydrogen

Q45. An electrolyte is a substance that:

(A) conducts electricity in molten or aqueous form

(B) never conducts electricity

(C) is always a metal

(D) is always a gas

Q46. At constant temperature, the volume of a fixed mass of gas is inversely proportional to its pressure. This statement is:

(A) Charles' law

(B) Boyle's law

(C) Avogadro's law

(D) Gay-Lussac's law

Q47. In electrolysis, the electrode connected to the positive terminal of the battery is called the:

(A) cathode

(B) electrolyte

(C) anode

(D) cell

Q48. At constant pressure, the volume of a fixed mass of gas is directly proportional to its:

(A) pressure

(B) mass

(C) density

(D) absolute temperature

Q49. Which one of the following is a fossil fuel?

(A) coal

(B) hydrogen

(C) wood

(D) biogas

Q50. The gas mainly responsible for the greenhouse effect and global warming is:

(A) oxygen

(B) carbon dioxide

(C) nitrogen

(D) hydrogen

Detailed Solutions

Q1.

Solution

Concept — Atom: An atom is the smallest particle of an element that can take part in a chemical reaction. It may or may not exist freely, but it always shows the chemical properties of the element.

Step 1 — Compare the options: A molecule is made of two or more atoms; electrons and protons are sub-atomic parts of an atom.

Step 2 — Identify the answer: The smallest reacting unit of an element is the atom.

Why other options are wrong:

- A molecule is a group of atoms, not the smallest unit of an element.
- Electrons and protons are parts inside the atom.

Final Answer: The atom is the smallest reacting particle $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q1

Q2.

Solution

Concept — Elements, compounds, mixtures: A compound is a pure substance made of two or more elements chemically combined in a fixed ratio. A mixture has no fixed ratio and an element has only one kind of atom.

Step 1 — Test each option: Air is a mixture of gases; brass is a mixture (alloy) of copper and zinc; oxygen is an element.

Step 2 — Identify the compound: Water (H_2O) is hydrogen and oxygen chemically combined in a fixed ratio, so it is a compound.

Why other options are wrong:

- Air and brass are mixtures.
- Oxygen is a single element.

Final Answer: Water is the compound $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q2

Q3.

Solution

Concept — Atomic number: The atomic number (Z) of an element is the number of protons present in the nucleus of its atom. In a neutral atom it also equals the number of electrons.

Step 1 — Recall the definition: $Z =$ number of protons.

Step 2 — Confirm: It is the protons that fix the identity of the element.

Why other options are wrong:

- Neutrons give the mass number difference, not the atomic number.
- Protons + neutrons gives the mass number.
- Electrons + neutrons has no standard meaning here.

Final Answer: Atomic number = number of protons $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q3

Q4.

Solution

Concept — Mass number: The mass number (A) of an atom is the total number of protons and neutrons in its nucleus, $A =$ protons + neutrons.

Step 1 — List the data: protons $= 11$, neutrons $= 12$.

Step 2 — Add them: $A = 11 + 12$.

Step 3 — Compute: $A = 23$.

Why other options are wrong:

- 11 is only the proton number (atomic number).
- 12 is only the neutron number.
- 1 is the difference, which has no meaning here.

Final Answer: Mass number $= 23 \Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q4

Q5.

Solution

Concept — Shell capacity: The maximum number of electrons in a shell is given by $2n^2$, where n is the shell number. The K shell is the first shell, so $n = 1$.

Step 1 — Substitute $n = 1$: maximum $= 2 \times (1)^2$.

Step 2 — Compute: $2 \times 1 = 2$.

Why other options are wrong:

- 8 is the capacity of the L shell ($n = 2$).
- 18 is the capacity of the M shell ($n = 3$).
- 1 is less than the actual capacity.

Final Answer: The K shell holds a maximum of 2 electrons $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q5

Q6.

Solution

Concept — Isotopes: Isotopes are atoms of the same element that have the same number of protons (same atomic number) but a different number of neutrons (different mass number).

Step 1 — Fix what stays the same: The atomic number, that is the number of protons, stays the same.

Step 2 — Identify what changes: The number of neutrons changes, so the mass number differs.

Why other options are wrong:

- Neutrons differ between isotopes, so they are not the same.
- Nucleons (protons + neutrons) differ.
- Molecules are unrelated to this definition.

Final Answer: Isotopes have the same number of protons $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q6

Q7.

Solution

Concept — Sub-atomic particles: A proton carries a positive charge, an electron carries an equal negative charge, and a neutron carries no charge at all.

Step 1 — Recall the neutron: The neutron is electrically neutral.

Step 2 — State the charge: Its charge is zero.

Why other options are wrong:

- Positive charge belongs to the proton.
- Negative charge belongs to the electron.
- A neutron is not charged at all, so it cannot be twice a proton's charge.

Final Answer: A neutron has zero charge $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q7

Q8.

Solution

Concept — Electronic configuration: Electrons fill shells in order, with the K shell holding up to 2, the L shell up to 8, and the M shell the rest. Magnesium has 12 electrons.

Step 1 — Fill the K shell: 2 electrons. Remaining $= 12 - 2 = 10$.

Step 2 — Fill the L shell: 8 electrons. Remaining $= 10 - 8 = 2$.

Step 3 — Fill the M shell: the last 2 electrons.

Step 4 — Write the configuration: $2, 8, 2$.

Why other options are wrong:

- $2, 8$ accounts for only 10 electrons.
- $2, 10$ overfills the L shell.
- $8, 4$ wrongly fills the K shell.

Final Answer: Magnesium is $2, 8, 2 \Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q8

Q9.

Solution

Concept — Discovery of particles: J. J. Thomson discovered the electron through his cathode ray experiments. The proton is credited to Goldstein/Rutherford's work and the neutron to Chadwick.

Step 1 — Match the scientist: Thomson → electron.

Step 2 — Confirm: The electron is the negatively charged particle he identified.

Why other options are wrong:

- The neutron was discovered by James Chadwick.
- The proton is linked to Goldstein and Rutherford.
- The positron is a different particle, discovered much later.

Final Answer: Thomson discovered the electron ⇒ $\boxed{\text{B}}$

Answer: (B) Go Back to Q9

Q10.

Solution

Concept — Modern periodic law: The modern periodic law states that the properties of elements are a periodic function of their atomic number. So the table is arranged by increasing atomic number.

Step 1 — Recall the basis: Atomic number is the ordering property.

Step 2 — Confirm: This corrected the earlier table that used atomic mass.

Why other options are wrong:

- Atomic mass was used in Mendeleev's older table.
- Valency and density are not the ordering basis.

Final Answer: Elements are arranged by atomic number ⇒ $\boxed{\text{A}}$

Answer: (A) Go Back to Q10

Q11.

Solution

Concept — Groups and periods: In the periodic table, the vertical columns are called groups and the horizontal rows are called periods.

Step 1 — Read the figure: The highlighted column runs vertically.

Step 2 — Name it: A vertical column is a group.

Why other options are wrong:

- A period is a horizontal row.
- Series and shell are not names of table columns.

Final Answer: A vertical column is a group $\Rightarrow$ C

Answer: (C) Go Back to Q11

Q12.

Solution

Concept — Structure of the periodic table: The modern periodic table has 7 horizontal rows called periods and 18 vertical columns called groups.

Step 1 — Recall the number of periods: There are 7 periods.

Step 2 — Confirm: Do not confuse this with the 18 groups.

Why other options are wrong:

- 18 is the number of groups.
- 8 was the number of groups in the older table.
- 5 is incorrect.

Final Answer: There are 7 periods $\Rightarrow$ D

Answer: (D) Go Back to Q12

Q13.

Solution

Concept — Groups and valence electrons: Elements in the same group have the same number of valence (outermost) electrons, which is why they show similar chemical properties.

Step 1 — Identify the common feature: Same group $\rightarrow$ same number of valence electrons.

Step 2 — Confirm: The number of shells increases down a group, but the valence electrons stay the same.

Why other options are wrong:

- The number of shells increases down a group.
- Neutrons and protons differ from element to element.

Final Answer: Same group $\rightarrow$ same valence electrons $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q13

Q14.

Solution

Concept — Noble gases: Noble (inert) gases such as helium, neon and argon have completely filled outermost shells, so they are very unreactive.

Step 1 — Test the options: Oxygen, nitrogen and chlorine are reactive non-metals.

Step 2 — Identify the noble gas: Argon has a full outer shell and is a noble gas.

Why other options are wrong:

- Oxygen and nitrogen react to form many compounds.
- Chlorine is a very reactive halogen.

Final Answer: Argon is the noble gas $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q14

Q15.

Solution

Concept — Oxidation: Oxidation is a reaction in which a substance gains oxygen (or loses hydrogen/electrons). The opposite process is reduction.

Step 1 — Match the definition: Combining with oxygen is oxidation.

Step 2 — Confirm: For example, $2Mg + O_2 \rightarrow 2MgO$ is oxidation.

Why other options are wrong:

- Reduction is loss of oxygen or gain of hydrogen.
- Displacement and decomposition are different reaction types.

Final Answer: Combining with oxygen is oxidation $\Rightarrow$ D

Answer: (D) Go Back to Q15

Q16.

Solution

Concept — Displacement reaction: In a displacement reaction, a more reactive element pushes out (displaces) a less reactive element from its compound.

Step 1 — Look at the reaction: Zinc is more reactive than copper, so it displaces copper from copper sulphate.

Step 2 — Name the type: A single element replacing another makes it a displacement reaction.

Why other options are wrong:

- Combination joins substances into one product.
- Decomposition breaks one substance into many.
- Double displacement involves an exchange of ions between two compounds.

Final Answer: It is a displacement reaction $\Rightarrow$ C

Answer: (C) Go Back to Q16

Q17.

Solution

Concept — Law of conservation of mass: In a balanced chemical equation, atoms are neither created nor destroyed, so the number of atoms of each element is equal on both sides.

Step 1 — Apply the law: Total mass and atoms are conserved.

Step 2 — Conclude: Each element has equal atoms on the reactant and product sides.

Why other options are wrong:

- Unequal atoms would mean the equation is not balanced.
- Atoms cannot be zero on both sides.

Final Answer: Atoms are equal on both sides $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q17

Q18.

Solution

Concept — Rusting: Rusting is the slow oxidation of iron in the presence of moisture and air to form hydrated iron oxide (rust).

Step 1 — Identify the change: Iron combines with oxygen, which is oxidation.

Step 2 — Confirm: Moisture speeds up the process.

Why other options are wrong:

- Reduction is the opposite of what happens.
- Neutralisation is an acid–base reaction.
- Sublimation is a change of state, not a chemical reaction.

Final Answer: Rusting is oxidation $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q18

Q19.

Solution

Concept — Electrolysis: Electrolysis is the decomposition of a compound (in molten or aqueous form) by passing an electric current through it.

Step 1 — Match the definition: Breaking down by electricity is electrolysis.

Step 2 — Example: Electrolysis of water gives hydrogen and oxygen.

Why other options are wrong:

- Photolysis uses light.
- Thermal decomposition uses heat.
- Combustion is burning in oxygen.

Final Answer: Decomposition by electricity is electrolysis $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q19

Q20.

Solution

Concept — Metal–acid reaction: When an active metal reacts with a dilute acid, it forms a salt and releases hydrogen gas: metal + acid $\rightarrow$ salt + hydrogen.

Step 1 — Recall the products: A salt plus hydrogen gas.

Step 2 — Identify the gas: The gas evolved is hydrogen, which burns with a pop sound.

Why other options are wrong:

- Oxygen and chlorine are not released here.
- Carbon dioxide forms when acids react with carbonates, not metals.

Final Answer: Hydrogen gas is evolved $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q20

Q21.

Solution

Concept — pH scale: The pH scale runs from 0 to 14. A value of 7 is neutral, below 7 is acidic and above 7 is basic.

Step 1 — Locate neutral: Neutral lies exactly in the middle of the scale.

Step 2 — Read the value: The middle value is 7 (for example, pure water).

Why other options are wrong:

- 0 and 1 are strongly acidic.
- 14 is strongly basic.

Final Answer: A neutral solution has pH $= 7 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q21

Q22.

Solution

Concept — Litmus indicator: Litmus is a natural indicator. Blue litmus turns red in an acid, while red litmus turns blue in a base.

Step 1 — Apply to an acid: In an acidic solution, blue litmus turns red.

Step 2 — Confirm: This is a standard test for acids.

Why other options are wrong:

- Blue would mean no change, which is wrong for an acid.
- Litmus does not turn green or colourless in acid.

Final Answer: Blue litmus turns red in acid $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q22

Q23.

Solution

Concept — Strong and weak substances: A strong base ionises completely in water to give many hydroxide ions. Sodium hydroxide (NaOH) is a common strong base.

Step 1 — Test the options: Acetic, citric and carbonic acids are all (weak) acids, not bases.

Step 2 — Identify the base: Sodium hydroxide is the only base, and it is strong.

Why other options are wrong:

- Acetic, citric and carbonic substances are acids.

Final Answer: Sodium hydroxide is the strong base $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q23

Q24.

Solution

Concept — Common salt: Common table salt is sodium chloride, with the chemical formula NaCl. It is formed by the neutralisation of hydrochloric acid with sodium hydroxide.

Step 1 — Recall the formula: Table salt $=$ NaCl.

Step 2 — Name it: Sodium chloride.

Why other options are wrong:

- Sodium carbonate (Na_2CO_3) is washing soda.
- Sodium bicarbonate ($NaHCO_3$) is baking soda.
- Calcium chloride is a drying agent, not table salt.

Final Answer: Common salt is sodium chloride $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q24

Q25.

Solution

Concept — pH and strength: A low pH means a high concentration of H^+ ions. The lower the pH below 7, the stronger the acid.

Step 1 — Read the value: $\text{pH} = 2$ is well below 7.

Step 2 — Classify: Such a low pH means the solution is strongly acidic.

Why other options are wrong:

- Neutral would be pH 7.
- Weakly or strongly basic would be above pH 7.

Final Answer: $\text{pH} = 2$ is strongly acidic $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q25

Q26.

Solution

Concept — Neutralisation: A neutralisation reaction is one between an acid and a base that produces salt and water: acid + base $\rightarrow$ salt + water.

Step 1 — Match the definition: Acid reacting with base $\rightarrow$ neutralisation.

Step 2 — Confirm: For example, $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$.

Why other options are wrong:

- Oxidation, displacement and combustion do not describe an acid–base reaction.

Final Answer: Acid + base is neutralisation $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q26

Q27.

Solution

Concept — Conductivity of metals: Among all metals, silver is the best conductor of electricity, followed closely by copper.

Step 1 — Compare the options: Iron, aluminium and gold all conduct, but less well than silver.

Step 2 — Identify the best: Silver has the highest electrical conductivity.

Why other options are wrong:

- Iron and aluminium are poorer conductors than silver.
- Gold conducts well but slightly less than silver.

Final Answer: Silver is the best conductor $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q27

Q28.

Solution

Concept — States of non-metals: Most non-metals are solids or gases at room temperature. Bromine is the only non-metal that is a liquid at room temperature.

Step 1 — Test the options: Carbon and sulphur are solids; iodine is a solid.

Step 2 — Identify the liquid: Bromine is a reddish-brown liquid non-metal.

Why other options are wrong:

- Carbon, sulphur and iodine are solid non-metals.
- (Mercury is a liquid, but it is a metal, not a non-metal.)

Final Answer: Bromine is the liquid non-metal $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q28

Q29.

Solution

Concept — Activity series: In the activity (reactivity) series, the metals at the top are the most reactive. Potassium and sodium sit near the very top.

Step 1 — Read the series: Potassium is highest among the options.

Step 2 — Identify the most reactive: Potassium is the most reactive metal here.

Why other options are wrong:

- Iron is moderately reactive.
- Copper and gold are low in the series (least reactive).

Final Answer: Potassium is the most reactive $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q29

Q30.

Solution

Concept — Galvanisation: Galvanisation is the process of coating iron or steel with a thin layer of zinc to protect it from rusting.

Step 1 — Match the process: Coating iron with zinc $\rightarrow$ galvanisation.

Step 2 — Confirm: The zinc layer keeps moisture and air away from the iron.

Why other options are wrong:

- Alloying mixes metals to form a new material.
- Electrolysis and annealing are different processes.

Final Answer: Coating iron with zinc is galvanisation $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q30

Q31.

Solution

Concept — Alloys: An alloy is a homogeneous mixture of a metal with one or more other elements. Brass is an alloy of copper and zinc.

Step 1 — Test the options: Copper, iron and zinc are pure metals (elements).

Step 2 — Identify the alloy: Brass is a mixture of copper and zinc, so it is the alloy.

Why other options are wrong:

- Copper, iron and zinc are single metals, not alloys.

Final Answer: Brass is the alloy $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q31

Q32.

Solution

Concept — Nature of oxides: Non-metals react with oxygen to form oxides that are acidic in nature (for example, CO_2 and SO_2 dissolve in water to give acids).

Step 1 — Recall the rule: Non-metal oxides are usually acidic.

Step 2 — Confirm: Metal oxides, in contrast, are usually basic.

Why other options are wrong:

- Basic oxides are formed by metals.
- Most non-metal oxides are not neutral, and they are not amphoteric.

Final Answer: Non-metals form acidic oxides $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q32

Q33.

Solution

Concept — Ionic bond: An ionic bond is formed when one atom completely transfers one or more electrons to another atom, creating oppositely charged ions that attract each other.

Step 1 — Read the figure: Sodium gives an electron to chlorine.

Step 2 — Name the bond: Electron transfer means an ionic bond.

Why other options are wrong:

- A covalent bond is formed by sharing, not transfer.
- Metallic and hydrogen bonds form in different ways.

Final Answer: Electron transfer gives an ionic bond $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q33

Q34.

Solution

Concept — Covalent bond: A covalent bond is formed when two atoms share one or more pairs of electrons, so that both achieve a stable outer shell.

Step 1 — Recall the mechanism: Covalent bonding is sharing of electrons.

Step 2 — Confirm: For example, in H_2 the two atoms share a pair of electrons.

Why other options are wrong:

- Transfer, removal or gaining of electrons describes ionic behaviour, not covalent.

Final Answer: A covalent bond forms by sharing electrons $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q34

Q35.

Solution

Concept — Bonding in methane: In methane (CH_4), one carbon atom shares electrons with four hydrogen atoms, forming four single covalent bonds.

Step 1 — Count the C–H bonds in the figure: There are four lines from C to the four H atoms.

Step 2 — State the number: Four covalent bonds.

Why other options are wrong:

- 1, 2 or 3 would leave the carbon's valency of four unsatisfied.

Final Answer: Methane has 4 covalent bonds $\Rightarrow$ C

Answer: (C) Go Back to Q35

Q36.

Solution

Concept — Bonding in NaCl: Sodium chloride is formed when sodium transfers one electron to chlorine, producing Na^+ and Cl^- ions held together by an ionic bond.

Step 1 — Identify the ions: Na^+ and Cl^-.

Step 2 — Name the bond: The electrostatic attraction between them is an ionic bond.

Why other options are wrong:

- Covalent bonding would mean sharing, which does not happen here.
- Metallic and hydrogen bonds are not present in NaCl.

Final Answer: NaCl has an ionic bond $\Rightarrow$ D

Answer: (D) Go Back to Q36

Q37.

Solution

Concept — Valency of carbon: Carbon has four electrons in its outermost shell, so it needs four more to complete its octet. Hence its valency is four (it is tetravalent).

Step 1 — Count outer electrons: Carbon has 4 valence electrons.

Step 2 — Find the valency: It forms four bonds, so valency $= 4$.

Why other options are wrong:

- 2, 1 or 3 would not let carbon complete its octet.

Final Answer: The valency of carbon is $4 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q37

Q38.

Solution

Concept — Methane: Methane is the first member of the alkane series. Its one carbon atom bonds with four hydrogen atoms, giving the formula CH_4.

Step 1 — Recall the structure: One C and four H.

Step 2 — Write the formula: CH_4.

Why other options are wrong:

- C_2H_6 is ethane and C_2H_4 is ethene.
- CH_3OH is methanol (an alcohol).

Final Answer: Methane is $CH_4 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q38

Q39.

Solution

Concept — Functional groups: A functional group is the atom or group of atoms that decides the chemical properties of a compound. Alcohols always contain the hydroxyl group, $-OH$.

Step 1 — Recall the alcohol group: Alcohols carry $-OH$.

Step 2 — Confirm: For example, ethanol is C_2H_5OH.

Why other options are wrong:

- $-COOH$ is the carboxylic acid group.
- $-CHO$ is the aldehyde group.
- $>C{=}O$ is the ketone (carbonyl) group.

Final Answer: Alcohols contain $-OH \Rightarrow \boxed{C}$

Answer: (C) Go Back to Q39

Q40.

Solution

Concept — Alkane series: The alkane series runs methane (C_1), ethane (C_2), propane (C_3), butane (C_4), and so on, each differing by a CH_2 unit.

Step 1 — Locate ethane: Ethane has 2 carbons.

Step 2 — Find the next member: The next has 3 carbons, which is propane (C_3H_8).

Why other options are wrong:

- Methane comes before ethane.
- Ethene is an alkene, not an alkane.
- Butane comes after propane.

Final Answer: Propane follows ethane $\Rightarrow \boxed{D}$

Answer: (D) Go Back to Q40

Q41.

Solution

Concept — Multiple bonds: When two atoms share one pair of electrons it is a single bond, two pairs a double bond, and three pairs a triple bond.

Step 1 — Read the figure: Two lines join the carbon atoms, meaning two shared pairs.

Step 2 — Name the bond: Two shared pairs make a double bond.

Why other options are wrong:

- A single bond is one shared pair.
- A triple bond is three shared pairs.
- An ionic bond involves transfer, not sharing.

Final Answer: Two shared pairs make a double bond $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q41

Q42.

Solution

Concept — General formula of alkanes: Alkanes are saturated hydrocarbons with only single bonds. Their general formula is C_nH_{2n+2}.

Step 1 — Recall the formula: C_nH_{2n+2}.

Step 2 — Check with methane: For $n = 1$, $C_1H_4 = CH_4$, which is correct.

Why other options are wrong:

- C_nH_{2n} is the alkene series.
- C_nH_{2n-2} is the alkyne series.
- C_nH_n does not fit the alkanes.

Final Answer: Alkanes are C_nH_{2n+2} $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q42

Q43.

Solution

Concept — Acetic acid: Vinegar is a dilute (about 5–8%) solution of acetic acid (CH_3COOH) in water.

Step 1 — Recall the source: Vinegar $\rightarrow$ acetic acid.

Step 2 — Confirm: Acetic acid gives vinegar its sour taste and smell.

Why other options are wrong:

- Citric acid is found in lemons.
- Formic acid is found in ant stings.
- Lactic acid is found in sour milk.

Final Answer: Vinegar contains acetic acid $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q43

Q44.

Solution

Concept — Electrolysis of water: When electricity is passed through acidified water, it splits into hydrogen and oxygen. Hydrogen is released at the cathode and oxygen at the anode, in a $2:1$ volume ratio.

Step 1 — Identify the cathode: The cathode is the negative electrode.

Step 2 — Name the gas there: Hydrogen is collected at the cathode.

Why other options are wrong:

- Oxygen is collected at the anode, not the cathode.
- Chlorine and carbon dioxide are not products of water electrolysis.

Final Answer: Hydrogen is collected at the cathode $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q44

Q45.

Solution

Concept — Electrolyte: An electrolyte is a substance that conducts electricity when it is molten or dissolved in water, because it then provides free-moving ions.

Step 1 — Recall the definition: Conducts in molten or aqueous state.

Step 2 — Confirm: For example, common salt solution conducts electricity.

Why other options are wrong:

- Saying it never conducts is wrong.
- An electrolyte need not be a metal or a gas.

Final Answer: An electrolyte conducts in molten or aqueous form $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q45

Q46.

Solution

Concept — Boyle's law: Boyle's law states that, at constant temperature, the volume of a fixed mass of gas is inversely proportional to its pressure, $V \propto \frac{1}{P}$.

Step 1 — Match the statement: Volume inversely proportional to pressure at constant temperature is Boyle's law.

Step 2 — Confirm: So $PV =$ constant.

Why other options are wrong:

- Charles' law relates volume and temperature.
- Avogadro's law relates volume and amount of gas.
- Gay-Lussac's law relates pressure and temperature.

Final Answer: This is Boyle's law $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q46

Q47.

Solution

Concept — Electrodes: In electrolysis the electrode joined to the positive terminal of the battery is the anode, and the one joined to the negative terminal is the cathode.

Step 1 — Match the terminal: Positive terminal $\rightarrow$ anode.

Step 2 — Confirm: Negatively charged ions move towards the anode.

Why other options are wrong:

- The cathode is joined to the negative terminal.
- Electrolyte and cell are not electrodes.

Final Answer: The positive electrode is the anode $\Rightarrow$ C

Answer: (C) Go Back to Q47

Q48.

Solution

Concept — Charles' law: Charles' law states that, at constant pressure, the volume of a fixed mass of gas is directly proportional to its absolute (Kelvin) temperature, $V \propto T$.

Step 1 — Match the statement: Volume directly proportional to absolute temperature at constant pressure.

Step 2 — Confirm: So heating a gas at constant pressure increases its volume.

Why other options are wrong:

- Volume is not directly proportional to pressure (that is inverse).
- Mass and density are not the variables in Charles' law.

Final Answer: Volume $\propto$ absolute temperature $\Rightarrow$ D

Answer: (D) Go Back to Q48

Q49.

Solution

Concept — Fossil fuels: Fossil fuels are formed from the remains of dead plants and animals buried for millions of years. Coal, petroleum and natural gas are fossil fuels.

Step 1 — Test the options: Hydrogen, wood and biogas are not fossil fuels.

Step 2 — Identify the fossil fuel: Coal is a fossil fuel.

Why other options are wrong:

- Hydrogen is a clean fuel, not a fossil fuel.
- Wood and biogas are renewable, not fossil fuels.

Final Answer: Coal is a fossil fuel $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q49

Q50.

Solution

Concept — Greenhouse effect: Greenhouse gases trap heat in the atmosphere. Carbon dioxide is the main greenhouse gas responsible for global warming.

Step 1 — Identify the gas: Carbon dioxide (CO_2) traps heat strongly and is released by burning fuels.

Step 2 — Confirm: Rising CO_2 levels increase global temperatures.

Why other options are wrong:

- Oxygen and nitrogen are not greenhouse gases.
- Hydrogen is not a greenhouse gas.

Final Answer: Carbon dioxide is the main greenhouse gas $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q50

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	C	3	A	4	D	5	B
6	A	7	C	8	D	9	B	10	A
11	C	12	D	13	B	14	A	15	D
16	C	17	A	18	B	19	D	20	C
21	A	22	B	23	D	24	C	25	A
26	B	27	D	28	C	29	A	30	B
31	C	32	D	33	A	34	B	35	C
36	D	37	A	38	B	39	C	40	D
41	B	42	A	43	C	44	D	45	A
46	B	47	C	48	D	49	A	50	B