Jharkhand Polytechnic Chemistry

Sample Paper – 2

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. Which one of the following is a physical change?

(A) burning of coal

(B) rusting of iron

(C) melting of ice

(D) cooking of food

Q2. The chemical symbol of the element sodium is:

(A) Na

(B) So

(C) Sd

(D) S

Q3. The molecular mass of water (H_2O), taking H $= 1$ u and O $= 16$ u, is:

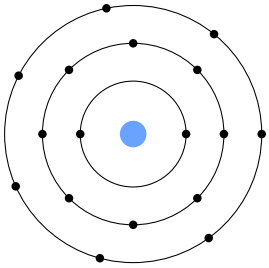
(A) 16 u

(B) 18 u

(C) 20 u

(D) 2 u

Q4. The Bohr model of a chlorine atom ($Z = 17$) is shown below. Its electronic configuration is:



(A) $2, 8, 8$

(B) $2, 7, 8$

(C) $8, 2, 7$

(D) $2, 8, 7$

Q5. An ion that carries a positive charge is called a:

(A) cation

(B) anion

(C) isotope

(D) molecule

Q6. The maximum number of electrons that the L shell (second shell) of an atom can hold is:

(A) 2

(B) 18

(C) 8

(D) 32

Q7. An atom has mass number $A = 23$ and atomic number $Z = 11$. The number of neutrons in it is:

(A) 11

(B) 12

(C) 23

(D) 34

Q8. The atomic theory, which proposed that matter is made of tiny indivisible atoms, was given by:

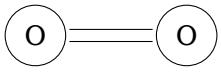
(A) John Dalton

(B) J. J. Thomson

(C) Ernest Rutherford

(D) James Chadwick

Q9. A molecule made up of two atoms is called diatomic, as shown below. Which one of the following is a diatomic molecule?



(A) Na

(B) He

(C) C

(D) O_2

Q10. Mendeleev arranged the elements in his periodic table in order of increasing:

(A) atomic number

(B) atomic mass

(C) valency

(D) density

Q11. The elements of group 1 of the periodic table are known as:

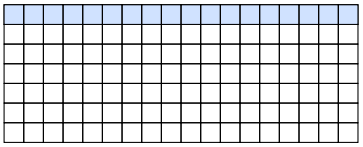
(A) alkali metals

(B) alkaline earth metals

(C) halogens

(D) noble gases

Q12. The schematic of the modern periodic table below has a fixed number of vertical columns (groups). This number is:



(A) 7

(B) 8

(C) 18

(D) 9

Q13. On moving from left to right across a period in the periodic table, the size of an atom generally:

(A) increases

(B) remains constant

(C) first decreases then increases

(D) decreases

Q14. In the modern periodic table, metals are mostly placed on the:

(A) left side

(B) right side

(C) top centre only

(D) bottom right only

Q15. The reaction $CaO + H_2O \rightarrow Ca(OH)_2$ is an example of a:

(A) decomposition reaction

(B) combination reaction

(C) displacement reaction

(D) double displacement reaction

Q16. On strong heating, calcium carbonate breaks down as $CaCO_3 \rightarrow CaO + CO_2$. This type of reaction is:

(A) decomposition

(B) combination

(C) neutralisation

(D) displacement

Q17. A chemical reaction that is accompanied by the release of heat to the surroundings is called:

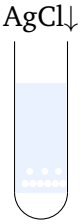
(A) endothermic

(B) photochemical

(C) exothermic

(D) reversible

Q18. When silver nitrate solution is mixed with sodium chloride solution, a white precipitate of silver chloride settles, as shown: $AgNO_3 + NaCl \rightarrow AgCl\downarrow + NaNO_3$. This reaction is a:



(A) combination

(B) decomposition

(C) displacement

(D) double displacement

Q19. Reduction is a chemical change in which a substance undergoes:

(A) gain of oxygen

(B) loss of oxygen

(C) gain of oxygen and loss of hydrogen

(D) gain of oxygen only

Q20. The process of respiration in living cells, which provides energy, is best described as a/an:

(A) exothermic reaction

(B) endothermic reaction

(C) neutralisation reaction

(D) precipitation reaction

Q21. The acid that gives a lemon its sour taste is:

(A) acetic acid

(B) lactic acid

(C) citric acid

(D) tartaric acid

Q22. When a few drops of phenolphthalein are added to a basic solution, the colour seen is:

(A) colourless

(B) red

(C) orange

(D) pink

Q23. When a dilute acid reacts with a metal carbonate, the gas usually released is:

(A) hydrogen

(B) carbon dioxide

(C) oxygen

(D) chlorine

Q24. The chemical name of baking soda is:

(A) sodium chloride

(B) sodium carbonate

(C) sodium hydrogencarbonate

(D) calcium carbonate

Q25. When dipped in a basic solution, red litmus paper turns:

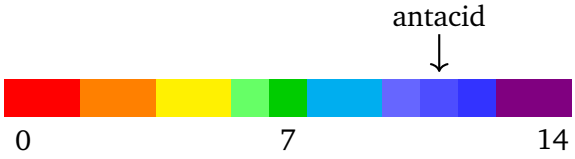
(A) blue

(B) red

(C) green

(D) colourless

Q26. An antacid taken to relieve acidity in the stomach works because it acts in the basic region of the pH scale shown below. An antacid mainly:



(A) increases the stomach acid

(B) has no effect on the acid

(C) adds more acid to the stomach

(D) neutralises the excess stomach acid

Q27. The property of metals by which they can be beaten into thin sheets is called:

(A) brittleness

(B) malleability

(C) low density

(D) dullness

Q28. Which one of the following is the hardest natural substance known?

(A) graphite

(B) sulphur

(C) iron

(D) diamond

Q29. Gold and platinum do not corrode or react easily, so they are classified as:

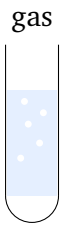
(A) alkali metals

(B) highly reactive metals

(C) noble metals

(D) alkaline earth metals

Q30. When a small piece of sodium reacts with water, the gas that is evolved (seen as bubbles) is:



(A) oxygen

(B) chlorine

(C) carbon dioxide

(D) hydrogen

Q31. Which one of the following is an amphoteric oxide (reacts with both acids and bases)?

(A) sodium oxide

(B) aluminium oxide (Al_2O_3)

(C) carbon dioxide

(D) magnesium oxide

Q32. Which one of the following metals is a liquid at room temperature?

(A) sodium

(B) iron

(C) mercury

(D) copper

Q33. Ionic compounds, such as common salt, generally have:

(A) high melting points

(B) very low melting points

(C) no fixed melting point

(D) melting points below $0^{\circ}C$

Q34. In the hydrogen molecule shown below, the two atoms are joined by a single covalent bond. The number of shared electron pairs in a single bond is:

(A) 0

(B) 2

(C) 3

(D) 1

Q35. Most covalent compounds are:

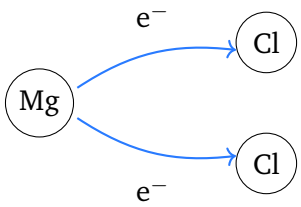
(A) very good conductors of electricity

(B) poor conductors of electricity

(C) conductors only in the solid state

(D) conductors like all metals

Q36. In the formation of magnesium chloride ($MgCl_2$), shown below, a magnesium atom transfers a number of electrons to two chlorine atoms. This number is:



(A) 1 electron

(B) 3 electrons

(C) 2 electrons

(D) 4 electrons

Q37. The unique ability of carbon to join with other carbon atoms to form long chains and rings is called:

(A) catenation

(B) hydrogenation

(C) oxidation

(D) ionisation

Q38. Which allotrope (form) of carbon is a good conductor of electricity?

(A) diamond

(B) graphite

(C) coal

(D) charcoal

Q39. The general molecular formula of the alkene (unsaturated hydrocarbon with one double bond) series is:

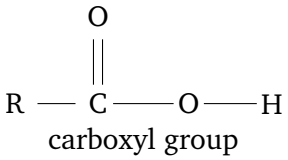
(A) C_nH_{2n+2}

(B) C_nH_{2n-2}

(C) C_nH_n

(D) C_nH_{2n}

Q40. The functional group shown below, $-COOH$, is present in which class of organic compounds?



carboxyl group

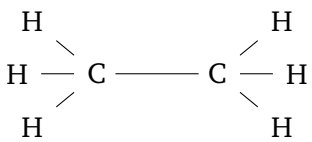
(A) alcohols

(B) aldehydes

(C) carboxylic acids

(D) ketones

Q41. The structure shown below has two carbon atoms joined by a single bond, each carrying three hydrogen atoms. Its molecular formula is:



(A) C_2H_6

(B) CH_4

(C) C_2H_4

(D) C_2H_2

Q42. Saturated hydrocarbons (alkanes) contain between their carbon atoms only:

(A) double bonds

(B) single bonds

(C) triple bonds

(D) one double and one triple bond

Q43. The conversion of liquid vegetable oil into solid fat (ghee) by passing hydrogen in the presence of a nickel catalyst is called:

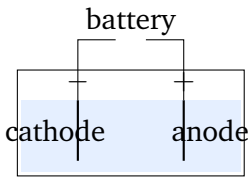
(A) oxidation

(B) saponification

(C) esterification

(D) hydrogenation

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



(A) oxygen

(B) hydrogen

(C) chlorine

(D) carbon dioxide

Q45. The process of depositing a layer of one metal over another metal by passing electric current is called:

(A) galvanisation

(B) calcination

(C) electroplating

(D) smelting

Q46. The law which states that equal volumes of all gases, under the same temperature and pressure, contain an equal number of molecules is:

(A) Boyle's law

(B) Avogadro's law

(C) Charles' law

(D) Gay-Lussac's law

Q47. The volume occupied by one mole of any gas at standard temperature and pressure (STP) is:

(A) 1 L

(B) 11.2 L

(C) 44.8 L

(D) 22.4 L

Q48. A solution conducts electricity because it contains:

(A) free ions

(B) only free electrons

(C) no charged particles

(D) only neutral molecules

Q49. Which one of the following is a cleaner fuel widely used in vehicles to reduce pollution?

(A) petrol

(B) CNG

(C) diesel

(D) kerosene

Q50. Which one of the following gases is mainly responsible for causing acid rain?

(A) oxygen

(B) nitrogen

(C) sulphur dioxide

(D) hydrogen

Detailed Solutions

Q1.

Solution

Concept — Physical and chemical changes: In a physical change, no new substance is formed and the change can usually be reversed. In a chemical change, one or more new substances are formed.

Step 1 — Test each option: Burning of coal, rusting of iron and cooking of food all form new substances, so they are chemical changes.

Step 2 — Identify the physical change: Melting of ice only changes solid water into liquid water; no new substance forms, and it can be reversed by freezing.

Why other options are wrong:

- Burning of coal produces ash and gases (chemical change).
- Rusting of iron forms a new compound, rust.
- Cooking of food changes its chemical nature.

Final Answer: Melting of ice is a physical change $\Rightarrow$ C

Answer: (C) Go Back to Q1

Q2.

Solution

Concept — Chemical symbols: A chemical symbol is a short form of an element's name. The symbol of sodium comes from its Latin name *natrium*.

Step 1 — Recall the Latin name: Sodium $\rightarrow$ natrium.

Step 2 — Write the symbol: The first two letters give Na (capital N, small a).

Why other options are wrong:

- So, Sd and S are not the accepted symbol for sodium.
- S is the symbol for sulphur.

Final Answer: The symbol of sodium is Na $\Rightarrow$ A

Answer: (A) Go Back to Q2

Q3.

Solution

Concept — Molecular mass: The molecular mass of a compound is the sum of the atomic masses of all the atoms present in one molecule.

Step 1 — List the atoms in H_2O: 2 hydrogen atoms and 1 oxygen atom.

Step 2 — Add the masses of hydrogen: $2 \times 1 = 2$ u.

Step 3 — Add the mass of oxygen: $1 \times 16 = 16$ u.

Step 4 — Find the total: $2 + 16 = 18$ u.

Why other options are wrong:

- 16 u is the mass of only the oxygen atom.
- 20 u and 2 u do not match the correct sum.

Final Answer: The molecular mass of water is 18 u $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q3

Q4.

Solution

Concept — Electronic configuration: Electrons fill the shells in order: K holds up to 2, L holds up to 8, and the rest go into M. Chlorine has 17 electrons.

Step 1 — Fill the K shell: 2 electrons. Remaining $= 17 - 2 = 15$.

Step 2 — Fill the L shell: 8 electrons. Remaining $= 15 - 8 = 7$.

Step 3 — Fill the M shell: the last 7 electrons.

Step 4 — Write the configuration: $2, 8, 7$.

Why other options are wrong:

- $2, 8, 8$ would mean 18 electrons, not 17.
- $2, 7, 8$ and $8, 2, 7$ do not follow the correct filling order.

Final Answer: Chlorine is $2, 8, 7 \Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q4

Q5.

Solution

Concept — Ions: An ion is a charged atom or group of atoms. A positively charged ion is formed by losing electrons and is called a cation; a negatively charged ion is called an anion.

Step 1 — Identify the charge: The question asks about a positive charge.

Step 2 — Name it: A positively charged ion is a cation (for example, Na^+).

Why other options are wrong:

- An anion is negatively charged.
- An isotope is a variety of an atom, not a charged species.
- A molecule is a neutral group of atoms.

Final Answer: A positive ion is a cation $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q5

Q6.

Solution

Concept — Shell capacity: The maximum number of electrons a shell can hold is $2n^2$, where n is the shell number. The L shell is the second shell, so $n = 2$.

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

Step 2 — Compute: $2 \times 4 = 8$.

Why other options are wrong:

- 2 is the capacity of the K shell ($n = 1$).
- 18 is the capacity of the M shell ($n = 3$).
- 32 is the capacity of the N shell ($n = 4$).

Final Answer: The L shell holds a maximum of 8 electrons $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q6

Q7.

Solution

Concept — Mass number and neutrons: The mass number (A) is the total of protons and neutrons. So the number of neutrons = mass number − atomic number, that is $A - Z$.

Step 1 — List the data: $A = 23$ and $Z = 11$.

Step 2 — Apply the formula: neutrons $= A - Z = 23 - 11$.

Step 3 — Compute: neutrons $= 12$.

Why other options are wrong:

- 11 is the number of protons.
- 23 is the mass number itself.
- 34 is the sum $A + Z$, which has no meaning here.

Final Answer: Number of neutrons $= 12 \Rightarrow$ B

Answer: (B) Go Back to Q7

Q8.

Solution

Concept — Dalton's atomic theory: John Dalton was the first to propose that all matter is made of tiny, indivisible particles called atoms, and that atoms of the same element are alike.

Step 1 — Match the scientist: Atomic theory $\rightarrow$ John Dalton.

Step 2 — Confirm: His theory laid the foundation of modern chemistry.

Why other options are wrong:

- Thomson discovered the electron.
- Rutherford proposed the nuclear model of the atom.
- Chadwick discovered the neutron.

Final Answer: The atomic theory was given by John Dalton $\Rightarrow$ A

Answer: (A) Go Back to Q8

Q9.

Solution

Concept — Atomicity: The number of atoms present in one molecule of a substance is its atomicity. A diatomic molecule contains exactly two atoms.

Step 1 — Examine the options: Sodium (Na) is a metal made of single atoms, helium (He) is monatomic, and carbon (C) is shown as a single atom.

Step 2 — Identify the diatomic molecule: Oxygen exists as O_2, which has two atoms, so it is diatomic.

Why other options are wrong:

- Helium is a noble gas and is monatomic.
- Na and C, as written, represent single atoms.

Final Answer: O_2 is a diatomic molecule $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q9

Q10.

Solution

Concept — Mendeleev's periodic law: Mendeleev arranged the known elements in order of increasing atomic mass and grouped those with similar properties together.

Step 1 — Recall the basis: The ordering property in Mendeleev's table was atomic mass.

Step 2 — Confirm: The modern table was later changed to use atomic number instead.

Why other options are wrong:

- Atomic number is the basis of the modern table, not Mendeleev's.
- Valency and density were not the ordering property.

Final Answer: Mendeleev used atomic mass $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q10

Q11.

Solution

Concept — Groups of the periodic table: Group 1 contains lithium, sodium, potassium and similar metals. They are very reactive and form strong alkalis, so they are called alkali metals.

Step 1 — Identify group 1: These elements have one valence electron.

Step 2 — Name the family: Group 1 elements are the alkali metals.

Why other options are wrong:

- Alkaline earth metals are group 2.
- Halogens are group 17.
- Noble gases are group 18.

Final Answer: Group 1 elements are alkali metals $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q11

Q12.

Solution

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

Step 1 — Read the figure: The schematic shows the vertical columns.

Step 2 — State the number: There are 18 groups.

Why other options are wrong:

- 7 is the number of periods.
- 8 was the number of groups in Mendeleev's older table.
- 9 is incorrect.

Final Answer: There are 18 groups $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q12

Q13.

Solution

Concept — Atomic size across a period: As we move from left to right across a period, the nuclear charge increases while electrons are added to the same shell. The stronger pull of the nucleus reduces the atomic size.

Step 1 — Note the trend: Nuclear charge increases across a period.

Step 2 — Conclude: The increased pull makes the atom smaller, so atomic size decreases.

Why other options are wrong:

- Size does not increase across a period.
- It does not stay constant or first decrease then increase.

Final Answer: Atomic size decreases across a period $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q13

Q14.

Solution

Concept — Position of metals: In the modern periodic table, metals occupy the left and central regions, while non-metals are found on the right side.

Step 1 — Recall the layout: Metals lose electrons easily and lie on the left.

Step 2 — Conclude: So metals are mostly placed on the left side.

Why other options are wrong:

- The right side holds non-metals.
- Metals are not confined only to the top centre or bottom right.

Final Answer: Metals are on the left side $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q14

Q15.

Solution

Concept — Combination reaction: In a combination reaction, two or more reactants join to form a single product.

Step 1 — Read the reaction: Calcium oxide and water combine.

Step 2 — Count the products: They form a single product, calcium hydroxide, $Ca(OH)_2$.

Step 3 — Name the type: Two reactants giving one product is a combination reaction.

Why other options are wrong:

- Decomposition breaks one substance into many.
- Displacement and double displacement involve element or ion exchange.

Final Answer: $CaO + H_2O$ is a combination reaction $\Rightarrow$ $\boxed{B}$

Answer: (B) Go Back to Q15

Q16.

Solution

Concept — Decomposition reaction: In a decomposition reaction, a single compound breaks down into two or more simpler substances, usually on heating.

Step 1 — Read the reaction: One reactant, $CaCO_3$, is heated.

Step 2 — Count the products: It gives two products, CaO and CO_2.

Step 3 — Name the type: One substance breaking into many is decomposition (here thermal decomposition).

Why other options are wrong:

- Combination joins reactants into one product.
- Neutralisation is an acid–base reaction.
- Displacement needs a more reactive element.

Final Answer: Breaking of $CaCO_3$ is decomposition $\Rightarrow$ $\boxed{A}$

Answer: (A) Go Back to Q16

Q17.

Solution

Concept — Exothermic reaction: A reaction that releases heat energy to the surroundings is called exothermic; the surroundings become warmer.

Step 1 — Match the definition: Release of heat $\rightarrow$ exothermic.

Step 2 — Confirm: Burning of fuels is a common exothermic reaction.

Why other options are wrong:

- An endothermic reaction absorbs heat.
- Photochemical and reversible describe different features, not heat release.

Final Answer: A heat-releasing reaction is exothermic $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q17

Q18.

Solution

Concept — Double displacement reaction: In a double displacement reaction, two compounds exchange their ions to form two new compounds, often with one being an insoluble precipitate.

Step 1 — Read the reaction: $AgNO_3$ and NaCl exchange ions.

Step 2 — Identify the exchange: Silver pairs with chloride to give AgCl, while sodium pairs with nitrate to give $NaNO_3$.

Step 3 — Name the type: An exchange of ions forming a white precipitate is a double displacement (precipitation) reaction.

Why other options are wrong:

- Combination joins reactants into one product.
- Decomposition breaks one into many.
- Displacement involves only a single element replacing another.

Final Answer: It is a double displacement reaction $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q18

Q19.

Solution

Concept — Reduction: Reduction is the opposite of oxidation. A substance is reduced when it loses oxygen or gains hydrogen (or gains electrons).

Step 1 — Recall the definition: Loss of oxygen or gain of hydrogen is reduction.

Step 2 — Confirm: For example, CuO losing oxygen to become Cu is reduction.

Why other options are wrong:

- Gain of oxygen is oxidation, not reduction.
- Gain of oxygen with loss of hydrogen describes oxidation.

Final Answer: Reduction is loss of oxygen $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q19

Q20.

Solution

Concept — Respiration as a reaction: During respiration, glucose combines with oxygen to release energy. Since energy (heat) is given out, respiration is an exothermic reaction.

Step 1 — Note the energy change: Energy is released to keep the body warm and active.

Step 2 — Classify: Release of energy makes it exothermic.

Why other options are wrong:

- An endothermic reaction would absorb heat.
- Neutralisation and precipitation describe different reaction types.

Final Answer: Respiration is an exothermic reaction $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q20

Q21.

Solution

Concept — Acids in fruits: Many fruits contain natural acids. Citrus fruits such as lemons and oranges contain citric acid, which gives them their sour taste.

Step 1 — Match the source: Lemon $\rightarrow$ citric acid.

Step 2 — Confirm: The sour taste of lemon is due to citric acid.

Why other options are wrong:

- Acetic acid is found in vinegar.
- Lactic acid is found in sour milk and curd.
- Tartaric acid is found in tamarind.

Final Answer: Lemon contains citric acid $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q21

Q22.

Solution

Concept — Phenolphthalein indicator: Phenolphthalein is an indicator that stays colourless in acidic solutions but turns pink in basic (alkaline) solutions.

Step 1 — Apply to a base: In a basic solution, phenolphthalein turns pink.

Step 2 — Confirm: This is a standard test to detect a base.

Why other options are wrong:

- Colourless is its colour in an acid.
- It does not turn red or orange in a base.

Final Answer: Phenolphthalein turns pink in a base $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q22

Q23.

Solution

Concept — Acid and carbonate reaction: When a dilute acid reacts with a metal carbonate, it forms a salt, water and carbon dioxide gas: acid + carbonate → salt + water + CO_2.

Step 1 — Recall the products: A salt, water and a gas.

Step 2 — Identify the gas: The gas released is carbon dioxide, which turns lime water milky.

Why other options are wrong:

- Hydrogen is released when acids react with metals, not carbonates.
- Oxygen and chlorine are not released here.

Final Answer: The gas released is carbon dioxide ⇒ $\boxed{\text{B}}$

Answer: (B) Go Back to Q23

Q24.

Solution

Concept — Baking soda: Baking soda is the common name of sodium hydrogencarbonate, with the formula $NaHCO_3$. It is a mild, non-corrosive base.

Step 1 — Recall the formula: Baking soda = $NaHCO_3$.

Step 2 — Name it: Sodium hydrogencarbonate (also called sodium bicarbonate).

Why other options are wrong:

- Sodium chloride is common salt.
- Sodium carbonate (Na_2CO_3) is washing soda.
- Calcium carbonate is limestone or marble.

Final Answer: Baking soda is sodium hydrogencarbonate ⇒ $\boxed{\text{C}}$

Answer: (C) Go Back to Q24

Q25.

Solution

Concept — Litmus and bases: Litmus is a natural indicator. A base turns red litmus blue, while an acid turns blue litmus red.

Step 1 — Apply to a base: In a basic solution, red litmus turns blue.

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

Why other options are wrong:

- Red would mean no change, which is wrong for a base.
- Litmus does not turn green or colourless in a base.

Final Answer: Red litmus turns blue in a base $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q25

Q26.

Solution

Concept — Antacids: Antacids are mild bases. The stomach makes acid that can cause acidity, and a base can neutralise this excess acid.

Step 1 — Identify the problem: Acidity is caused by too much acid in the stomach.

Step 2 — Apply the remedy: A basic antacid neutralises the excess acid, giving relief. On the pH scale, antacids act in the basic region (pH above 7).

Why other options are wrong:

- An antacid does not increase or add more acid.
- It does have an effect, so the no-effect option is wrong.

Final Answer: An antacid neutralises excess stomach acid $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q26

Q27.

Solution

Concept — Malleability: Malleability is the property of metals by which they can be hammered or beaten into thin sheets without breaking.

Step 1 — Match the property: Beaten into sheets → malleability.

Step 2 — Confirm: Gold and aluminium are highly malleable.

Why other options are wrong:

- Brittleness is a property of non-metals, not metals.
- Low density and dullness do not describe being beaten into sheets.

Final Answer: Being beaten into sheets is malleability ⇒ B

Answer: (B) Go Back to Q27

Q28.

Solution

Concept — Diamond: Diamond is an allotrope of carbon in which each carbon atom is strongly bonded to four others in a rigid network. This makes it the hardest natural substance known.

Step 1 — Compare hardness: Diamond's rigid structure makes it extremely hard.

Step 2 — Identify the answer: Diamond is the hardest natural substance.

Why other options are wrong:

- Graphite is soft and slippery.
- Sulphur and iron are far less hard than diamond.

Final Answer: Diamond is the hardest natural substance ⇒ D

Answer: (D) Go Back to Q28

Q29.

Solution

Concept — Noble metals: Noble metals are metals that are very unreactive and do not corrode or tarnish easily. Gold and platinum are common examples.

Step 1 — Note the property: Gold and platinum resist corrosion.

Step 2 — Name the class: Such unreactive metals are called noble metals.

Why other options are wrong:

- Alkali and alkaline earth metals are highly reactive.
- Gold and platinum are not reactive metals.

Final Answer: Gold and platinum are noble metals $\Rightarrow \boxed{C}$

Answer: (C) Go Back to Q29

Q30.

Solution

Concept — Sodium and water: Sodium is a very reactive metal. It reacts vigorously with water to form sodium hydroxide and release hydrogen gas.

Step 1 — Write the products: Sodium + water $\rightarrow$ sodium hydroxide + hydrogen.

Step 2 — Identify the gas: The bubbles seen are hydrogen gas, which may catch fire due to the heat released.

Why other options are wrong:

- Oxygen and chlorine are not produced in this reaction.
- Carbon dioxide is not formed here.

Final Answer: Sodium with water releases hydrogen $\Rightarrow \boxed{D}$

Answer: (D) Go Back to Q30

Q31.

Solution

Concept — Amphoteric oxides: An amphoteric oxide can react with both acids and bases to form a salt and water. Aluminium oxide (Al_2O_3) is a common example.

Step 1 — Test the options: Sodium oxide and magnesium oxide are basic; carbon dioxide is acidic.

Step 2 — Identify the amphoteric oxide: Aluminium oxide reacts with both acids and bases, so it is amphoteric.

Why other options are wrong:

- Sodium oxide and magnesium oxide are basic oxides.
- Carbon dioxide is an acidic oxide.

Final Answer: Aluminium oxide is amphoteric $\Rightarrow$ $\boxed{B}$

Answer: (B) Go Back to Q31

Q32.

Solution

Concept — Physical state of metals: Most metals are solids at room temperature. Mercury is a special metal that is a liquid at room temperature.

Step 1 — Test the options: Sodium, iron and copper are solids at room temperature.

Step 2 — Identify the liquid metal: Mercury is the only metal that is liquid at room temperature.

Why other options are wrong:

- Sodium, iron and copper are all solid metals at room temperature.

Final Answer: Mercury is the liquid metal $\Rightarrow$ $\boxed{C}$

Answer: (C) Go Back to Q32

Q33.

Solution

Concept — Properties of ionic compounds: Ionic compounds are held together by strong electrostatic forces between oppositely charged ions. Breaking these strong forces needs a lot of energy, so they have high melting and boiling points.

Step 1 — Note the bonding: Strong ionic forces hold the ions tightly.

Step 2 — Conclude: A lot of heat is needed to melt them, so they have high melting points.

Why other options are wrong:

- They do not have very low melting points.
- They have definite melting points, and not below 0°C.

Final Answer: Ionic compounds have high melting points $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q33

Q34.

Solution

Concept — Single covalent bond: A single covalent bond is formed when two atoms share one pair of electrons (that is, two electrons in total).

Step 1 — Read the figure: The two hydrogen atoms share one pair of electrons.

Step 2 — Count the shared pairs: A single bond has exactly 1 shared pair.

Why other options are wrong:

- 0 would mean no bond at all.
- 2 shared pairs make a double bond and 3 make a triple bond.

Final Answer: A single bond has 1 shared pair $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q34

Q35.

Solution

Concept — Conductivity of covalent compounds: Covalent compounds are made of neutral molecules and do not contain free ions or free electrons, so they are generally poor conductors of electricity.

Step 1 — Note the structure: No charged particles are free to move.

Step 2 — Conclude: Without free charges, they are poor conductors.

Why other options are wrong:

- They are not good conductors like metals.
- They do not conduct only in the solid state.

Final Answer: Covalent compounds are poor conductors $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q35

Q36.

Solution

Concept — Formation of $MgCl_2$: Magnesium has 2 electrons in its outermost shell. To become stable, it loses both electrons, giving one to each of two chlorine atoms.

Step 1 — Count magnesium's valence electrons: Magnesium has 2 valence electrons.

Step 2 — Transfer the electrons: It transfers 1 electron to each chlorine atom, that is 2 electrons in all.

Why other options are wrong:

- Transferring 1 electron would not empty magnesium's outer shell.
- 3 or 4 electrons are more than magnesium has to give.

Final Answer: $MgCl_2$ involves transfer of 2 electrons $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q36

Q37.

Solution

Concept — Catenation: Catenation is the property of an element to form long chains, branches and rings by bonding its own atoms together. Carbon shows this property strongly.

Step 1 — Match the property: Carbon atoms joining one another in chains → catenation.

Step 2 — Confirm: Catenation is one reason carbon forms so many compounds.

Why other options are wrong:

- Hydrogenation is the addition of hydrogen.
- Oxidation and ionisation are different processes.

Final Answer: Forming long carbon chains is catenation ⇒ $\boxed{\text{A}}$

Answer: (A) Go Back to Q37

Q38.

Solution

Concept — Allotropes of carbon: Graphite is an allotrope of carbon in which each carbon atom is bonded to three others, leaving one free electron per atom. These free electrons let graphite conduct electricity.

Step 1 — Note the free electrons: Graphite has mobile electrons.

Step 2 — Conclude: These free electrons make graphite a good conductor.

Why other options are wrong:

- Diamond has no free electrons, so it does not conduct.
- Coal and charcoal are not conducting allotropes like graphite.

Final Answer: Graphite conducts electricity ⇒ $\boxed{\text{B}}$

Answer: (B) Go Back to Q38

Q39.

Solution

Concept — General formula of alkenes: Alkenes are unsaturated hydrocarbons that contain one carbon–carbon double bond. Their general molecular formula is C_nH_{2n}.

Step 1 — Recall the series: Ethene (C_2H_4) and propene (C_3H_6) are alkenes.

Step 2 — Check the pattern: For $n = 2$, $2n = 4$ gives C_2H_4, which matches; so the formula is C_nH_{2n}.

Why other options are wrong:

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

Final Answer: The alkene formula is $C_nH_{2n} \Rightarrow \boxed{D}$

Answer: (D) Go Back to Q39

Q40.

Solution

Concept — Functional groups: A functional group is the reactive part of an organic molecule. The group $-COOH$ (carboxyl group) is found in carboxylic acids.

Step 1 — Read the figure: The group shown is $-COOH$ (a carbon double-bonded to one oxygen and single-bonded to an O–H).

Step 2 — Name the class: Compounds with the $-COOH$ group are carboxylic acids, such as ethanoic acid.

Why other options are wrong:

- Alcohols have the $-OH$ group.
- Aldehydes have the $-CHO$ group.
- Ketones have the $>C=O$ group.

Final Answer: The $-COOH$ group belongs to carboxylic acids $\Rightarrow \boxed{C}$

Answer: (C) Go Back to Q40

Q41.

Solution

Concept — Molecular formula from structure: To find the molecular formula, count the carbon and hydrogen atoms shown in the structure.

Step 1 — Count carbon atoms: There are 2 carbon atoms.

Step 2 — Count hydrogen atoms: Each carbon has 3 hydrogen atoms, so $3+3=6$ hydrogen atoms.

Step 3 — Write the formula: 2 carbon and 6 hydrogen atoms give C_2H_6 (ethane).

Why other options are wrong:

- CH_4 has only one carbon.
- C_2H_4 and C_2H_2 have fewer hydrogen atoms and contain multiple bonds.

Final Answer: The molecule is ethane, $C_2H_6 \Rightarrow \boxed{A}$

Answer: (A) Go Back to Q41

Q42.

Solution

Concept — Saturated hydrocarbons: Saturated hydrocarbons (alkanes) contain only single covalent bonds between their carbon atoms. They have the maximum number of hydrogen atoms.

Step 1 — Recall the meaning of saturated: No double or triple bonds are present.

Step 2 — Conclude: Only single bonds join the carbon atoms.

Why other options are wrong:

- Double bonds are found in alkenes (unsaturated).
- Triple bonds are found in alkynes (unsaturated).

Final Answer: Saturated hydrocarbons have only single bonds $\Rightarrow \boxed{B}$

Answer: (B) Go Back to Q42

Q43.

Solution

Concept — Hydrogenation: Hydrogenation is the addition of hydrogen across the double bonds of an unsaturated oil in the presence of a nickel catalyst, turning the liquid oil into a solid fat.

Step 1 — Note the process: Hydrogen is added to vegetable oil using nickel.

Step 2 — Name it: This conversion of oil to ghee is hydrogenation.

Why other options are wrong:

- Oxidation is reaction with oxygen.
- Saponification is the making of soap.
- Esterification forms esters from an acid and an alcohol.

Final Answer: Oil to ghee with nickel is hydrogenation $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q43

Q44.

Solution

Concept — Electrolysis of water: When acidified water is electrolysed, hydrogen is released at the cathode (negative electrode) and oxygen is released at the anode (positive electrode).

Step 1 — Identify the anode: The anode is connected to the positive terminal.

Step 2 — Name the gas: At the anode, oxygen gas is collected.

Why other options are wrong:

- Hydrogen is collected at the cathode, not the anode.
- Chlorine and carbon dioxide are not produced from pure acidified water.

Final Answer: Oxygen is collected at the anode $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q44

Q45.

Solution

Concept — Electroplating: Electroplating is the process of depositing a thin layer of a metal over another object by passing an electric current through a suitable solution.

Step 1 — Match the definition: Coating one metal over another using electricity $\rightarrow$ electroplating.

Step 2 — Confirm: It is used to prevent corrosion and improve appearance, for example chromium plating.

Why other options are wrong:

- Galvanisation is coating iron with zinc (not by this electrolytic definition).
- Calcination and smelting are metal-extraction processes.

Final Answer: The process is electroplating $\Rightarrow$ $\boxed{C}$

Answer: (C) Go Back to Q45

Q46.

Solution

Concept — Avogadro's law: Avogadro's law states that equal volumes of all gases, measured at the same temperature and pressure, contain an equal number of molecules.

Step 1 — Match the statement: Same volume, same T and P $\rightarrow$ equal number of molecules.

Step 2 — Name the law: This is Avogadro's law.

Why other options are wrong:

- Boyle's law relates pressure and volume.
- Charles' law relates volume and temperature.
- Gay-Lussac's law relates pressure and temperature.

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

Answer: (B) Go Back to Q46

Q47.

Solution

Concept — Molar volume at STP: One mole of any gas at standard temperature and pressure (STP) occupies a fixed volume called the molar volume, which is 22.4 litres.

Step 1 — Recall the value: Molar volume at STP $= 22.4$ L.

Step 2 — Confirm: This holds for any gas at STP.

Why other options are wrong:

- 1 L and 11.2 L are too small for one full mole.
- 44.8 L would be the volume of two moles.

Final Answer: Molar volume at STP is 22.4 L $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q47

Q48.

Solution

Concept — Conduction in solutions: A solution conducts electricity only if it contains charged particles that are free to move. In solutions, these charged particles are free ions.

Step 1 — Identify the carriers: Free ions carry the electric current through a solution.

Step 2 — Conclude: So a conducting solution must contain free ions.

Why other options are wrong:

- Free electrons carry current in metals, not in solutions.
- Without charged particles, a solution cannot conduct.
- Neutral molecules alone do not conduct electricity.

Final Answer: A conducting solution contains free ions $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q48

Q49.

Solution

Concept — Clean fuels: CNG (compressed natural gas) burns more completely and produces fewer harmful pollutants than petrol or diesel, so it is widely used in vehicles as a cleaner fuel.

Step 1 — Compare the fuels: Petrol, diesel and kerosene release more pollutants.

Step 2 — Identify the clean fuel: CNG is the cleaner vehicle fuel.

Why other options are wrong:

- Petrol and diesel give out more smoke and harmful gases.
- Kerosene is not used as a clean vehicle fuel.

Final Answer: CNG is the cleaner vehicle fuel $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q49

Q50.

Solution

Concept — Acid rain: Acid rain is caused mainly by oxides of sulphur and nitrogen released from burning fossil fuels. Sulphur dioxide (SO_2) dissolves in rain water to form sulphurous and sulphuric acids.

Step 1 — Identify the polluting gas: Sulphur dioxide is a major cause of acid rain.

Step 2 — Confirm: It reacts with water and oxygen in the air to form acids.

Why other options are wrong:

- Oxygen, nitrogen and hydrogen do not by themselves cause acid rain.

Final Answer: Sulphur dioxide causes acid rain $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q50

Answer Key

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