Jharkhand Polytechnic Chemistry

Sample Paper – 7

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 direct change of a solid into a gas without passing through the liquid state, as seen with dry ice, is called:

(A) melting

(B) condensation

(C) sublimation

(D) freezing

Q2. The chemical symbol of the element lead is:

(A) Pb

(B) Pd

(C) Ld

(D) Le

Q3. Taking the atomic mass of hydrogen as 1 u, the molecular mass of a hydrogen molecule (H_2) is:

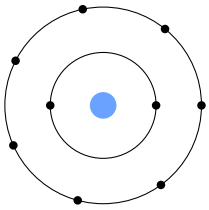
(A) 1 u

(B) 4 u

(C) 16 u

(D) 2 u

Q4. The electronic configuration of a fluorine atom ($Z = 9$), shown below, is:



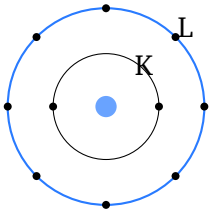
(A) $2, 8$

(B) $2, 7$

(C) $7, 2$

(D) $2, 5$

Q5. In the atom shown below, the second (L) shell is highlighted. The maximum number of electrons that the L shell can hold is:



(A) 2

(B) 18

(C) 8

(D) 32

Q6. An atom of calcium has mass number 40 and atomic number 20. The number of neutrons present in it is:

(A) 20

(B) 40

(C) 60

(D) 10

Q7. A pure substance that is made up of only one kind of atom is called a/an:

(A) mixture

(B) element

(C) compound

(D) solution

Q8. The smallest particle of a compound that can exist independently and still shows all the properties of that compound is the:

(A) atom

(B) ion

(C) electron

(D) molecule

Q9. Cathode rays produced in a discharge tube are actually a stream of:

(A) electrons

(B) protons

(C) neutrons

(D) photons

Q10. The horizontal rows of the modern periodic table are called:

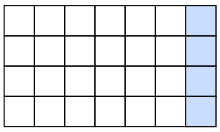
(A) groups

(B) periods

(C) families

(D) blocks

Q11. The highlighted last vertical column in the table below represents group 18 (the noble gases). These elements are very unreactive because their outermost shells are:



(A) completely empty

(B) half filled

(C) singly filled

(D) completely filled

Q12. An element has the electronic configuration $2, 8, 1$. In the periodic table it belongs to:

(A) group 1, period 2

(B) group 8, period 1

(C) group 1, period 3

(D) group 3, period 1

Q13. As we move from left to right across a period, the ionisation energy of the elements generally:

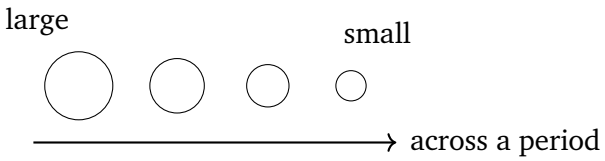
(A) increases

(B) decreases

(C) remains the same

(D) becomes zero

Q14. The diagram shows how atomic size changes across a period. Since atomic size decreases from left to right, the largest atom in a period lies:



(A) on the extreme right

(B) on the extreme left

(C) exactly in the middle

(D) outside the table

Q15. Respiration, in which glucose is slowly broken down inside the body to release energy, is an example of a/an:

(A) endothermic reaction

(B) precipitation reaction

(C) displacement reaction

(D) exothermic reaction

Q16. Passing electricity through molten sodium chloride to break it down into sodium and chlorine is an example of a/an:

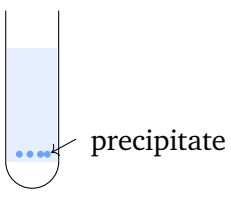
(A) combination reaction

(B) displacement reaction

(C) decomposition reaction

(D) neutralisation reaction

Q17. When two clear solutions are mixed, an insoluble solid settles at the bottom of the test tube as shown. This type of reaction is called a:



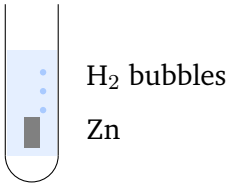
(A) precipitation reaction

(B) combustion reaction

(C) combination reaction

(D) redox reaction

Q18. In the reaction $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$ (shown), zinc pushes out hydrogen. This reaction is a:



(A) combination reaction

(B) displacement reaction

(C) decomposition reaction

(D) double displacement reaction

Q19. The gain of electrons by an atom or ion during a chemical reaction is called:

(A) oxidation

(B) neutralisation

(C) reduction

(D) ionisation

Q20. The development of a bad smell and taste in fatty or oily food, called rancidity, can be slowed down by adding:

(A) water

(B) common salt only

(C) extra sugar

(D) antioxidants

Q21. The acid secreted in the human stomach that helps in the digestion of food is:

(A) hydrochloric acid

(B) sulphuric acid

(C) nitric acid

(D) acetic acid

Q22. When the indicator phenolphthalein is added to an acidic solution, its colour is:

(A) pink

(B) colourless

(C) blue

(D) yellow

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

(A) hydrogen

(B) oxygen

(C) ammonia

(D) carbon dioxide

Q24. A common antacid taken to relieve acidity in the stomach contains the mild base:

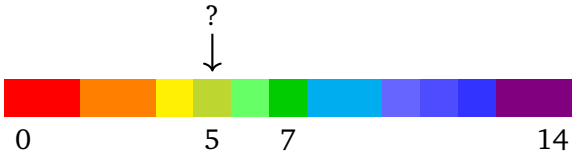
(A) sodium chloride

(B) hydrochloric acid

(C) magnesium hydroxide

(D) calcium chloride

Q25. Tooth decay begins when the pH of the mouth falls below the value marked by the arrow on the scale below. That value is:



(A) 7.0

(B) 5.5

(C) 9.0

(D) 11.0

Q26. A weak acid is one that, in its aqueous solution:

(A) ionises only partially

(B) ionises completely

(C) does not contain hydrogen

(D) turns red litmus blue

Q27. Metals usually take part in chemical reactions by:

(A) gaining electrons to form negative ions

(B) sharing electrons equally

(C) losing electrons to form positive ions

(D) neither losing nor gaining electrons

Q28. Non-metals usually react by:

(A) losing electrons to form positive ions

(B) remaining chemically unchanged

(C) forming alloys with each other

(D) gaining electrons to form negative ions

Q29. Aluminium does not corrode easily because its surface is covered by a thin, protective layer of:

(A) aluminium chloride

(B) aluminium oxide

(C) aluminium sulphate

(D) pure aluminium

Q30. Copper does not react with dilute hydrochloric acid to release hydrogen gas because copper is:

(A) less reactive than hydrogen

(B) more reactive than hydrogen

(C) a non-metal

(D) a liquid metal

Q31. An alloy in which one of the constituent metals is mercury is called a/an:

(A) solder

(B) brass

(C) bronze

(D) amalgam

Q32. The most abundant metal found in the earth's crust is:

(A) iron

(B) calcium

(C) aluminium

(D) sodium

Q33. Ionic compounds conduct electricity:

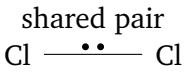
(A) in the solid state only

(B) in the molten or aqueous state but not as solids

(C) in all states equally well

(D) under no condition at all

Q34. Two chlorine atoms join together by sharing one pair of electrons, as shown below. This type of bond is a:



(A) single bond

(B) double bond

(C) triple bond

(D) ionic bond

Q35. The bond formed between two non-metal atoms by the mutual sharing of electrons is a:

(A) ionic bond

(B) metallic bond

(C) covalent bond

(D) zero bond (no bond)

Q36. A potassium atom (configuration $2, 8, 8, 1$) attains a stable noble-gas configuration by:

(A) gaining one electron

(B) sharing one electron

(C) gaining eight electrons

(D) losing one electron

Q37. The property of carbon by which its atoms link with one another to form long chains, branches and rings is called:

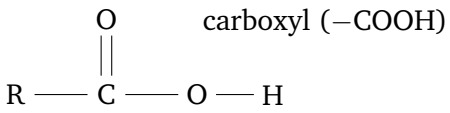
(A) catenation

(B) ionisation

(C) hydrogenation

(D) sublimation

Q38. The functional group present in all carboxylic acids, shown in the structure below, is:



(A) $-OH$

(B) $-COOH$

(C) $-CHO$

(D) $>C=O$

Q39. The molecular formula of ethyne (acetylene) is:

(A) C_2H_6

(B) C_2H_4

(C) C_2H_2

(D) CH_4

Q40. The IUPAC name of acetic acid (CH_3COOH) is:

(A) methanoic acid

(B) methanol

(C) ethanol

(D) ethanoic acid

Q41. Addition reactions are a characteristic property of:

(A) saturated hydrocarbons (alkanes)

(B) unsaturated hydrocarbons (alkenes and alkynes)

(C) noble gases

(D) ionic compounds

Q42. When ethanol is burnt completely in plenty of air, the products formed are:

(A) carbon dioxide and water

(B) carbon monoxide and hydrogen

(C) only carbon (soot)

(D) ethanoic acid and water

Q43. The first (simplest) member of the alkane series is:

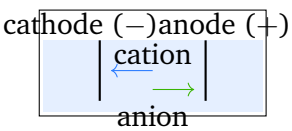
(A) ethane

(B) propane

(C) butane

(D) methane

Q44. During the electrolysis of a solution (shown), the negatively charged ions (anions) move towards the:



(A) cathode

(B) battery

(C) anode

(D) electrolyte

Q45. At constant pressure, when the absolute (Kelvin) temperature of a fixed mass of gas is increased, its volume:

(A) increases

(B) decreases

(C) remains constant

(D) becomes zero

Q46. A strong electrolyte is one that, in its aqueous solution:

(A) does not dissociate at all

(B) dissociates almost completely into ions

(C) dissociates only very slightly

(D) contains no ions at all

Q47. Metals are good conductors of electricity mainly because they contain:

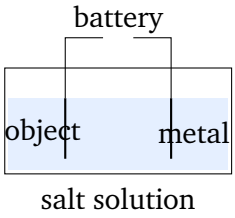
(A) free protons

(B) free neutrons

(C) tightly bound electrons

(D) free (mobile) electrons

Q48. The process shown below, in which a layer of one metal is deposited on another object by passing an electric current through a solution, is called:



(A) galvanisation

(B) alloying

(C) electroplating

(D) calcination

Q49. The continuous burning of fossil fuels in factories and vehicles mainly increases the atmospheric level of:

(A) carbon dioxide

(B) oxygen

(C) nitrogen

(D) helium

Q50. CNG, widely used as a cleaner fuel in vehicles, stands for:

(A) condensed natural gas

(B) compressed natural gas

(C) carbon natural gas

(D) compressed nitrogen gas

Detailed Solutions

Q1.

Solution

Concept — Sublimation: Sublimation is the change of a substance directly from the solid state to the gaseous state without first becoming a liquid.

Step 1 — Recall the example: Solid carbon dioxide (dry ice) turns straight into gas, so it is a sublimation.

Step 2 — Identify the answer: The direct solid-to-gas change is sublimation.

Why other options are wrong:

- Melting is solid to liquid.
- Condensation is gas to liquid.
- Freezing is liquid to solid.

Final Answer: Solid changing directly to gas is sublimation $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q1

Q2.

Solution

Concept — Symbols of elements: Many symbols come from the Latin names of elements. Lead is named *plumbum* in Latin, giving the symbol Pb.

Step 1 — Recall the Latin name: Lead = plumbum.

Step 2 — Write the symbol: The first two suitable letters give Pb.

Why other options are wrong:

- Pd is the symbol of palladium.
- Ld and Le are not symbols of any element.

Final Answer: The symbol of lead is Pb $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q2

Q3.

Solution

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

Step 1 — Count the atoms: H_2 contains 2 hydrogen atoms.

Step 2 — Add the masses: $1 + 1$.

Step 3 — Compute: $= 2$ u.

Why other options are wrong:

- 1 u is the mass of a single hydrogen atom, not a molecule.
- 4 u and 16 u do not match two hydrogen atoms.

Final Answer: Molecular mass of $H_2 = 2$ u $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q3

Q4.

Solution

Concept — Electronic configuration: Electrons fill shells in order: the K shell holds up to 2 and the L shell up to 8. Fluorine has 9 electrons.

Step 1 — Fill the K shell: 2 electrons. Remaining $= 9 - 2 = 7$.

Step 2 — Fill the L shell: the remaining 7 electrons.

Step 3 — Write the configuration: $2, 7$.

Why other options are wrong:

- $2, 8$ would need 10 electrons.
- $7, 2$ wrongly fills the K shell first with 7.
- $2, 5$ accounts for only 7 electrons in total.

Final Answer: Fluorine is $2, 7 \Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q4

Q5.

Solution

Concept — Shell capacity: The maximum number of electrons in a shell 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 $\Rightarrow$ C

Answer: (C) Go Back to Q5

Q6.

Solution

Concept — Number of neutrons: The number of neutrons in an atom is found by subtracting the atomic number from the mass number: neutrons $= A - Z$.

Step 1 — List the data: $A = 40$, $Z = 20$.

Step 2 — Subtract: neutrons $= 40 - 20$.

Step 3 — Compute: $= 20$.

Why other options are wrong:

- 40 is the mass number, not the neutron count.
- 60 would be $A + Z$, which has no meaning here.
- 10 is half the mass number, not the neutron count.

Final Answer: Number of neutrons $= 20 \Rightarrow$ A

Answer: (A) Go Back to Q6

Q7.

Solution

Concept — Element: An element is the simplest pure substance, built up of only one kind of atom. It cannot be broken into simpler substances by chemical means.

Step 1 — Match the definition: One kind of atom $\rightarrow$ element.

Step 2 — Confirm: For example, oxygen, gold and iron are elements.

Why other options are wrong:

- A compound has two or more kinds of atoms chemically joined.
- A mixture and a solution contain more than one substance.

Final Answer: A substance of one kind of atom is an element $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q7

Q8.

Solution

Concept — Molecule of a compound: A molecule is the smallest particle of a substance that can exist on its own and still shows all the properties of that substance. For a compound, this smallest independent unit is its molecule.

Step 1 — Identify the smallest free unit: For a compound it is the molecule (for example, one molecule of water, H_2O).

Step 2 — Confirm: An atom alone cannot show the properties of a compound.

Why other options are wrong:

- An atom is the smallest unit of an element, not of a compound.
- Ions and electrons are charged particles, not the independent unit of a compound.

Final Answer: The smallest free particle of a compound is its molecule $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q8

Q9.

Solution

Concept — Cathode rays: Cathode rays are the rays that travel from the cathode (negative electrode) to the anode in a discharge tube. Experiments showed they are a stream of negatively charged particles, the electrons.

Step 1 — Recall the nature of the rays: They are deflected by electric and magnetic fields towards the positive plate, showing a negative charge.

Step 2 — Identify the particle: The negatively charged particle is the electron.

Why other options are wrong:

- Protons form the positively charged anode (canal) rays.
- Neutrons carry no charge and are not deflected.
- Photons are particles of light, not cathode rays.

Final Answer: Cathode rays are a stream of electrons $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q9

Q10.

Solution

Concept — Periods: In the modern periodic table, the horizontal rows are called periods, while the vertical columns are called groups.

Step 1 — Read the question: Horizontal rows are asked.

Step 2 — Name them: Horizontal rows = periods.

Why other options are wrong:

- Groups (or families) are the vertical columns.
- Blocks are sections (s, p, d, f), not the rows.

Final Answer: Horizontal rows are periods $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q10

Q11.

Solution

Concept — Noble gases: The elements of group 18 are the noble gases. They are chemically very stable because their outermost shells are completely filled with electrons.

Step 1 — Read the figure: The highlighted last column is group 18.

Step 2 — Explain the stability: A completely filled outer shell needs neither to gain nor to lose electrons, so the elements are unreactive.

Why other options are wrong:

- An empty, half filled or singly filled shell would make the element reactive.

Final Answer: Noble gases have completely filled outer shells $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q11

Q12.

Solution

Concept — Position from configuration: The number of shells (digits) gives the period, and the number of valence (outermost) electrons gives the group for main-group elements.

Step 1 — Count the shells: $2, 8, 1$ has three shells, so the period is 3.

Step 2 — Count valence electrons: The outermost shell has 1 electron, so the group is 1.

Step 3 — Identify the element: This is sodium, in group 1, period 3.

Why other options are wrong:

- Period 2 would need only two shells.
- Group 8 or group 3 does not match 1 valence electron.

Final Answer: $2, 8, 1$ is in group 1, period 3 $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q12

Q13.

Solution

Concept — Ionisation energy trend: Ionisation energy is the energy needed to remove an electron from an atom. Across a period the nuclear charge rises and the atom gets smaller, so electrons are held more tightly.

Step 1 — Identify the trend: Stronger pull on electrons means more energy is required to remove one.

Step 2 — Conclude: Ionisation energy increases from left to right across a period.

Why other options are wrong:

- It does not decrease across a period; it decreases down a group instead.
- It neither stays constant nor becomes zero.

Final Answer: Ionisation energy increases across a period $\Rightarrow$ A

Answer: (A) Go Back to Q13

Q14.

Solution

Concept — Atomic size across a period: Across a period the nuclear charge increases while electrons enter the same shell, so the atoms are pulled in and become smaller from left to right.

Step 1 — Read the figure: The circles shrink as we move to the right.

Step 2 — Locate the largest atom: Since size decreases to the right, the largest atom lies at the extreme left of the period.

Why other options are wrong:

- The extreme right holds the smallest atom.
- The middle and "outside the table" are not correct positions.

Final Answer: The largest atom is on the extreme left $\Rightarrow$ B

Answer: (B) Go Back to Q14

Q15.

Solution

Concept — Exothermic reaction: An exothermic reaction is one that releases energy (heat) to the surroundings. Respiration slowly breaks down glucose and releases energy that the body uses.

Step 1 — Identify the energy change: Respiration gives out energy.

Step 2 — Classify: A reaction that gives out heat is exothermic.

Why other options are wrong:

- An endothermic reaction absorbs heat, which is the opposite.
- Precipitation and displacement describe different reaction types, not the energy change here.

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

Answer: (D) Go Back to Q15

Q16.

Solution

Concept — Decomposition reaction: In a decomposition reaction a single compound breaks down into two or more simpler substances. When electricity causes this, it is an electrolytic decomposition.

Step 1 — Look at the change: One compound, molten NaCl, breaks into two substances, sodium and chlorine.

Step 2 — Name the type: One substance splitting into many is a decomposition reaction.

Why other options are wrong:

- Combination joins substances into one product.
- Displacement and neutralisation are different reaction types.

Final Answer: Splitting molten NaCl is a decomposition reaction $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q16

Q17.

Solution

Concept — Precipitation reaction: A precipitation reaction is one in which two solutions react to form an insoluble solid called a precipitate, which settles down.

Step 1 — Read the figure: An insoluble solid is shown settling at the bottom of the test tube.

Step 2 — Name the type: Formation of an insoluble solid from solutions is a precipitation reaction.

Why other options are wrong:

- Combustion is burning in oxygen.
- Combination joins substances into one product.
- A redox reaction involves transfer of electrons, which is not the focus here.

Final Answer: Formation of an insoluble solid is precipitation $\Rightarrow$ A

Answer: (A) Go Back to Q17

Q18.

Solution

Concept — Displacement reaction: In a displacement reaction a more reactive element pushes out a less reactive element from its compound. Zinc is more reactive than hydrogen.

Step 1 — Look at the reaction: Zinc displaces hydrogen from sulphuric acid, releasing hydrogen gas as bubbles.

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 needs an exchange of ions between two compounds.

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

Answer: (B) Go Back to Q18

Q19.

Solution

Concept — Reduction: In terms of electrons, reduction is the gain of electrons by a species during a reaction. (Oxidation is the loss of electrons.)

Step 1 — Match the definition: Gain of electrons $\rightarrow$ reduction.

Step 2 — Confirm: A handy memory aid is "OIL RIG" — Reduction Is Gain of electrons.

Why other options are wrong:

- Oxidation is the loss of electrons.
- Neutralisation is an acid–base reaction.
- Ionisation is the formation of ions, not specifically the gain of electrons.

Final Answer: Gain of electrons is reduction $\Rightarrow$ C

Answer: (C) Go Back to Q19

Q20.

Solution

Concept — Rancidity: Rancidity is the spoiling of fats and oils by oxidation, which gives food a bad smell and taste. Antioxidants slow this oxidation.

Step 1 — Identify the cause: Rancidity is caused by oxidation of oils and fats.

Step 2 — Find the remedy: Adding antioxidants prevents or slows this oxidation.

Why other options are wrong:

- Water and sugar do not stop the oxidation of fats.
- Common salt alone is not the standard preventive added for this purpose.

Final Answer: Rancidity is slowed by antioxidants $\Rightarrow$ D

Answer: (D) Go Back to Q20

Q21.

Solution

Concept — Stomach acid: The gastric juice in the human stomach contains hydrochloric acid (HCl). It helps to digest food and kills harmful germs.

Step 1 — Recall the acid: The stomach produces hydrochloric acid.

Step 2 — Confirm: Its role is to aid digestion and provide an acidic medium for enzymes.

Why other options are wrong:

- Sulphuric and nitric acids are strong industrial acids, not made in the stomach.
- Acetic acid is found in vinegar, not the stomach.

Final Answer: The stomach acid is hydrochloric acid $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q21

Q22.

Solution

Concept — Phenolphthalein: Phenolphthalein is an acid–base indicator. It is colourless in acidic solution and turns pink in basic solution.

Step 1 — Apply to an acid: In an acidic solution phenolphthalein stays colourless.

Step 2 — Confirm: The pink colour appears only in a base.

Why other options are wrong:

- Pink is its colour in a base, not an acid.
- It does not turn blue or yellow.

Final Answer: Phenolphthalein is colourless in acid $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q22

Q23.

Solution

Concept — Carbonate plus acid: A metal carbonate reacts with a dilute acid to give a salt, water and carbon dioxide gas: carbonate + acid → salt + water + CO_2.

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

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

Why other options are wrong:

- Hydrogen is released when acids react with active metals, not carbonates.
- Oxygen and ammonia are not produced in this reaction.

Final Answer: Carbonate + acid gives carbon dioxide ⇒ $\boxed{\text{D}}$

Answer: (D) Go Back to Q23

Q24.

Solution

Concept — Antacids: An antacid is a mild base that neutralises the excess hydrochloric acid in the stomach. Magnesium hydroxide (milk of magnesia) is a common antacid.

Step 1 — Recall the action: An antacid must be a base to neutralise acid.

Step 2 — Identify the base: Magnesium hydroxide is the mild base used.

Why other options are wrong:

- Hydrochloric acid would add to the acidity, not reduce it.
- Sodium chloride and calcium chloride are neutral salts, not antacids.

Final Answer: The antacid base is magnesium hydroxide ⇒ $\boxed{\text{C}}$

Answer: (C) Go Back to Q24

Q25.

Solution

Concept — pH and tooth decay: Tooth enamel begins to dissolve (decay) when the pH inside the mouth drops below about 5.5, that is, when the mouth becomes too acidic.

Step 1 — Read the scale: The arrow points just below the middle, in the acidic region.

Step 2 — State the value: Tooth decay starts when the pH falls below 5.5.

Why other options are wrong:

- 7.0 is neutral and does not cause decay.
- 9.0 and 11.0 are basic, where enamel is safe.

Final Answer: Tooth decay begins below pH $5.5 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q25

Q26.

Solution

Concept — Weak acid: A weak acid ionises only partially in water, so it produces relatively few hydrogen ions. (A strong acid ionises almost completely.)

Step 1 — Recall the behaviour: Only some molecules of a weak acid split into ions.

Step 2 — Conclude: Therefore a weak acid ionises only partially in solution.

Why other options are wrong:

- Complete ionisation describes a strong acid.
- All acids contain replaceable hydrogen.
- Turning red litmus blue is a property of bases, not acids.

Final Answer: A weak acid ionises only partially $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q26

Q27.

Solution

Concept — Reactivity of metals: Metals have few valence electrons that they tend to lose easily. By losing electrons they form positively charged ions (cations).

Step 1 — Recall the tendency: Metals lose electrons in reactions.

Step 2 — State the result: Losing electrons gives positive ions.

Why other options are wrong:

- Gaining electrons to form negative ions is typical of non-metals.
- Metals do not simply share electrons equally, nor do they stay unchanged.

Final Answer: Metals lose electrons to form positive ions $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q27

Q28.

Solution

Concept — Reactivity of non-metals: Non-metals have nearly complete outer shells, so they tend to gain electrons. By gaining electrons they form negatively charged ions (anions).

Step 1 — Recall the tendency: Non-metals gain electrons in reactions.

Step 2 — State the result: Gaining electrons gives negative ions.

Why other options are wrong:

- Losing electrons to form positive ions is a property of metals.
- Non-metals do not stay unchanged, and they do not form alloys with each other.

Final Answer: Non-metals gain electrons to form negative ions $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q28

Q29.

Solution

Concept — Protective oxide layer: When aluminium is exposed to air, a thin, tough layer of aluminium oxide forms on its surface. This layer sticks firmly and stops further corrosion.

Step 1 — Identify the coating: The protective layer is aluminium oxide.

Step 2 — Explain: The oxide layer seals the metal below from air and moisture.

Why other options are wrong:

- Aluminium chloride and sulphate are not the protective surface layers formed in air.
- Pure aluminium is the metal itself, not a protective coating.

Final Answer: Aluminium is protected by an aluminium oxide layer $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q29

Q30.

Solution

Concept — Reactivity series and acids: Only metals placed above hydrogen in the reactivity series can displace hydrogen from dilute acids. Copper lies below hydrogen, so it cannot.

Step 1 — Place copper: Copper is less reactive than hydrogen.

Step 2 — Conclude: Being less reactive, copper cannot displace hydrogen from dilute HCl, so no gas is released.

Why other options are wrong:

- Copper is not more reactive than hydrogen.
- Copper is a metal, and it is solid at room temperature.

Final Answer: Copper is less reactive than hydrogen $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q30

Q31.

Solution

Concept — Amalgam: An alloy is a homogeneous mixture of metals. When one of the metals in the alloy is mercury, the alloy is called an amalgam.

Step 1 — Match the definition: Alloy containing mercury → amalgam.

Step 2 — Confirm: For example, dental fillings use a silver amalgam.

Why other options are wrong:

- Solder is an alloy of lead and tin.
- Brass is copper and zinc; bronze is copper and tin.

Final Answer: An alloy with mercury is an amalgam ⇒ D

Answer: (D) Go Back to Q31

Q32.

Solution

Concept — Abundance of metals: Among all metals, aluminium is the most abundant in the earth's crust, mainly found in the ore bauxite.

Step 1 — Recall the order: Aluminium is the most abundant metal (oxygen and silicon are more abundant overall but are non-metals).

Step 2 — Identify: The most abundant metal is aluminium.

Why other options are wrong:

- Iron is the second most abundant metal, not the first.
- Calcium and sodium are less abundant than aluminium.

Final Answer: The most abundant metal is aluminium ⇒ C

Answer: (C) Go Back to Q32

Q33.

Solution

Concept — Conduction by ionic compounds: Ionic compounds conduct electricity only when their ions are free to move. This happens in the molten state or in aqueous solution, but not in the solid state where the ions are locked in place.

Step 1 — Solid state: Ions are fixed, so no conduction.

Step 2 — Molten or aqueous state: Ions become free to move, so conduction occurs.

Why other options are wrong:

- They do not conduct in the solid state.
- They do not conduct equally in all states, nor never at all.

Final Answer: Ionic compounds conduct only when molten or aqueous $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q33

Q34.

Solution

Concept — Single covalent bond: A covalent bond is formed by the sharing of electrons. When two atoms share exactly one pair of electrons, the bond is a single bond.

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

Step 2 — Name the bond: Sharing one pair gives a single bond (Cl–Cl).

Why other options are wrong:

- A double bond shares two pairs and a triple bond shares three pairs.
- An ionic bond involves transfer of electrons, not sharing.

Final Answer: Sharing one pair of electrons is a single bond $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q34

Q35.

Solution

Concept — Covalent bonding: Two non-metal atoms each need electrons to complete their octets. Instead of transferring electrons, they share pairs of electrons, forming a covalent bond.

Step 1 — Look at the atoms: Both atoms are non-metals, so neither readily gives up electrons.

Step 2 — Decide the bond: Sharing of electron pairs between them is a covalent bond.

Why other options are wrong:

- An ionic bond forms by transfer of electrons (metal + non-metal).
- A metallic bond is found in metals.
- There is certainly a bond, so "no bond" is wrong.

Final Answer: Two non-metals form a covalent bond $\Rightarrow$ C

Answer: (C) Go Back to Q35

Q36.

Solution

Concept — Achieving a stable octet: An atom becomes stable by attaining the electron arrangement of the nearest noble gas. Potassium $(2, 8, 8, 1)$ has just one electron in its outermost shell.

Step 1 — Count the outer electrons: The outermost shell has 1 electron.

Step 2 — Decide the easiest path: Losing that single electron leaves the stable arrangement $2, 8, 8$.

Why other options are wrong:

- Gaining one or eight electrons is much harder than losing one.
- Potassium forms ionic bonds by losing, not sharing, electrons.

Final Answer: Potassium loses one electron $\Rightarrow$ D

Answer: (D) Go Back to Q36

Q37.

Solution

Concept — Catenation: Catenation is the special ability of carbon atoms to link with one another through covalent bonds, forming long chains, branched chains and rings.

Step 1 — Match the definition: Carbon linking with carbon $\rightarrow$ catenation.

Step 2 — Confirm: This property, with tetravalency, lets carbon form a huge number of compounds.

Why other options are wrong:

- Ionisation is the formation of ions.
- Hydrogenation adds hydrogen; sublimation is a change of state.

Final Answer: Carbon chains, branches and rings show catenation $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q37

Q38.

Solution

Concept — Carboxyl group: The functional group present in all carboxylic acids is the carboxyl group, written as $-\text{COOH}$. It is made of a carbonyl ($>\text{C}=\text{O}$) joined to a hydroxyl ($-\text{OH}$).

Step 1 — Read the structure: The carbon is double bonded to one oxygen and single bonded to an $-\text{OH}$ group.

Step 2 — Name the group: Together this is the carboxyl group, $-\text{COOH}$.

Why other options are wrong:

- $-\text{OH}$ alone is the alcohol group.
- $-\text{CHO}$ is the aldehyde group and $>\text{C}=\text{O}$ is the ketone group.

Final Answer: The carboxylic acid group is $-\text{COOH}$ $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q38

Q39.

Solution

Concept — Ethyne: Ethyne (acetylene) is the first member of the alkyne series, which contains a carbon–carbon triple bond. Its molecular formula is C_2H_2.

Step 1 — Recall the alkyne formula: Alkynes follow C_nH_{2n-2}.

Step 2 — Put $n = 2$: $C_2H_{(2\times2)-2} = C_2H_2$.

Why other options are wrong:

- C_2H_6 is ethane and C_2H_4 is ethene.
- CH_4 is methane.

Final Answer: Ethyne is $C_2H_2 \Rightarrow \boxed{C}$

Answer: (C) Go Back to Q39

Q40.

Solution

Concept — IUPAC naming: In the IUPAC system, the common name acetic acid (CH_3COOH) corresponds to ethanoic acid, because the molecule has two carbon atoms (eth-) and a carboxylic acid group (-oic acid).

Step 1 — Count carbons: Two carbon atoms give the stem "eth".

Step 2 — Add the suffix: The $-COOH$ group gives "-anoic acid", so the name is ethanoic acid.

Why other options are wrong:

- Methanoic acid (HCOOH) has only one carbon.
- Methanol and ethanol are alcohols, not acids.

Final Answer: Acetic acid is ethanoic acid $\Rightarrow \boxed{D}$

Answer: (D) Go Back to Q40

Q41.

Solution

Concept — Addition reactions: Addition reactions occur where there are double or triple bonds. Unsaturated hydrocarbons (alkenes and alkynes) have such multiple bonds, so they readily undergo addition.

Step 1 — Identify the requirement: A multiple (double or triple) bond is needed for addition.

Step 2 — Match the family: Unsaturated hydrocarbons have these bonds, so addition is their characteristic reaction.

Why other options are wrong:

- Alkanes are saturated and mainly undergo substitution, not addition.
- Noble gases and ionic compounds do not undergo addition reactions.

Final Answer: Addition reactions are typical of unsaturated hydrocarbons $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q41

Q42.

Solution

Concept — Complete combustion: When a carbon compound burns completely in plenty of air (oxygen), it gives carbon dioxide and water along with heat and light.

Step 1 — Write the idea: Ethanol + enough oxygen $\rightarrow$ carbon dioxide + water.

Step 2 — Identify the products: The products are carbon dioxide and water.

Why other options are wrong:

- Carbon monoxide or soot forms only in incomplete combustion (limited air).
- Ethanoic acid is a product of oxidation by a different process, not complete burning.

Final Answer: Ethanol burns completely to CO_2 and water $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q42

Q43.

Solution

Concept — Alkane series: The alkanes are saturated hydrocarbons with the general formula C_nH_{2n+2}. The first (simplest) member has $n = 1$.

Step 1 — Put $n = 1$: $C_1H_{(2\times1)+2} = CH_4$.

Step 2 — Name it: CH_4 is methane, the first member.

Why other options are wrong:

- Ethane is the second member, propane the third and butane the fourth.

Final Answer: The first alkane is methane $\Rightarrow$ D

Answer: (D) Go Back to Q43

Q44.

Solution

Concept — Movement of ions in electrolysis: During electrolysis, opposite charges attract. Positive ions (cations) move to the negative cathode, while negative ions (anions) move to the positive anode.

Step 1 — Look at the anions: Anions are negatively charged.

Step 2 — Decide the direction: They are attracted to the positive electrode, the anode.

Why other options are wrong:

- Cations, not anions, move towards the cathode.
- The battery and the electrolyte are not electrodes that ions migrate to.

Final Answer: Anions move towards the anode $\Rightarrow$ C

Answer: (C) Go Back to Q44

Q45.

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 temperature, $V \propto T$.

Step 1 — Apply the law: At constant pressure, raising the absolute temperature raises the volume in proportion.

Step 2 — Conclude: So the volume of the gas increases.

Why other options are wrong:

- The volume does not decrease or stay constant when temperature rises at constant pressure.
- The volume cannot become zero on heating.

Final Answer: The volume increases $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q45

Q46.

Solution

Concept — Strong electrolyte: An electrolyte conducts electricity in solution because it splits into ions. A strong electrolyte is one that dissociates almost completely into ions.

Step 1 — Recall the meaning: "Strong" means a high degree of dissociation.

Step 2 — Conclude: A strong electrolyte dissociates almost completely into ions.

Why other options are wrong:

- No dissociation or only slight dissociation describes a non-electrolyte or weak electrolyte.
- It must contain ions in order to conduct.

Final Answer: A strong electrolyte dissociates almost completely $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q46

Q47.

Solution

Concept — Conduction in metals: Metals conduct electricity because they have a large number of loosely held, free (mobile) electrons that drift when a voltage is applied.

Step 1 — Identify the charge carriers: In metals the carriers are free electrons.

Step 2 — Conclude: The free (mobile) electrons make metals good conductors.

Why other options are wrong:

- Protons and neutrons are fixed in the nucleus and do not move through the metal.
- Tightly bound electrons cannot move to carry current.

Final Answer: Metals conduct due to free (mobile) electrons $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q47

Q48.

Solution

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

Step 1 — Read the figure: A current is passed through a solution, coating the object with metal.

Step 2 — Name the process: Depositing a metal layer by electrolysis is electroplating.

Why other options are wrong:

- Galvanisation specifically coats iron with zinc, usually by dipping.
- Alloying mixes metals, and calcination is the heating of an ore.

Final Answer: Depositing a metal layer by electrolysis is electroplating $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q48

Q49.

Solution

Concept — Fossil fuels and CO_2: Fossil fuels such as coal, petroleum and natural gas contain carbon. Burning them releases carbon dioxide, so heavy use raises the atmospheric carbon dioxide level.

Step 1 — Recall the product of burning: Burning carbon-rich fuels gives carbon dioxide.

Step 2 — Conclude: Continuous burning increases atmospheric carbon dioxide.

Why other options are wrong:

- Oxygen is used up, not increased, during burning.
- Nitrogen and helium are not the gases added by burning fuels.

Final Answer: Burning fossil fuels increases carbon dioxide $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q49

Q50.

Solution

Concept — CNG: CNG stands for Compressed Natural Gas. It is mostly methane stored under pressure and is used as a cleaner fuel in vehicles because it produces less pollution.

Step 1 — Expand the abbreviation: C = compressed, N = natural, G = gas.

Step 2 — State the full form: CNG = compressed natural gas.

Why other options are wrong:

- "Condensed" and "carbon" natural gas are not the correct expansions.
- "Compressed nitrogen gas" is wrong, as the fuel is natural gas (methane), not nitrogen.

Final Answer: CNG is compressed natural gas $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q50

Answer Key

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