Jharkhand Polytechnic Chemistry

Sample Paper – 10

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. Dissolving common salt in water, from which the salt can later be recovered by evaporation, is an example of a:

(A) physical change

(B) chemical change

(C) nuclear change

(D) irreversible chemical change

Q2. The chemical symbol of the element calcium is:

(A) Ca

(B) C

(C) Cl

(D) Cd

Q3. The molecular mass of ammonia (NH_3) is (atomic masses: N $= 14$, H $= 1$):

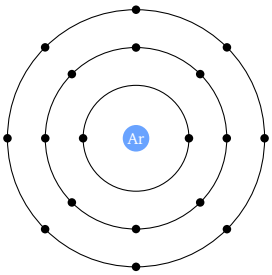
(A) 14 u

(B) 15 u

(C) 17 u

(D) 16 u

Q4. The figure below shows a Bohr model of an argon atom ($Z = 18$). Its electronic configuration is:



(A) $2, 8, 18$

(B) $2, 8, 8$

(C) $8, 8, 2$

(D) $2, 16$

Q5. A sodium atom has the electronic configuration $2, 8, 1$. The number of valence (outermost) electrons in it is:

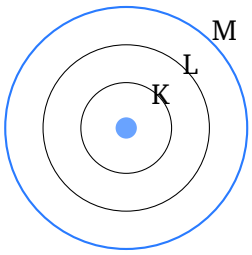
(A) 8

(B) 2

(C) 11

(D) 1

Q6. In the shell diagram shown, the outermost highlighted shell is the M shell (third shell). The maximum number of electrons it can hold is:



(A) 8

(B) 18

(C) 32

(D) 2

Q7. An atom contains 8 protons and 8 neutrons. Its mass number is:

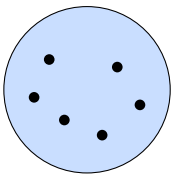
(A) 16

(B) 8

(C) 24

(D) 0

Q8. The atomic model shown below, which pictures the atom as a sphere of positive charge with electrons embedded in it (like seeds in a watermelon), was proposed by:



(A) Rutherford

(B) Bohr

(C) J. J. Thomson

(D) Dalton

Q9. When iron filings are simply mixed with sulphur powder, without heating, the result is a:

(A) compound

(B) new element

(C) mixture

(D) gas

Q10. The modern periodic table contains:

(A) 7 groups and 18 periods

(B) 8 groups and 7 periods

(C) 18 groups and 8 periods

(D) 18 groups and 7 periods

Q11. The elements of group 1 of the periodic table (except hydrogen) are known as the:

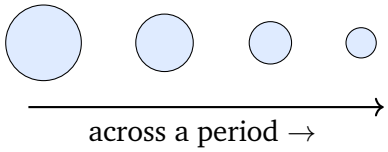
(A) alkali metals

(B) alkaline earth metals

(C) halogens

(D) noble gases

Q12. The diagram shows atoms of the elements of one period. On moving from left to right across a period, the size of the atoms generally:



(A) increases

(B) decreases

(C) remains the same

(D) first decreases then increases

Q13. In the periodic table, the most reactive metals are located at the:

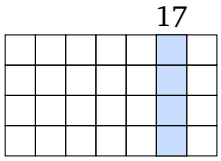
(A) top-right corner

(B) bottom-left region

(C) centre

(D) top-left corner

Q14. An element has the electronic configuration $2, 8, 7$. From the highlighted column of the table shown, it belongs to group:



(A) 17

(B) 7

(C) 2

(D) 8

Q15. The reaction $CaO + H_2O \rightarrow Ca(OH)_2$, which gives out a large amount of heat, is best described as a:

(A) decomposition reaction

(B) displacement reaction

(C) combination reaction

(D) double displacement reaction

Q16. Passing electricity through acidified water breaks it down into hydrogen and oxygen. This is an example of a:

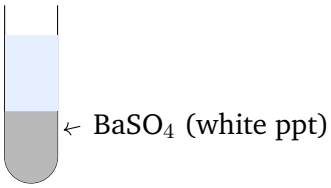
(A) combination reaction

(B) displacement reaction

(C) neutralisation reaction

(D) decomposition reaction

Q17. In the reaction $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 \downarrow +2NaCl$, a white insoluble solid settles at the bottom, as shown. This type of reaction is a:



(A) double displacement (precipitation)

(B) combination

(C) displacement

(D) decomposition

Q18. A reaction in which a more reactive metal removes a less reactive metal from its salt solution is called a:

(A) combination reaction

(B) displacement reaction

(C) decomposition reaction

(D) neutralisation reaction

Q19. During a redox reaction, the species that undergoes reduction is the one that:

(A) loses electrons

(B) gains oxygen

(C) loses hydrogen

(D) gains electrons

Q20. The rusting of iron is a slow chemical change that requires:

(A) only dry air

(B) only water, with no air

(C) heat and light

(D) both air (oxygen) and moisture

Q21. The acid naturally present in apples is:

(A) citric acid

(B) acetic acid

(C) malic acid

(D) tartaric acid

Q22. When a turmeric (haldi) stain is touched with a basic solution such as soap, its colour turns:

(A) red

(B) green

(C) blue

(D) colourless

Q23. Which metals react with dilute acids to liberate hydrogen gas?

(A) metals placed below hydrogen in the reactivity series

(B) metals placed above hydrogen in the reactivity series

(C) only noble metals such as gold

(D) no metal reacts with dilute acids

Q24. The salt formed by the neutralisation of a strong acid with a strong base has a pH of about:

(A) 2

(B) 4

(C) 7

(D) 10

Q25. A base that is soluble in water and gives hydroxide (OH^-) ions in solution is called a/an:

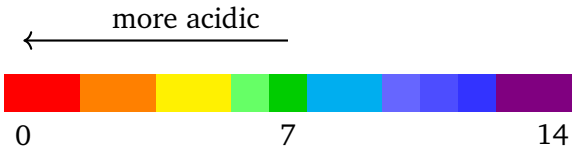
(A) alkali

(B) salt

(C) acid

(D) indicator

Q26. Using the pH scale shown below, as a solution becomes more and more acidic, its pH value:



(A) increases towards 14

(B) decreases towards 0

(C) stays fixed at 7

(D) becomes negative

Q27. Metals produce a ringing sound when they are struck. This property of metals is called:

(A) malleability

(B) ductility

(C) conductivity

(D) sonorousness

Q28. Non-metals such as sulphur and phosphorus are generally:

(A) good conductors of electricity

(B) shiny and malleable

(C) poor conductors of electricity

(D) liquids at room temperature

Q29. The chief ore from which aluminium is extracted is:

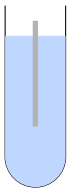
(A) bauxite

(B) haematite

(C) cinnabar

(D) calamine

Q30. An iron nail is dipped in blue copper sulphate solution, as shown, and copper is slowly deposited on it. This happens because:



iron nail in $CuSO_4$

(A) copper is more reactive than iron

(B) iron is more reactive than copper

(C) both have equal reactivity

(D) iron does not react at all

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

(A) amalgam

(B) brass

(C) bronze

(D) solder

Q32. Pure gold is too soft for making jewellery, so it is usually mixed with which metal to make it harder?

(A) mercury

(B) zinc

(C) aluminium

(D) copper

Q33. At room temperature, ionic compounds usually exist as:

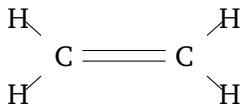
(A) gases

(B) liquids

(C) crystalline solids

(D) soft waxes

Q34. In the structure of ethene shown below, the two carbon atoms are joined by a:



(A) single bond

(B) double bond

(C) triple bond

(D) ionic bond

Q35. A covalent bond is formed when two atoms:

(A) completely transfer electrons from one to the other

(B) gain electrons from a metal

(C) lose electrons to a non-metal

(D) share one or more pairs of electrons

Q36. A chlorine atom $(2, 8, 7)$ attains a stable octet by:

(A) gaining one electron to form Cl^-

(B) losing one electron to form Cl^+

(C) gaining two electrons

(D) sharing three electrons

Q37. Carbon mostly forms covalent compounds because it:

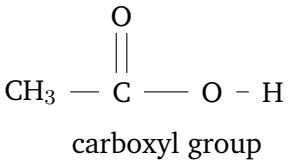
(A) easily loses 4 electrons

(B) easily gains 4 electrons

(C) shares its electrons with other atoms

(D) forms positive ions readily

Q38. The functional group present in ethanoic acid (CH_3COOH), highlighted in the structure shown, is the:



(A) hydroxyl ($-OH$) group

(B) carboxyl ($-COOH$) group

(C) aldehyde ($-CHO$) group

(D) ketone ($>C{=}O$) group

Q39. The molecular formula of hexane, the alkane having six carbon atoms, is:

(A) C_6H_{14}

(B) C_6H_{12}

(C) C_6H_6

(D) C_5H_{12}

Q40. Reddish-brown bromine water is decolourised when added to a certain compound. This shows that the compound is:

(A) a saturated alkane

(B) an ionic compound

(C) a noble gas

(D) an unsaturated hydrocarbon

Q41. Ethanol (C_2H_5OH) is a member of the homologous series of:

(A) alkanes

(B) alkenes

(C) alcohols

(D) alkynes

Q42. When ethanol reacts with sodium metal, the gas evolved is:

(A) oxygen

(B) hydrogen

(C) carbon dioxide

(D) chlorine

Q43. The IUPAC name of the compound CH_3CH_2OH is:

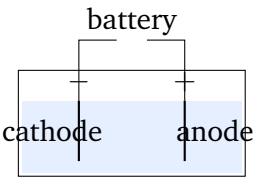
(A) methanol

(B) ethanal

(C) ethanoic acid

(D) ethanol

Q44. In the electrolysis apparatus shown, positively charged ions (cations) move towards and are deposited at the:



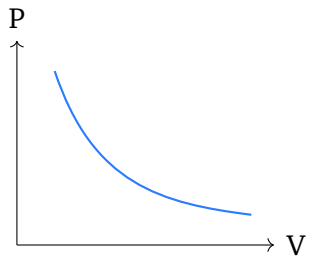
(A) cathode (negative electrode)

(B) anode (positive electrode)

(C) battery

(D) connecting wire

Q45. According to Boyle's law, the graph of pressure (P) against volume (V) of a fixed mass of gas at constant temperature, shown below, is a:



(A) straight line through the origin

(B) curve (hyperbola)

(C) horizontal straight line

(D) vertical straight line

Q46. A solution can conduct electricity only if it contains:

(A) sugar molecules

(B) only water molecules

(C) freely moving ions

(D) dissolved oxygen gas

Q47. One mole of any substance contains a number of particles equal to:

(A) 22.4

(B) 18

(C) 273

(D) 6.022×10^{23}

Q48. Electroplating is commonly used to:

(A) break a compound using heat

(B) separate a mixture of two liquids

(C) coat a cheaper metal with silver or chromium

(D) measure the pH of a solution

Q49. Carbon monoxide (CO) is a poisonous gas mainly because it:

(A) is highly acidic

(B) combines with haemoglobin in blood and lowers oxygen supply

(C) is heavier than air

(D) reacts violently with water

Q50. Which one of the following helps to reduce air pollution?

(A) burning more coal

(B) cutting down forests

(C) using more diesel vehicles

(D) planting trees and using clean fuels

Detailed Solutions

Q1.

Solution

Concept — Physical and chemical change: In a physical change no new substance is formed and the change can usually be reversed. In a chemical change a new substance with new properties is formed.

Step 1 — Examine the process: Salt dissolves in water but its particles are still salt; no new substance forms.

Step 2 — Check reversibility: On evaporating the water, the salt is recovered unchanged, which confirms it is a physical change.

Why other options are wrong:

- No new substance is formed, so it is not a chemical change.
- Nuclear changes involve the nucleus, which is not the case here.
- Since the salt can be recovered, the change is reversible, not irreversible.

Final Answer: Dissolving salt in water is a physical change $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q1

Q2.

Solution

Concept — Symbols of elements: Each element has a one or two letter symbol. The first letter is a capital and the second, if present, is small. Many symbols come from the element's English or Latin name.

Step 1 — Recall the symbol: Calcium is written as Ca.

Step 2 — Confirm: The C is capital and the a is small, as the rule requires.

Why other options are wrong:

- C is the symbol for carbon.
- Cl is the symbol for chlorine.
- Cd is the symbol for cadmium.

Final Answer: The symbol of calcium is Ca $\Rightarrow$ $\boxed{\text{A}}$

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 in one molecule.

Step 1 — List the atoms in NH_3: one nitrogen atom and three hydrogen atoms.

Step 2 — Multiply by atomic masses: nitrogen $= 1 \times 14 = 14$; hydrogen $= 3 \times 1 = 3$.

Step 3 — Add the masses: $14 + 3 = 17$ u.

Why other options are wrong:

- 14 u counts only the nitrogen atom.
- 15 u and 16 u miss one or two hydrogen atoms.

Final Answer: The molecular mass of NH_3 is 17 u $\Rightarrow$ C

Answer: (C) Go Back to Q3

Q4.

Solution

Concept — Electronic configuration: Electrons fill shells in order. The K shell holds up to 2, the L shell up to 8, and the M shell up to 18, but the M shell takes only 8 when it is the outermost shell of a small atom. Argon has 18 electrons.

Step 1 — Fill the K shell: 2 electrons. Remaining $= 18 - 2 = 16$.

Step 2 — Fill the L shell: 8 electrons. Remaining $= 16 - 8 = 8$.

Step 3 — Fill the M shell: the last 8 electrons.

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

Why other options are wrong:

- $2, 8, 18$ uses 28 electrons, far too many.
- $8, 8, 2$ wrongly fills the inner shells.
- $2, 16$ overfills the L shell.

Final Answer: Argon is $2, 8, 8 \Rightarrow$ B

Answer: (B) Go Back to Q4

Q5.

Solution

Concept — Valence electrons: The valence electrons are the electrons present in the outermost shell of an atom. They decide the chemical behaviour of the element.

Step 1 — Read the configuration: Sodium is $2, 8, 1$.

Step 2 — Pick the outermost shell: The last number, 1, is the number of electrons in the outermost shell.

Why other options are wrong:

- 8 is the number in the second (inner) shell.
- 2 is the number in the innermost shell.
- 11 is the total number of electrons, not the valence electrons.

Final Answer: Sodium has 1 valence electron $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q5

Q6.

Solution

Concept — Shell capacity: The maximum number of electrons that a shell can hold is given by $2n^2$, where n is the shell number. The M shell is the third shell, so $n = 3$.

Step 1 — Substitute $n = 3$: maximum $= 2 \times (3)^2$.

Step 2 — Compute: $2 \times 9 = 18$.

Why other options are wrong:

- 8 is the capacity of the L shell ($n = 2$).
- 32 is the capacity of the N shell ($n = 4$).
- 2 is the capacity of the K shell ($n = 1$).

Final Answer: The M shell holds a maximum of 18 electrons $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q6

Q7.

Solution

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

Step 1 — List the data: protons $= 8$, neutrons $= 8$.

Step 2 — Add them: $A = 8 + 8$.

Step 3 — Compute: $A = 16$.

Why other options are wrong:

- 8 is only the proton (or neutron) number.
- 24 wrongly counts electrons as well.
- 0 is meaningless here.

Final Answer: The mass number is $16 \Rightarrow$ A

Answer: (A) Go Back to Q7

Q8.

Solution

Concept — Thomson's model: J. J. Thomson proposed that an atom is a sphere of positive charge with negatively charged electrons embedded in it, like seeds in a watermelon. This is called the plum-pudding model.

Step 1 — Read the figure: A positive sphere with electrons spread inside it.

Step 2 — Match the scientist: This picture belongs to Thomson.

Why other options are wrong:

- Rutherford proposed a small dense nucleus at the centre.
- Bohr proposed electrons revolving in fixed shells.
- Dalton treated the atom as a solid indivisible sphere with no internal parts.

Final Answer: The plum-pudding model is Thomson's $\Rightarrow$ C

Answer: (C) Go Back to Q8

Q9.

Solution

Concept — Mixture versus compound: A mixture is formed when substances are simply mixed without any chemical reaction, so they keep their own properties. A compound forms only when elements combine chemically.

Step 1 — Examine the process: Iron and sulphur are only mixed, not heated, so no reaction takes place.

Step 2 — Identify the result: The iron can still be picked out with a magnet, showing it is a mixture.

Why other options are wrong:

- A compound (iron sulphide) forms only after heating.
- No new element is created.
- There is no liquid solvent, so it is not a solution.

Final Answer: Iron filings mixed with sulphur form a mixture $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q9

Q10.

Solution

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

Step 1 — Recall the groups: There are 18 groups.

Step 2 — Recall the periods: There are 7 periods.

Why other options are wrong:

- 7 groups and 18 periods reverses the two numbers.
- 8 groups belonged to the older table.
- 8 periods is incorrect; there are only 7.

Final Answer: The table has 18 groups and 7 periods $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q10

Q11.

Solution

Concept — Families of elements: Groups of the periodic table have special family names. Group 1 elements (except hydrogen) are the alkali metals because their oxides and hydroxides are strong alkalis.

Step 1 — Identify the group: Group 1, leaving out hydrogen.

Step 2 — Name the family: These are the alkali metals, such as sodium and potassium.

Why other options are wrong:

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

Final Answer: Group 1 (except H) are alkali metals $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q11

Q12.

Solution

Concept — Trend in atomic size: Across a period the nuclear charge increases while electrons are added to the same shell. The stronger pull of the nucleus draws the electrons closer, so the atomic size decreases from left to right.

Step 1 — Note the cause: More protons mean a stronger pull on the same outer shell.

Step 2 — State the trend: The atoms become smaller across the period, as the figure shows.

Why other options are wrong:

- Size does not increase across a period; that happens down a group.
- It does not stay the same.
- It steadily decreases, not first decrease then increase.

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

Answer: (B) Go Back to Q12

Q13.

Solution

Concept — Position of reactive metals: Metallic (reactive) character increases down a group and decreases across a period. So the most reactive metals lie towards the bottom-left of the periodic table.

Step 1 — Combine the two trends: Going down increases metal reactivity; going left increases it too.

Step 2 — Locate the region: Both trends point to the bottom-left region, where elements like caesium and francium sit.

Why other options are wrong:

- The top-right corner holds reactive non-metals, not metals.
- The centre and top-left do not hold the most reactive metals.

Final Answer: Most reactive metals are at the bottom-left $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q13

Q14.

Solution

Concept — Group from configuration: For elements of the p-block, the group number equals 10 plus the number of valence electrons. An element with 7 valence electrons therefore belongs to group 17 (the halogens).

Step 1 — Count the valence electrons: The configuration $2, 8, 7$ has 7 electrons in the outermost shell.

Step 2 — Find the group: $10 + 7 = 17$, so the element is in group 17.

Why other options are wrong:

- Group 7 is an old style not used for this p-block element.
- Group 2 and group 8 do not match 7 valence electrons.

Final Answer: The element belongs to group 17 $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q14

Q15.

Solution

Concept — Combination reaction: A combination reaction is one in which two or more reactants join to form a single product. When such a reaction also gives out heat, it is exothermic.

Step 1 — Look at the reaction: CaO and H_2O combine to give a single product, $Ca(OH)_2$.

Step 2 — Name the type: Two reactants forming one product is a combination reaction.

Why other options are wrong:

- Decomposition breaks one substance into many.
- Displacement and double displacement involve replacement or exchange, not simple joining.

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

Answer: (C) Go Back to Q15

Q16.

Solution

Concept — Decomposition reaction: A decomposition reaction is one in which a single compound breaks down into two or more simpler substances. When electricity drives the breakdown it is called electrolytic decomposition.

Step 1 — Examine the process: Water is a single compound that splits into hydrogen and oxygen.

Step 2 — Name the type: One substance giving two products by electricity is a decomposition reaction.

Why other options are wrong:

- Combination joins substances, the opposite of this.
- Displacement and neutralisation are different reaction types.

Final Answer: Electrolysis of water is a decomposition reaction $\Rightarrow$ D

Answer: (D) Go Back to Q16

Q17.

Solution

Concept — Double displacement and precipitation: In a double displacement reaction two compounds exchange their ions. If one of the new products is insoluble, it separates out as a precipitate.

Step 1 — Track the ions: Na_2SO_4 and $BaCl_2$ exchange ions to give $BaSO_4$ and NaCl.

Step 2 — Spot the precipitate: $BaSO_4$ is insoluble and settles as a white solid, so it is a precipitation reaction of the double displacement type.

Why other options are wrong:

- Combination joins reactants into one product.
- Displacement involves a single element replacing another.
- Decomposition breaks one compound into simpler ones.

Final Answer: It is a double displacement (precipitation) reaction $\Rightarrow$ $\boxed{A}$

Answer: (A) Go Back to Q17

Q18.

Solution

Concept — Displacement reaction: In a displacement reaction a more reactive element takes the place of a less reactive element in its compound.

Step 1 — Read the description: A more reactive metal pushes out a less reactive metal from its salt solution.

Step 2 — Name the type: This is exactly a displacement reaction.

Why other options are wrong:

- Combination joins substances into one product.
- Decomposition breaks one substance into many.
- Neutralisation is a reaction between an acid and a base.

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

Answer: (B) Go Back to Q18

Q19.

Solution

Concept — Reduction in terms of electrons: In the electronic view of redox, reduction is the gain of electrons, while oxidation is the loss of electrons.

Step 1 — Define reduction: Reduction means gain of electrons (or loss of oxygen, or gain of hydrogen).

Step 2 — Pick the matching option: The species that gains electrons is the one reduced.

Why other options are wrong:

- Loss of electrons is oxidation, not reduction.
- Gaining oxygen and losing hydrogen both describe oxidation.

Final Answer: Reduction is the gain of electrons $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q19

Q20.

Solution

Concept — Conditions for rusting: Rusting of iron is a slow oxidation in which iron reacts with oxygen and water to form hydrated iron oxide (rust). Both air (oxygen) and moisture are needed.

Step 1 — Recall the requirements: Iron rusts only when both oxygen and water are present.

Step 2 — Confirm: Iron kept in dry air alone, or in air-free water alone, does not rust.

Why other options are wrong:

- Dry air alone is not enough.
- Water without air is not enough.
- Heat and light are not the required conditions for rusting.

Final Answer: Rusting needs both air and moisture $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q20

Q21.

Solution

Concept — Acids in foods: Many fruits contain natural acids. Apples contain malic acid, which gives them their characteristic sour-sweet taste.

Step 1 — Match the fruit and acid: Apple $\rightarrow$ malic acid.

Step 2 — Confirm: Malic acid is found mainly in apples and some other fruits.

Why other options are wrong:

- Citric acid is found in lemons and oranges.
- Acetic acid is found in vinegar.
- Tartaric acid is found in tamarind and grapes.

Final Answer: Apples contain malic acid $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q21

Q22.

Solution

Concept — Turmeric as an indicator: Turmeric is a natural indicator. It stays yellow in acidic and neutral solutions but turns red (reddish-brown) in a basic solution.

Step 1 — Apply to a base: Soap solution is basic.

Step 2 — State the colour change: Turmeric turns red in this basic solution.

Why other options are wrong:

- Green and blue are not colours of turmeric in a base.
- Turmeric does not become colourless.

Final Answer: Turmeric turns red in a base $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q22

Q23.

Solution

Concept — Reactivity series and acids: A metal can displace hydrogen from a dilute acid only if it is more reactive than hydrogen, that is, if it lies above hydrogen in the reactivity series.

Step 1 — Recall the rule: Metals above hydrogen react with dilute acids.

Step 2 — State the result: Such metals release hydrogen gas, for example zinc and magnesium.

Why other options are wrong:

- Metals below hydrogen (like copper and silver) do not displace hydrogen.
- Noble metals such as gold are unreactive towards dilute acids.
- It is wrong to say no metal reacts.

Final Answer: Metals above hydrogen give hydrogen with acids $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q23

Q24.

Solution

Concept — Nature of salts: The pH of a salt depends on the acid and base that form it. A salt of a strong acid and a strong base is neutral, with a pH close to 7.

Step 1 — Identify the parents: Strong acid and strong base.

Step 2 — Decide the pH: Their salt (for example NaCl) is neutral, so pH ≈ 7.

Why other options are wrong:

- pH 2 or 4 would mean an acidic salt.
- pH 10 would mean a basic salt.

Final Answer: The salt is neutral, pH $\approx 7 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q24

Q25.

Solution

Concept — Alkali: A base that dissolves in water is called an alkali. In solution it releases hydroxide (OH^-) ions, for example NaOH and KOH.

Step 1 — Read the description: A water-soluble base giving OH^- ions.

Step 2 — Name it: Such a base is an alkali.

Why other options are wrong:

- A salt is formed by neutralisation, not a soluble base.
- An acid gives H^+ ions, not OH^- ions.
- An indicator only shows acidity or basicity by colour.

Final Answer: A water-soluble base is an alkali $\Rightarrow$ $\boxed{A}$

Answer: (A) Go Back to Q25

Q26.

Solution

Concept — pH and acidity: The pH scale runs from 0 to 14. A lower pH means a higher concentration of H^+ ions, so the more acidic a solution is, the lower its pH.

Step 1 — Read the scale: The arrow points from 7 towards 0, the acidic end.

Step 2 — State the change: As acidity rises, the pH falls towards 0.

Why other options are wrong:

- Increasing towards 14 happens for bases, not acids.
- The pH does not stay fixed at 7 as acidity increases.
- pH values do not become negative on this scale for ordinary solutions.

Final Answer: pH decreases towards 0 as acidity increases $\Rightarrow$ $\boxed{B}$

Answer: (B) Go Back to Q26

Q27.

Solution

Concept — Sonorousness: Metals that make a ringing sound when struck are said to be sonorous. This is why metals are used to make bells.

Step 1 — Match the property: Ringing sound on being struck → sonorousness.

Step 2 — Confirm: School bells and temple bells are made of metal for this reason.

Why other options are wrong:

- Malleability is being beaten into sheets.
- Ductility is being drawn into wires.
- Conductivity is the ability to carry heat or electricity.

Final Answer: The ringing property is sonorousness ⇒ $\boxed{\text{D}}$

Answer: (D) Go Back to Q27

Q28.

Solution

Concept — Properties of non-metals: Most non-metals are poor conductors of heat and electricity because they have no free electrons. (Graphite is the main exception.)

Step 1 — Consider sulphur and phosphorus: Both are typical non-metals.

Step 2 — State the property: They are poor conductors of electricity.

Why other options are wrong:

- They are not good conductors.
- They are not shiny and malleable like metals.
- Sulphur and phosphorus are solids, not liquids, at room temperature.

Final Answer: Sulphur and phosphorus are poor conductors ⇒ $\boxed{\text{C}}$

Answer: (C) Go Back to Q28

Q29.

Solution

Concept — Ores of metals: An ore is a mineral from which a metal can be extracted economically. The chief ore of aluminium is bauxite.

Step 1 — Match the metal and its ore: Aluminium $\rightarrow$ bauxite.

Step 2 — Confirm: Bauxite is hydrated aluminium oxide.

Why other options are wrong:

- Haematite is an ore of iron.
- Cinnabar is an ore of mercury.
- Calamine is an ore of zinc.

Final Answer: The chief ore of aluminium is bauxite $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q29

Q30.

Solution

Concept — Displacement and reactivity: A more reactive metal can displace a less reactive metal from its salt solution. Iron is more reactive than copper.

Step 1 — Compare reactivities: Iron lies above copper in the reactivity series.

Step 2 — Explain the result: Iron displaces copper from $CuSO_4$, so copper is deposited and the solution fades.

Why other options are wrong:

- Copper is not more reactive than iron.
- Their reactivities are not equal.
- Iron does react, so saying it does not is wrong.

Final Answer: Iron is more reactive than copper $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q30

Q31.

Solution

Concept — Amalgam: An amalgam is an alloy in which one of the metals is mercury. For example, dental amalgam contains mercury with silver and tin.

Step 1 — Read the definition: An alloy containing mercury.

Step 2 — Name it: Such an alloy is called an amalgam.

Why other options are wrong:

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

Final Answer: An alloy with mercury is an amalgam $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q31

Q32.

Solution

Concept — Alloying gold: Pure (24 carat) gold is very soft. To make it hard enough for jewellery, it is mixed with a small amount of copper (and sometimes silver).

Step 1 — Note the problem: Pure gold is too soft to hold shape.

Step 2 — State the solution: Copper is added to harden the gold.

Why other options are wrong:

- Mercury would form an amalgam, not jewellery gold.
- Zinc and aluminium are not the usual hardening metals for gold.

Final Answer: Gold is hardened with copper $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q32

Q33.

Solution

Concept — Physical state of ionic compounds: Ionic compounds have strong electrostatic forces between their ions, arranged in a regular pattern. This makes them hard, crystalline solids at room temperature.

Step 1 — Recall the bonding: Strong ionic forces hold the ions in a fixed lattice.

Step 2 — State the form: They exist as crystalline solids.

Why other options are wrong:

- They are not gases or liquids at room temperature.
- They are hard solids, not soft waxes.

Final Answer: Ionic compounds are crystalline solids $\Rightarrow$ C

Answer: (C) Go Back to Q33

Q34.

Solution

Concept — Bonding in ethene: In ethene (C_2H_4) the two carbon atoms share two pairs of electrons, which makes a double bond. The figure shows this as two lines between the carbons.

Step 1 — Count the lines: Two lines join the carbon atoms.

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

Why other options are wrong:

- A single bond would show only one line (one shared pair).
- A triple bond would show three lines.
- An ionic bond involves transfer of electrons, not sharing.

Final Answer: The carbon atoms in ethene have a double bond $\Rightarrow$ B

Answer: (B) Go Back to Q34

Q35.

Solution

Concept — Covalent bond: A covalent bond forms when two atoms share one or more pairs of electrons, so that each atom attains a stable outer shell.

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

Step 2 — Pick the matching option: Sharing one or more pairs of electrons describes a covalent bond.

Why other options are wrong:

- Complete transfer of electrons gives an ionic bond.
- Gaining or losing electrons describes ion formation, not covalent bonding.

Final Answer: A covalent bond forms by sharing electron pairs $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q35

Q36.

Solution

Concept — Octet completion: An atom becomes stable when its outer shell has eight electrons. Chlorine has 7 valence electrons, so it needs just one more.

Step 1 — Count the gap: $8 - 7 = 1$ electron is needed.

Step 2 — State the change: Chlorine gains one electron to become Cl^- with a stable octet.

Why other options are wrong:

- Losing one electron would leave only 6 outer electrons.
- Gaining two electrons would exceed the octet.
- Sharing three electrons does not give a complete octet here.

Final Answer: Chlorine gains one electron to form Cl^- $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q36

Q37.

Solution

Concept — Why carbon is covalent: Carbon has 4 valence electrons. Losing or gaining 4 electrons would need a very large amount of energy, so carbon instead shares its electrons, forming covalent bonds.

Step 1 — Note the difficulty: Removing or adding 4 electrons is energetically very hard.

Step 2 — State the result: Carbon shares electrons, so it forms covalent compounds.

Why other options are wrong:

- Carbon does not easily lose 4 electrons.
- Carbon does not easily gain 4 electrons.
- Carbon does not readily form positive ions.

Final Answer: Carbon shares electrons, forming covalent compounds $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q37

Q38.

Solution

Concept — Functional groups: The functional group decides the chemical behaviour of an organic compound. Ethanoic acid (CH_3COOH) contains the carboxyl group, written $-COOH$.

Step 1 — Read the structure: The highlighted part has a C bonded to a double-bonded O and an $-OH$.

Step 2 — Name the group: This combination is the carboxyl ($-COOH$) group.

Why other options are wrong:

- The $-OH$ group alone belongs to alcohols.
- The $-CHO$ group belongs to aldehydes.
- The $>C{=}O$ group belongs to ketones.

Final Answer: Ethanoic acid has the carboxyl ($-COOH$) group $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q38

Q39.

Solution

Concept — Formula of alkanes: Alkanes follow the general formula C_nH_{2n+2}. For hexane, $n = 6$.

Step 1 — Substitute $n = 6$: hydrogen atoms $= 2 \times 6 + 2$.

Step 2 — Compute: $2 \times 6 + 2 = 14$, so the formula is C_6H_{14}.

Why other options are wrong:

- C_6H_{12} fits an alkene, not an alkane.
- C_6H_6 is benzene.
- C_5H_{12} is pentane (five carbons).

Final Answer: Hexane is $C_6H_{14} \Rightarrow \boxed{A}$

Answer: (A) Go Back to Q39

Q40.

Solution

Concept — Test for unsaturation: Unsaturated hydrocarbons (alkenes and alkynes) have double or triple bonds that react with bromine by addition, decolourising bromine water. Saturated hydrocarbons do not.

Step 1 — Observe the change: Bromine water loses its reddish-brown colour.

Step 2 — Draw the conclusion: The compound must be unsaturated.

Why other options are wrong:

- A saturated alkane does not decolourise bromine water quickly.
- Ionic compounds and noble gases do not give this addition test.

Final Answer: Decolourising bromine water shows an unsaturated hydrocarbon $\Rightarrow \boxed{D}$

Answer: (D) Go Back to Q40

Q41.

Solution

Concept — Homologous series: A homologous series is a family of organic compounds with the same functional group. The hydroxyl group ($-$OH) on a carbon chain defines the alcohol series.

Step 1 — Spot the functional group: Ethanol contains the $-$OH group.

Step 2 — Name the series: Compounds with $-$OH belong to the alcohols.

Why other options are wrong:

- Alkanes, alkenes and alkynes are hydrocarbons with no $-$OH group.

Final Answer: Ethanol belongs to the alcohols $\Rightarrow$ C

Answer: (C) Go Back to Q41

Q42.

Solution

Concept — Reaction of ethanol with sodium: Ethanol reacts with sodium metal to form sodium ethoxide and hydrogen gas: $2C_2H_5OH + 2Na \rightarrow 2C_2H_5ONa + H_2$.

Step 1 — Recall the products: Sodium ethoxide plus hydrogen gas.

Step 2 — Identify the gas: The gas evolved is hydrogen, which is given off as brisk bubbles.

Why other options are wrong:

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

Final Answer: Ethanol with sodium gives hydrogen gas $\Rightarrow$ B

Answer: (B) Go Back to Q42

Q43.

Solution

Concept — IUPAC naming: CH_3CH_2OH has two carbon atoms (so the stem is eth-) and an $-OH$ group (so the suffix is -ol). Combining these gives the name ethanol.

Step 1 — Count the carbons: Two carbons give the stem eth-.

Step 2 — Add the suffix: The $-OH$ group gives -ol, so the name is ethanol.

Why other options are wrong:

- Methanol has only one carbon (CH_3OH).
- Ethanal is an aldehyde ($-CHO$ group).
- Ethanoic acid contains a $-COOH$ group.

Final Answer: CH_3CH_2OH is ethanol $\Rightarrow$ $\boxed{D}$

Answer: (D) Go Back to Q43

Q44.

Solution

Concept — Cathode in electrolysis: The cathode is the electrode joined to the negative terminal of the battery. Positively charged ions (cations) are attracted to it, gain electrons (reduction) and are deposited there.

Step 1 — Identify the electrode: Cations move towards the negative electrode, the cathode.

Step 2 — State what happens: They are reduced and deposited at the cathode.

Why other options are wrong:

- The anode attracts negative ions (anions), not cations.
- The battery and connecting wire are not where ions are deposited.

Final Answer: Cations are deposited at the cathode $\Rightarrow$ $\boxed{A}$

Answer: (A) Go Back to Q44

Q45.

Solution

Concept — Boyle's law graph: Boyle's law states that at constant temperature $PV =$ constant, so P is inversely proportional to V. A graph of P against V is therefore a smooth curve called a hyperbola.

Step 1 — Recall the relation: $P \propto \frac{1}{V}$.

Step 2 — Identify the shape: An inverse relation gives a curve (hyperbola), as shown.

Why other options are wrong:

- A straight line through the origin shows direct proportion, not inverse.
- A horizontal or vertical straight line does not represent $PV =$ constant.

Final Answer: The P versus V graph is a hyperbola $\Rightarrow$ B

Answer: (B) Go Back to Q45

Q46.

Solution

Concept — Electrical conduction in solutions: A solution conducts electricity only when it contains free-moving charged particles, that is, ions. Such solutions are called electrolytes.

Step 1 — Recall the requirement: Conduction needs mobile ions.

Step 2 — Pick the option: Only a solution with freely moving ions conducts electricity.

Why other options are wrong:

- Sugar dissolves as molecules, not ions, so its solution does not conduct.
- Pure water with only water molecules is a very poor conductor.
- Dissolved oxygen does not provide ions for conduction.

Final Answer: Conduction needs freely moving ions $\Rightarrow$ C

Answer: (C) Go Back to Q46

Q47.

Solution

Concept — Avogadro's number: One mole of any substance contains a fixed number of particles, called Avogadro's number, equal to 6.022×10^{23}.

Step 1 — Recall the value: Avogadro's number $= 6.022 \times 10^{23}$.

Step 2 — Confirm: This is the number of particles (atoms, molecules or ions) in one mole.

Why other options are wrong:

- 22.4 (litres) is the molar volume of a gas at STP, not a particle count.
- 18 is the molecular mass of water.
- 273 is the temperature (in kelvin) of $0°$C.

Final Answer: One mole contains 6.022×10^{23} particles $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q47

Q48.

Solution

Concept — Electroplating: Electroplating uses electrolysis to deposit a thin layer of one metal onto the surface of another. It is used to coat cheaper metals with silver, chromium or gold for protection and a better look.

Step 1 — Recall the purpose: A metal layer is deposited using electricity.

Step 2 — Pick the option: Coating a cheaper metal with silver or chromium matches electroplating.

Why other options are wrong:

- Breaking a compound by heat is thermal decomposition.
- Separating liquids is distillation.
- Measuring pH uses an indicator or pH meter.

Final Answer: Electroplating coats cheaper metals with silver or chromium $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q48

Q49.

Solution

Concept — Toxicity of carbon monoxide: Carbon monoxide binds very strongly with haemoglobin in the blood, much more than oxygen does. This blocks the blood from carrying oxygen and can cause suffocation.

Step 1 — Identify the cause: CO combines with haemoglobin.

Step 2 — State the effect: This lowers the oxygen-carrying ability of the blood, making CO poisonous.

Why other options are wrong:

- Its toxicity is not because it is highly acidic.
- Being heavier than air is not the reason for its poison effect.
- CO does not react violently with water.

Final Answer: CO is poisonous because it binds with haemoglobin $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q49

Q50.

Solution

Concept — Controlling air pollution: Air pollution can be reduced by cutting harmful emissions and by increasing the use of clean energy. Planting trees absorbs carbon dioxide and clean fuels release fewer pollutants.

Step 1 — Test the options: The right step should lower pollutants in the air.

Step 2 — Pick the option: Planting trees and using clean fuels both reduce air pollution.

Why other options are wrong:

- Burning more coal adds more smoke and gases.
- Cutting down forests removes trees that clean the air.
- Using more diesel vehicles increases pollution.

Final Answer: Planting trees and using clean fuels reduce air pollution $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q50

Answer Key

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