SCO INTERNATIONAL CHEMISTRY OLYMPIAD

CLASS 10 | OFFICIAL QUESTION PAPER

Question Paper Set H

Designed for global school learners with concept clarity, reasoning, applications, and responsible scientific thinking.

Designed from Class 10 Chemistry syllabus pathways and aligned with SCO's guided preparation, practice, reporting, and future-ready academic growth.

- question blocks with compact numbering, options, answer key, and detailed explanations
- grade-appropriate chemistry reasoning across reactions, acids/bases, metals, carbon, periodicity, and energy

Chemical Reactions	Acids, Bases & Salts	Metals & Non-Metals
Carbon Compounds	Periodic Classification	Sources of Energy

Exam Code	Grade	Document
IChO	10	SCO Official

Guidelines for the Candidate

Total Questions	50
Time	60 minutes
Marking Pattern	General, Case Study, and Reason/Assertion: 1 mark each; Achievers Section: 2 marks each

- Use only one response for each question. Every question has exactly one correct answer.
- Read case passages carefully. All passage text is included inside the relevant question block.
- Calculators are not required. Use chemical reasoning, balanced equations, and class-level calculations.
- For OMR use, darken only the circle corresponding to the selected option.
- Before attempting the paper, complete the name, registration ID, and contact details in the space provided by the exam centre.

Name:	**Registration ID: .....**
School / Country:	**Contact No.: .....**

Section A - General Chemistry Questions

Q1 Chemical Reaction and Equation

A student heats calcium carbonate and observes that it forms calcium oxide and carbon dioxide. Which type of chemical reaction is mainly taking place?

A. Combination reaction
B. Decomposition reaction
C. Displacement reaction
D. Neutralisation reaction

Answer: B

Explanation: Calcium carbonate breaks down into two simpler substances: $CaCO_3$ -> $CaO + CO_2$. A reaction in which one compound splits into simpler products is a decomposition reaction.

Q2 Chemical Reaction and Equation

When magnesium ribbon burns in air, it produces a bright white flame and a white ash of magnesium oxide. Which statement is correct?

A. Magnesium is reduced to MgO
B. Oxygen is oxidized to MgO
C. Magnesium is oxidized and oxygen is reduced
D. The reaction is only physical because light is produced

Answer: C

Explanation: Magnesium gains oxygen to form MgO, so magnesium is oxidized. Oxygen gains electrons from magnesium and is reduced. This is a redox reaction.

Q3 Chemical Reaction and Equation

Which balanced equation represents the reaction between zinc and hydrochloric acid?

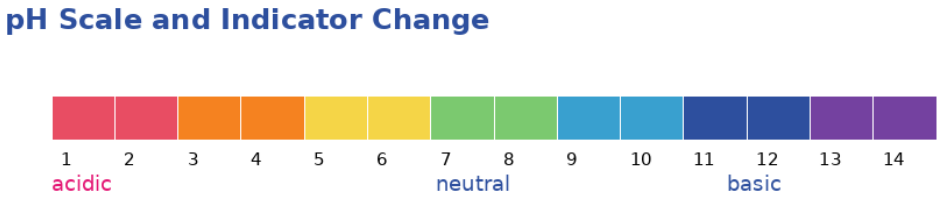
A. $Zn + HCl \rightarrow ZnCl_2 + H_2$
B. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$
C. $2Zn + HCl \rightarrow Zn_2Cl + H_2$
D. $ZnCl_2 + H_2 \rightarrow Zn + 2HCl$

Answer: B

Explanation: Zinc displaces hydrogen from hydrochloric acid. Balancing gives $Zn + 2HCl \rightarrow ZnCl_2 + H_2$.

Q4 Acid Bases and Salt

A solution turns blue litmus red and has pH 3. Which conclusion is most suitable?



A. It is strongly basic
B. It is acidic
C. It is neutral
D. It contains no ions

Answer: B

Explanation: Acids turn blue litmus red and have pH below 7. A pH of 3 indicates an acidic solution.

Q5 Acid Bases and Salt

A student adds sodium carbonate to dilute hydrochloric acid and notices effervescence. Which gas is evolved?

A. Hydrogen
B. Oxygen
C. Carbon dioxide
D. Nitrogen

Answer: C

Explanation: Acids react with carbonates to form salt, water, and carbon dioxide gas. The bubbles are CO_2.

Q6 Acid Bases and Salt

Which substance is commonly used to neutralise excess acid in the stomach?

A. Sodium chloride
B. Magnesium hydroxide
C. Copper sulfate
D. Ethanol

Answer: B

Explanation: Magnesium hydroxide is a mild base used in antacids. It neutralises excess stomach acid.

Q7 Metals and Non Metals

Why is sodium stored under kerosene?

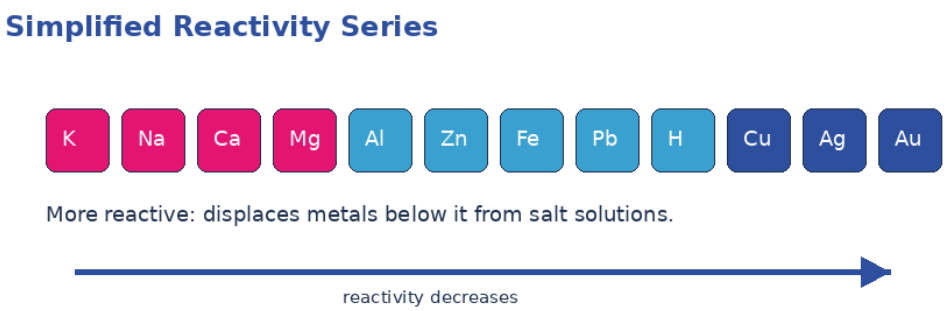
A. It is very soft
B. It reacts violently with air and water
C. It is magnetic
D. It cannot conduct electricity

Answer: B

Explanation: Sodium is highly reactive and can react with moisture and oxygen in air. Kerosene prevents contact with air and water.

Q8 Metals and Non Metals

In the reaction $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$, why does zinc displace copper?



A. Zinc is less reactive than copper
B. Copper is above zinc in the reactivity series
C. Zinc is more reactive than copper
D. Copper is a non-metal

Answer: C

Explanation: A more reactive metal displaces a less reactive metal from its salt solution. Zinc is above copper in the reactivity series.

Q9 Metals and Non Metals

Which pair correctly matches a metal property with its meaning?

A. Malleability - can be drawn into wires

B. Ductility - can be beaten into sheets
C. Sonority - produces sound when struck
D. Lustre - poor conductor of heat

Answer: C

Explanation: Sonority is the property of producing a ringing sound when struck. Malleability is beating into sheets; ductility is drawing into wires.

Q10 Carbon and Its Compounds

Why does carbon form a large number of compounds?

A. Carbon always forms ionic bonds
B. Carbon has valency four and shows catenation
C. Carbon has only one electron
D. Carbon cannot bond with hydrogen

Answer: B

Explanation: Carbon is tetravalent and can form stable covalent bonds with itself and many other elements. This catenation leads to many compounds.

Q11 Carbon and Its Compounds

Which of the following is the functional group of alcohols?

A. -COOH
B. -CHO
C. -OH
D. -CO-

Answer: C

Explanation: Alcohols contain the hydroxyl functional group, -OH.

Q12 Carbon and Its Compounds

Complete combustion of methane mainly produces:

A. Carbon monoxide and water
B. Carbon dioxide and water
C. Soot and hydrogen
D. Methanol and oxygen

Answer: B

Explanation: Complete combustion of methane is $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$, releasing heat.

Q13 Periodic Classification of Elements

Across a period from left to right, atomic size generally decreases because:

A. new shells are added
B. effective nuclear charge increases
C. electrons move farther from the nucleus
D. metals become more reactive

Answer: B

Explanation: Across a period, electrons are added to the same shell while nuclear charge increases, pulling the electron cloud closer.

Q14 Periodic Classification of Elements

Elements in the same group of the periodic table usually have similar chemical properties because they have the same:

A. atomic mass
B. number of valence electrons
C. number of neutrons
D. physical state

Answer: B

Explanation: Elements in a group have the same number of valence electrons, which mainly determines chemical behaviour.

Q15 Periodic Classification of Elements

Which element is most likely to form a stable noble gas configuration by gaining one electron?

A. Sodium
B. Magnesium
C. Chlorine
D. Argon

Answer: C

Explanation: Chlorine has seven valence electrons and gains one electron to complete its octet.

Q16 Sources of energy

Which feature makes a source of energy more suitable for daily use?

A. Very high smoke production
B. High energy output with low pollution
C. Difficult storage and transport
D. Very high cost only

Answer: B

Explanation: A good energy source should provide adequate energy, be easy to handle, and produce minimal pollution.

Q17 Sources of energy

In a hydrogen fuel cell, the useful energy output is mainly obtained as:

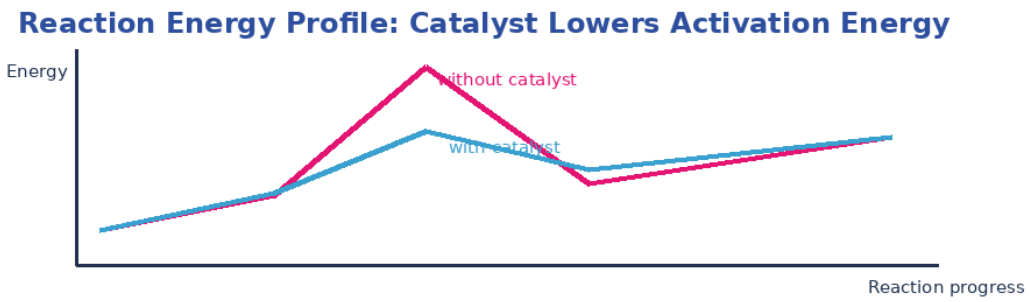
A. heat from burning hydrogen
B. electrical energy from electrochemical reactions
C. smoke from incomplete combustion
D. sound energy from gas release

Answer: B

Explanation: A fuel cell converts chemical energy directly into electrical energy by electrochemical reactions, producing water as a major product.

Q18 Chemical Reaction and Equation

When silver chloride is exposed to sunlight, it turns grey due to formation of silver. This is an example of:



A. photochemical decomposition
B. neutralisation
C. double displacement
D. precipitation only

Answer: A

Explanation: AgCl decomposes in sunlight: 2AgCl -> 2Ag + Cl_2. Since light causes the breakdown, it is photochemical decomposition.

Q19 Acid Bases and Salt

Which salt is used in making baking powder and also acts as a mild base?

A. NaCl
B. $NaHCO_3$
C. $CaSO_4.1/2H_2O$
D. $CuSO_4$

Answer: B

Explanation: Sodium hydrogen carbonate, $NaHCO_3$, is baking soda and is used in baking powder.

Q20 Metals and Non Metals

Ionic compounds generally have high melting points because:

A. ions are neutral and weak
B. strong electrostatic forces hold oppositely charged ions
C. they contain only gases
D. electrons move freely like in metals

Answer: B

Explanation: Ionic compounds have strong attractions between positive and negative ions, requiring high energy to break.

Section B - Case Study and Application Questions

Q21 Chemical Reaction and Equation

Case Study: A school laboratory compares reactions of hydrochloric acid with zinc, copper, and magnesium strips. Magnesium reacts fastest, zinc reacts moderately, and copper shows almost no reaction. Which order of reactivity is supported by the observations?

A. Cu > Zn > Mg
B. Mg > Zn > Cu
C. Zn > Mg > Cu
D. Mg > Cu > Zn

Answer: B

Explanation: The faster the metal displaces hydrogen from acid, the more reactive it is. The observations support Mg > Zn > Cu.

Q22 Acid Bases and Salt

Case Study: A gardener tests soil and finds pH 5.2. Most vegetables in that garden grow better near neutral pH. Which treatment is most suitable?

A. Add lime such as calcium carbonate
B. Add more acid rainwater
C. Add common salt only
D. Add copper sulfate crystals

Answer: A

Explanation: A pH of 5.2 is acidic. Adding lime, a basic material, reduces acidity and brings soil closer to neutral.

Q23 Carbon and Its Compounds

Case Study: A fuel sample burns with a yellow smoky flame and leaves black deposits on a glass plate. What does this indicate?

A. Complete combustion with enough oxygen
B. Incomplete combustion producing soot
C. Neutralisation reaction
D. Formation of only water vapour

Answer: B

Explanation: A yellow smoky flame and black soot indicate incomplete combustion due to insufficient oxygen or a carbon-rich fuel.

Q24 Metals and Non Metals

Case Study: An iron bridge near the sea corrodes faster than one in a dry region. Which factor best explains the faster corrosion?

A. More sunlight only
B. Presence of moisture and dissolved salts
C. Absence of oxygen
D. Lower surface area of iron

Answer: B

Explanation: Moisture and salts increase electrical conductivity and accelerate electrochemical corrosion of iron.

Q25 Periodic Classification of Elements

Case Study: Three unknown elements have valence electrons 1, 2, and 7 respectively. Which element is most likely to form a negative ion?

A. Element with 1 valence electron
B. Element with 2 valence electrons
C. Element with 7 valence electrons
D. All equally form negative ions

Answer: C

Explanation: Elements with seven valence electrons tend to gain one electron to complete an octet, forming an anion.

Q26 Sources of energy

Case Study: A village wants lighting with minimum local air pollution and low running cost. It has good sunlight throughout the year. Which option is most suitable?

A. Diesel generator only
B. Solar photovoltaic panels with battery storage
C. Burning coal at home
D. Open firewood burning inside rooms

Answer: B

Explanation: Solar panels produce electricity during operation without smoke or local air pollution, and battery storage helps at night.

Q27 Acid Bases and Salt

Case Study: A student adds universal indicator to four solutions. Solution X turns red, Y turns green, Z turns blue, and W turns purple. Which solution is closest to neutral?

A. X
B. Y. Z
D. W

Answer: B

Explanation: Universal indicator is green near pH 7, which is neutral.

Q28 Chemical Reaction and Equation

Case Study: Lead nitrate is heated in a test tube. Brown fumes are produced along with oxygen and lead oxide. What type of reaction occurs?

A. Thermal decomposition
B. Displacement reaction
C. Neutralisation
D. Addition reaction

Answer: A

Explanation: Heating breaks lead nitrate into simpler products; hence it is thermal decomposition.

Q29 Carbon and Its Compounds

Case Study: A compound has formula C_2H_6O. It reacts with sodium to evolve hydrogen and is used in sanitizers. Which compound is most likely?

A. Ethanoic acid
B. Ethanol
C. Ethene
D. Methane

Answer: B

Explanation: Ethanol has formula C_2H_6O, contains an -OH group, reacts with sodium to release H_2, and is used in sanitizers.

Q30 Metals and Non Metals

Case Study: A metal forms an oxide that reacts with both acids and bases. Which term describes this oxide?

A. Neutral oxide
B. Basic oxide
C. Amphoteric oxide
D. Acidic oxide

Answer: C

Explanation: Oxides such as Al_2O_3 and ZnO react with both acids and bases and are called amphoteric oxides.

Section C - Reason and Assertion Questions

For Q31-Q40, use: A = both true and reason explains assertion; B = both true but reason does not explain; C = assertion true, reason false; D = assertion false, reason true.

Q31 Chemical Reaction and Equation

Assertion: A catalyst increases the rate of a chemical reaction. Reason: A catalyst provides an alternate pathway with lower activation energy.

A. Both Assertion and Reason are true, and Reason correctly explains Assertion.
B. Both Assertion and Reason are true, but Reason does not correctly explain Assertion.
C. Assertion is true, but Reason is false.
D. Assertion is false, but Reason is true.

Answer: A

Explanation: The lower activation energy allows more collisions to become successful, so the reaction is faster.

Q32 Acid Bases and Salt

Assertion: A salt made from a strong acid and a strong base is generally neutral. Reason: The ions of such a salt do not hydrolyse appreciably in water.

A. Both Assertion and Reason are true, and Reason correctly explains Assertion.
B. Both Assertion and Reason are true, but Reason does not correctly explain Assertion.
C. Assertion is true, but Reason is false.
D. Assertion is false, but Reason is true.

Answer: A

Explanation: Salts such as NaCl do not produce excess H^+ or OH^- by hydrolysis, so the solution is neutral.

Q33 Metals and Non Metals

Assertion: Aluminum resists corrosion even though it is reactive. Reason: Aluminum forms a thin protective oxide layer on its surface.

A. Both Assertion and Reason are true, and Reason correctly explains Assertion.
B. Both Assertion and Reason are true, but Reason does not correctly explain Assertion.
C. Assertion is true, but Reason is false.
D. Assertion is false, but Reason is true.

Answer: A

Explanation: The oxide layer prevents further contact of aluminum with air and moisture.

Q34 Carbon and Its Compounds

Assertion: Alkenes are more reactive than alkanes in addition reactions. Reason: Alkenes contain a pi bond that can break during addition.

A. Both Assertion and Reason are true, and Reason correctly explains Assertion.
B. Both Assertion and Reason are true, but Reason does not correctly explain Assertion.
C. Assertion is true, but Reason is false.
D. Assertion is false, but Reason is true.

Answer: A

Explanation: The pi bond of a double bond is more reactive than the sigma bonds in alkanes.

Q35 Periodic Classification of Elements

Assertion: Atomic radius decreases across a period. Reason: Electrons are added to new shells from left to right.

A. Both Assertion and Reason are true, and Reason correctly explains Assertion.
B. Both Assertion and Reason are true, but Reason does not correctly explain Assertion.
C. Assertion is true, but Reason is false.
D. Assertion is false, but Reason is true.

Answer: C

Explanation: The assertion is true, but electrons are added to the same shell across a period, not new shells.

Q36 Sources of energy

Assertion: Fossil fuels are non-renewable. Reason: They form over millions of years and are consumed much faster than they are naturally formed.

A. Both Assertion and Reason are true, and Reason correctly explains Assertion.
B. Both Assertion and Reason are true, but Reason does not correctly explain Assertion.
C. Assertion is true, but Reason is false.
D. Assertion is false, but Reason is true.

Answer: A

Explanation: The rate of use is far greater than the natural formation rate, so fossil fuels are non-renewable.

Q37 Acid Bases and Salt

Assertion: Baking soda can help neutralise an acidic solution. Reason: Baking soda is sodium hydrogen carbonate, which behaves as a mild base.

A. Both Assertion and Reason are true, and Reason correctly explains Assertion.
B. Both Assertion and Reason are true, but Reason does not correctly explain Assertion.
C. Assertion is true, but Reason is false.
D. Assertion is false, but Reason is true.

Answer: A

Explanation: $NaHCO_3$ can react with acids and reduce acidity.

Q38 Metals and Non Metals

Assertion: Ionic compounds conduct electricity in molten state. Reason: Ions are free to move when the compound is molten.

A. Both Assertion and Reason are true, and Reason correctly explains Assertion.
B. Both Assertion and Reason are true, but Reason does not correctly explain Assertion.
C. Assertion is true, but Reason is false.
D. Assertion is false, but Reason is true.

Answer: A

Explanation: Mobile ions carry electric charge in molten ionic compounds.

Q39 Carbon and Its Compounds

Assertion: Soaps are less effective in hard water. Reason: Calcium and magnesium ions form insoluble scum with soap.

A. Both Assertion and Reason are true, and Reason correctly explains Assertion.
B. Both Assertion and Reason are true, but Reason does not correctly explain Assertion.
C. Assertion is true, but Reason is false.
D. Assertion is false, but Reason is true.

Answer: A

Explanation: The scum reduces the amount of soap available for cleaning.

Q40 Chemical Reaction and Equation

Assertion: In a balanced chemical equation, the total number of atoms of each element is the same on both sides. Reason: Matter is conserved in a chemical reaction.

A. Both Assertion and Reason are true, and Reason correctly explains Assertion.
B. Both Assertion and Reason are true, but Reason does not correctly explain Assertion.
C. Assertion is true, but Reason is false.
D. Assertion is false, but Reason is true.

Answer: A

Explanation: Balancing ensures the law of conservation of mass is followed.

Section D - Achievers Section

Q41 Chemical Reaction and Equation

A student decomposes 17 g of hydrogen peroxide completely: $2H_2O_2 \rightarrow 2H_2O + O_2$. If molar mass of H_2O_2 is 34 g/mol, how many moles of oxygen gas are produced?

A. 0.25 mol
B. 0.50 mol
C. 1.00 mol
D. 2.00 mol

Answer: A

Explanation: 17 g H_2O_2 = 0.5 mol. From the equation, 2 mol H_2O_2 gives 1 mol O_2. Therefore 0.5 mol H_2O_2 gives 0.25 mol O_2.

Q42 Acid Bases and Salt

A solution changes red litmus to blue and has pH 11. If it is diluted ten times with water, what is most likely?

A. It becomes more acidic than pH 7
B. Its pH decreases but remains basic
C. Its pH becomes exactly zero
D. It stops containing ions

Answer: B

Explanation: Dilution reduces OH^- concentration, so pH moves closer to 7 but remains above 7 if still basic.

Q43 Metals and Non Metals

In a displacement test, metal X displaces Fe from $FeSO_4$ but does not displace Mg from $MgSO_4$. Which order is correct?

A. Mg > X > Fe
B. X > Mg > Fe
C. Fe > X > Mg
D. Fe > Mg > X

Answer: A

Explanation: X is more reactive than Fe because it displaces Fe, but less reactive than Mg because it cannot displace Mg.

Q44 Carbon and Its Compounds

A hydrocarbon has formula C_3H_6. It decolourises bromine water. Which class is most likely?

A. Alkane
B. Alkene
C. Alcohol
D. Carboxylic acid

Answer: B

Explanation: C_3H_6 follows the alkene general formula C_nH_{2n} and decolourises bromine water due to addition across C=C.

Q45 Periodic Classification of Elements

Element A has atomic number 11 and element B has atomic number 17. Which compound is most likely to form between them?

A. AB by ionic bonding
B. A_2B by covalent bonding
C. AB_2 by metallic bonding
D. No compound can form

Answer: A

Explanation: A is sodium-like with one valence electron; B is chlorine-like with seven. A transfers one electron to B to form an ionic compound AB.

Q46 Sources of energy

A hydrogen fuel cell uses $2H_2 + O_2 \rightarrow 2H_2O$. Which reason best explains its low direct pollution?

A. It burns carbon completely
B. It produces water as the main product
C. It releases soot but no CO_2
D. It requires coal to operate

Answer: B

Explanation: The electrochemical reaction forms water, with no direct carbon dioxide emission from the cell reaction.

Q47 Acid Bases and Salt

A factory effluent sample has pH 2.5. Which treatment and monitoring choice is most scientific before release?

A. Add acid and check colour only
B. Neutralise with suitable base and monitor pH near safe range
C. Release directly because all acids are weak
D. Add salt to hide the acidity

Answer: B

Explanation: Acidic effluent should be neutralised and verified through pH monitoring before safe discharge.

Q48 Chemical Reaction and Equation

When 5.6 g of iron reacts with excess sulfur to form FeS, how many moles of FeS are produced? (Atomic mass Fe = 56 u)

A. 0.01 mol
B. 0.05 mol
C. 0.10 mol
D. 1.00 mol

Answer: C

Explanation: Moles of Fe = 5.6/56 = 0.10 mol. In Fe + S -> FeS, the mole ratio Fe:FeS is 1:1, so FeS produced = 0.10 mol.

Q49 Carbon and Its Compounds

A molecule has the structure CH_3-CH_2-COOH. Which functional group is present and what is the compound type?

A. -OH, alcohol
B. -COOH, carboxylic acid
C. -CHO, aldehyde
D. C=C, alkene

Answer: B

Explanation: The -COOH group is the carboxyl group, so the compound is a carboxylic acid.

Q50 Periodic Classification of Elements

An element has electronic configuration 2,8,7. What is its valency and likely chemical nature?

A. Valency 1, non-metal
B. Valency 7, metal
C. Valency 0, noble gas
D. Valency 2, metal

Answer: A

Explanation: It needs one electron to complete the octet, so valency is 1. It behaves like a reactive non-metal.

Answer Key

Q	**Ans**	**Q**	**Ans**	**Chapter Focus**
1	**B**	26	**B**	Chemical Reaction and Equation / Sources of energy
2	**C**	27	**B**	Chemical Reaction and Equation / Acid Bases and Salt
3	**B**	28	**A**	Chemical Reaction and Equation / Chemical Reaction and Equation
4	**B**	29	**B**	Acid Bases and Salt / Carbon and Its Compounds
5	**C**	30	**C**	Acid Bases and Salt / Metals and Non Metals
6	**B**	31	**A**	Acid Bases and Salt / Chemical Reaction and Equation

7	**B**	32	**A**	Metals and Non Metals / Acid Bases and Salt
8	**C**	33	**A**	Metals and Non Metals / Metals and Non Metals
9	**C**	34	**A**	Metals and Non Metals / Carbon and Its Compounds
10	**B**	35	**C**	Carbon and Its Compounds / Periodic Classification of Elements
11	**C**	36	**A**	Carbon and Its Compounds / Sources of energy
12	**B**	37	**A**	Carbon and Its Compounds / Acid Bases and Salt
13	**B**	38	**A**	Periodic Classification of Elements / Metals and Non Metals
14	**B**	39	**A**	Periodic Classification of Elements / Carbon and Its Compounds
15	**C**	40	**A**	Periodic Classification of Elements / Chemical Reaction and Equation
16	**B**	41	**A**	Sources of energy / Chemical Reaction and Equation
17	**B**	42	**B**	Sources of energy / Acid Bases and Salt
18	**A**	43	**A**	Chemical Reaction and Equation / Metals and Non Metals
19	**B**	44	**B**	Acid Bases and Salt / Carbon and Its Compounds
20	**B**	45	**A**	Metals and Non Metals / Periodic Classification of Elements
21	**B**	46	**B**	Chemical Reaction and Equation / Sources of energy
22	**A**	47	**B**	Acid Bases and Salt / Acid Bases and Salt
23	**B**	48	**C**	Carbon and Its Compounds / Chemical Reaction and Equation
24	**B**	49	**B**	Metals and Non Metals / Carbon and Its Compounds
25	**C**	50	**A**	Periodic Classification of Elements / Periodic Classification of Elements

Space for Rough Work