AFNS DAY-6

Lecture #10: Chemistry for AFNS Academic Test

Assalam-o-Alaikum future AFNS officers. Welcome to **AFNS Day-6 Lecture #10: Chemistry**.

Chemistry is an important part of the AFNS academic test. It checks basic concepts from atomic structure, periodic table, bonding, mole concept, gases, acids and bases, redox reactions, organic chemistry, polymers, benzene, and chemical kinetics.

Complete Chemistry Syllabus

1. Atomic Structure
2. Quantum Numbers and Electronic Configuration
3. Periodic Table and Periodic Trends
4. Chemical Bonding
5. Molecular Shapes and Hybridization
6. Mole Concept and Stoichiometry
7. Gases and Gas Laws
8. Acids and Bases
9. Oxidation and Reduction
10. Electrochemistry
11. Chemical Nomenclature
12. Coordination Compounds
13. Organic Functional Groups
14. Isomerism
15. Organic Reaction Mechanisms
16. Polymerization
17. Benzene and Aromatic Compounds
18. Grignard Reagents and Organic Synthesis
19. Chemical Kinetics
20. Types of Organic Reactions

Topic 1: Atomic Structure

Explanation

Atomic structure deals with the particles present inside an atom. An atom is made up of electrons, protons, and neutrons.

- **Electron:** Negatively charged particle.
- **Proton:** Positively charged particle.
- **Neutron:** Neutral particle with no charge.

The nucleus contains protons and neutrons, while electrons revolve around the nucleus.

Bohr's model explains that electrons move in fixed energy levels or shells around the nucleus.

Practice MCQs

Q1. Electron has:

a) Positive charge
b) Negative charge
c) No charge
d) Double charge
Answer: b) Negative charge

Q2. Proton has:

a) Positive charge
b) Negative charge
c) No charge
d) No mass
Answer: a) Positive charge

Q3. Neutron is:

a) Positively charged
b) Negatively charged
c) Neutral

d) Electron-like
Answer: c) Neutral

Q4. Nucleus contains:

a) Electrons only
b) Protons and neutrons
c) Neutrons and electrons
d) Electrons and protons only
Answer: b) Protons and neutrons

Q5. Bohr's model is related to:

a) Fixed energy levels
b) Chemical reactions only
c) Acids only
d) Polymers only
Answer: a) Fixed energy levels

Topic 2: Quantum Numbers and Electronic Configuration

Explanation

Quantum numbers describe the position and energy of an electron in an atom.

Four Quantum Numbers

1. **Principal quantum number (n):** Shows shell or energy level.
2. **Azimuthal quantum number (l):** Shows subshell or shape.
3. **Magnetic quantum number (m):** Shows orbital orientation.
4. **Spin quantum number (s):** Shows electron spin direction.

Important Rules

Pauli Exclusion Principle

No two electrons in an atom can have the same set of four quantum numbers.

Hund's Rule

Electrons first occupy orbitals singly before pairing.

Practice MCQs

Q1. Principal quantum number is represented by:

a) n
b) l
c) m
d) s
Answer: a) n

Q2. Azimuthal quantum number tells about:

a) Shell
b) Subshell shape
c) Spin only
d) Nuclear charge
Answer: b) Subshell shape

Q3. Spin quantum number is represented by:

a) n
b) l
c) m
d) s
Answer: d) s

Q4. Pauli exclusion principle states that:

a) Electrons move in circles only
b) No two electrons have same four quantum numbers
c) Atoms are indivisible
d) Neutrons have charge
Answer: b) No two electrons have same four quantum numbers

Q5. Hund's rule is about:

a) Pairing after single filling
b) Acid strength
c) Gas pressure
d) Polymer formation
Answer: a) Pairing after single filling

Topic 3: Periodic Table and Periodic Trends

Explanation

The periodic table arranges elements according to atomic number and properties.

Mendeleev arranged elements according to atomic masses. Modern periodic law states that properties of elements are periodic functions of their atomic numbers.

Important Periodic Trends

- **Atomic radius:** Generally decreases across a period and increases down a group.
- **Ionization energy:** Generally increases across a period and decreases down a group.
- **Electronegativity:** Generally increases across a period and decreases down a group.
- **Electron affinity:** Energy change when atom gains electron.
- **Shielding effect:** Inner electrons reduce nuclear attraction on outer electrons.

Practice MCQs

Q1. Modern periodic table is based on:

a) Atomic mass
b) Atomic number
c) Neutron number

d) Molecular mass
Answer: b) Atomic number

Q2. Mendeleev arranged elements according to:

a) Atomic number
b) Atomic mass
c) Electron number only
d) Isotopes
Answer: b) Atomic mass

Q3. Atomic radius generally decreases:

a) Across a period
b) Down a group
c) In liquids only
d) In gases only
Answer: a) Across a period

Q4. Ionization energy generally increases:

a) Across a period
b) Down a group
c) In metals only
d) In polymers only
Answer: a) Across a period

Q5. Electronegativity means:

a) Ability to attract shared electrons
b) Ability to lose neutrons
c) Ability to form nucleus
d) Ability to form isotopes only
Answer: a) Ability to attract shared electrons

Topic 4: Chemical Bonding

Explanation

Chemical bonding is the force that holds atoms together.

Types of Bonds

Ionic Bond

Formed by transfer of electrons.

Example: NaCl

Covalent Bond

Formed by sharing of electrons.

Example: H_2O, CH_4

Coordinate Covalent Bond

A shared pair of electrons is donated by one atom.

Metallic Bond

Bond between metal atoms due to delocalized electrons.

Practice MCQs

Q1. Ionic bond is formed by:

a) Sharing of electrons
b) Transfer of electrons
c) Sharing of protons
d) Transfer of neutrons
Answer: b) Transfer of electrons

Q2. Covalent bond is formed by:

a) Sharing of electrons
b) Transfer of electrons
c) Loss of nucleus
d) Gain of protons
Answer: a) Sharing of electrons

Q3. NaCl has:

a) Ionic bond
b) Covalent bond
c) Metallic bond
d) Hydrogen bond only
Answer: a) Ionic bond

Q4. Metallic bonding involves:

a) Delocalized electrons
b) Only neutrons
c) Only protons
d) No electrons
Answer: a) Delocalized electrons

Q5. Coordinate covalent bond is formed when:

a) Both atoms donate electrons equally
b) One atom donates shared pair
c) No electrons are involved
d) Neutrons are transferred
Answer: b) One atom donates shared pair

Topic 5: Molecular Shapes and Hybridization

Explanation

Molecular shape describes the arrangement of atoms in a molecule. VSEPR theory explains molecular shapes by repulsion between electron pairs.

Common Hybridizations

- **sp:** Linear shape
- **sp^2:** Trigonal planar shape
- **sp^3:** Tetrahedral shape

Important Shapes

- Linear
- Bent
- Trigonal planar
- Tetrahedral

Polarity depends on bond polarity and molecular shape.

Practice MCQs

Q1. VSEPR theory explains:

a) Molecular shapes
b) Atomic mass
c) Isotopes
d) Radioactivity only
Answer: a) Molecular shapes

Q2. sp hybridization gives:

a) Linear shape
b) Tetrahedral shape
c) Bent shape only

d) Square shape
Answer: a) Linear shape

Q3. sp^3 hybridization is commonly:

a) Tetrahedral
b) Linear
c) Trigonal planar
d) Circular
Answer: a) Tetrahedral

Q4. Dipole moment is related to:

a) Polarity
b) Atomic number only
c) Neutrons
d) Gas law only
Answer: a) Polarity

Q5. Methane has approximately:

a) Tetrahedral shape
b) Linear shape
c) Square shape
d) Bent shape
Answer: a) Tetrahedral shape

Topic 6: Mole Concept and Stoichiometry

Explanation

Mole concept is used to count atoms, molecules, and ions.

Important Terms

- **Avogadro's number:** 6.022×10^{23} particles
- **Molar mass:** Mass of one mole of substance
- **Empirical formula:** Simplest whole-number ratio
- **Molecular formula:** Actual formula of compound
- **Stoichiometry:** Calculation based on balanced chemical equations

Practice MCQs

Q1. Avogadro's number is:

a) 6.022×10^{23}
b) 3.14
c) 9.8
d) 22.4 only
Answer: a) 6.022×10^{23}

Q2. Empirical formula shows:

a) Actual number of atoms
b) Simplest ratio of atoms
c) Molecular mass only
d) Atomic number only
Answer: b) Simplest ratio of atoms

Q3. Molecular formula shows:

a) Actual number of atoms
b) Only ratio
c) Only mass
d) Only charge
Answer: a) Actual number of atoms

Q4. Stoichiometry is based on:

a) Balanced chemical equation
b) Unbalanced equation
c) Atomic radius only
d) Bond angle only
Answer: a) Balanced chemical equation

Q5. Percent yield is:

a) Actual yield / theoretical yield × 100
b) Theoretical yield / actual yield × 100
c) Mass / volume
d) Pressure / temperature
Answer: a) Actual yield / theoretical yield × 100

Topic 7: Gases and Gas Laws

Explanation

Gas laws explain the relationship between pressure, volume, temperature, and moles of gases.

Important Gas Laws

- **Boyle's Law:** Pressure is inversely proportional to volume.
- **Charles' Law:** Volume is directly proportional to temperature.
- **Avogadro's Law:** Volume is directly proportional to number of moles.
- **Ideal Gas Equation:** PV = nRT

Practice MCQs

Q1. Boyle's law relates:

a) Pressure and volume
b) Mass and color
c) Acid and base
d) Polymer and monomer
Answer: a) Pressure and volume

Q2. Charles' law relates:

a) Volume and temperature
b) Pressure and color
c) Bond length and mass

d) pH and pOH
Answer: a) Volume and temperature

Q3. Ideal gas equation is:

a) PV = nRT
b) $E = mc^2$
c) F = ma
d) V = IR
Answer: a) PV = nRT

Q4. Real gases deviate from ideal behavior at:

a) High pressure and low temperature
b) Low pressure and high temperature
c) Normal conditions only
d) No condition
Answer: a) High pressure and low temperature

Q5. Avogadro's law relates volume with:

a) Number of moles
b) Atomic radius
c) pH
d) Electronegativity
Answer: a) Number of moles

Topic 8: Acids and Bases

Explanation

Acids and bases are important chemical substances.

Theories

Arrhenius Theory

Acids produce H^+ ions in water.
Bases produce OH^- ions in water.

Bronsted-Lowry Theory

Acid donates proton.
Base accepts proton.

Lewis Theory

Acid accepts electron pair.
Base donates electron pair.

pH and pOH

pH shows acidity or basicity.
pH less than 7 is acidic.
pH greater than 7 is basic.
pH 7 is neutral.

Practice MCQs

Q1. Arrhenius acid produces:

a) H^+ ions
b) OH^- ions
c) Electrons

d) Neutrons
Answer: a) H^+ ions

Q2. Arrhenius base produces:

a) OH^- ions
b) H^+ ions
c) Protons only
d) Neutrons
Answer: a) OH^- ions

Q3. Bronsted acid is:

a) Proton donor
b) Proton acceptor
c) Electron donor only
d) Neutron donor
Answer: a) Proton donor

Q4. pH less than 7 is:

a) Acidic
b) Basic
c) Neutral
d) Metallic
Answer: a) Acidic

Q5. pH 7 is:

a) Neutral
b) Acidic
c) Basic
d) Strong acid only
Answer: a) Neutral

Topic 9: Oxidation and Reduction

Explanation

Redox reactions involve oxidation and reduction.

Oxidation

Oxidation means loss of electrons or increase in oxidation number.

Reduction

Reduction means gain of electrons or decrease in oxidation number.

Practice MCQs

Q1. Oxidation means:

a) Loss of electrons
b) Gain of electrons
c) Loss of neutrons
d) Gain of protons only
Answer: a) Loss of electrons

Q2. Reduction means:

a) Gain of electrons
b) Loss of electrons
c) Loss of oxygen only
d) Loss of mass
Answer: a) Gain of electrons

Q3. Oxidation number increases during:

a) Oxidation
b) Reduction
c) Neutralization

d) Polymerization
Answer: a) Oxidation

Q4. Oxidation and reduction occur:

a) Together
b) Separately always
c) Only in gases
d) Only in solids
Answer: a) Together

Q5. Redox reaction involves:

a) Electron transfer
b) Only color change
c) Only melting
d) Only boiling
Answer: a) Electron transfer

Topic 10: Electrochemistry

Explanation

Electrochemistry deals with chemical reactions involving electricity.

Important Terms

- **Electrochemical cell:** Converts chemical energy into electrical energy.
- **Galvanic cell:** Produces electricity from spontaneous reaction.
- **Electrode potential:** Tendency of electrode to gain or lose electrons.
- **Redox titration:** Titration based on oxidation-reduction reaction.

Practice MCQs

Q1. Electrochemistry deals with:

a) Electricity and chemical reactions
b) Only gases
c) Only acids
d) Only polymers
Answer: a) Electricity and chemical reactions

Q2. Galvanic cell produces:

a) Electrical energy
b) Only heat
c) Only light
d) Only sound
Answer: a) Electrical energy

Q3. Electrochemical cell involves:

a) Redox reaction
b) Only neutralization
c) Only digestion
d) Only precipitation
Answer: a) Redox reaction

Q4. Electrode potential is tendency to:

a) Gain or lose electrons
b) Lose nucleus
c) Gain neutrons only
d) Change color only
Answer: a) Gain or lose electrons

Q5. Redox titration is based on:

a) Oxidation-reduction
b) Only pH
c) Only melting point
d) Only boiling point
Answer: a) Oxidation-reduction

Topic 11: Chemical Nomenclature

Explanation

Chemical nomenclature means naming chemical compounds according to rules.

Important Areas

- IUPAC naming
- Naming ionic compounds
- Naming acids
- Naming salts
- Naming coordination compounds
- Stock and classical nomenclature

Practice MCQs

Q1. IUPAC naming provides:

a) Systematic names
b) Random names
c) Only colors
d) Only masses
Answer: a) Systematic names

Q2. NaCl is commonly called:

a) Sodium chloride
b) Sodium carbonate
c) Potassium chloride
d) Calcium chloride
Answer: a) Sodium chloride

Q3. HCl in water is called:

a) Hydrochloric acid
b) Sulfuric acid

c) Nitric acid
d) Acetic acid
Answer: a) Hydrochloric acid

Q4. Stock nomenclature uses:

a) Roman numerals
b) Greek letters only
c) Arabic poems
d) No symbols
Answer: a) Roman numerals

Q5. Salts are formed by reaction of:

a) Acid and base
b) Metal and metal only
c) Gas and gas only
d) Polymer and monomer
Answer: a) Acid and base

Topic 12: Coordination Compounds

Explanation

Coordination compounds contain a central metal atom or ion surrounded by ligands.

Important Terms

- **Ligand:** Ion or molecule attached to central metal.
- **Coordination number:** Number of ligand donor atoms attached to central metal.
- **Complex ion:** Central metal with attached ligands.

Practice MCQs

Q1. Ligand is:

a) Atom or ion attached to central metal
b) Only proton
c) Only neutron
d) Gas law
Answer: a) Atom or ion attached to central metal

Q2. Coordination number means:

a) Number of ligand donor atoms attached
b) Atomic number
c) Mass number
d) pH value
Answer: a) Number of ligand donor atoms attached

Q3. Coordination compounds usually contain:

a) Central metal ion
b) Only nonmetals
c) Only gases
d) Only polymers
Answer: a) Central metal ion

Q4. NH_3 can act as:

a) Ligand
b) Neutron
c) Proton only
d) Polymer
Answer: a) Ligand

Q5. Complex ion contains:

a) Metal and ligands
b) Only electrons
c) Only water
d) Only acid
Answer: a) Metal and ligands

Topic 13: Organic Functional Groups

Explanation

Functional groups are specific groups of atoms that determine the properties and reactions of organic compounds.

Important Functional Groups

- Alcohols
- Aldehydes
- Ketones
- Carboxylic acids
- Esters
- Amines
- Halides
- Ethers
- Nitriles
- Organic acids

Practice MCQs

Q1. Alcohol functional group is:

a) -OH
b) -COOH
c) -CHO
d) $-NH_2$
Answer: a) -OH

Q2. Carboxylic acid group is:

a) -COOH
b) -OH
c) $-NH_2$
d) -X
Answer: a) -COOH

Q3. Aldehyde group is:

a) -CHO
b) -OH
c) -COOH
d) $-NH_2$
Answer: a) -CHO

Q4. Amines contain:

a) Nitrogen
b) Chlorine only
c) Sodium
d) Calcium
Answer: a) Nitrogen

Q5. Esters are commonly known for:

a) Fruity smell
b) Magnetic property
c) Radioactivity
d) Metallic bonding
Answer: a) Fruity smell

Topic 14: Isomerism

Explanation

Isomerism occurs when compounds have the same molecular formula but different structures or arrangements.

Types

- Structural isomerism

- Geometrical isomerism
- Optical isomerism
- Cis-trans isomerism
- Enantiomers
- Diastereomers
- Conformational isomerism

Practice MCQs

Q1. Isomers have same:

a) Molecular formula
b) Atomic number
c) Mass number only
d) Shape always
Answer: a) Molecular formula

Q2. Structural isomers differ in:

a) Structure
b) Molecular formula
c) Number of protons only
d) Isotopes
Answer: a) Structure

Q3. Cis-trans isomerism is a type of:

a) Geometrical isomerism
b) Atomic structure
c) Gas law
d) Acid-base reaction
Answer: a) Geometrical isomerism

Q4. Optical isomerism is related to:

a) Plane polarized light
b) Gas pressure
c) pH only
d) Atomic radius
Answer: a) Plane polarized light

Q5. Enantiomers are:

a) Non-superimposable mirror images
b) Same compounds always
c) Ionic salts
d) Polymers only
Answer: a) Non-superimposable mirror images

Topic 15: Organic Reaction Mechanisms

Explanation

Organic reaction mechanisms explain how organic reactions occur step by step.

Important Mechanisms

- Electrophilic addition
- Nucleophilic substitution
- SN1 mechanism
- SN2 mechanism
- Addition to alkenes and alkynes
- Substitution in aromatic compounds

Practice MCQs

Q1. Electrophile is:

a) Electron-loving species
b) Neutron-loving species
c) Water only
d) Metal only
Answer: a) Electron-loving species

Q2. Nucleophile is:

a) Nucleus-loving/electron-rich species
b) Proton only
c) Neutron only
d) Gas only
Answer: a) Nucleus-loving/electron-rich species

Q3. SN1 reaction usually involves:

a) Carbocation intermediate
b) No intermediate
c) Only free neutrons
d) Only gases
Answer: a) Carbocation intermediate

Q4. SN2 reaction occurs in:

a) One step
b) Three steps always
c) Ten steps
d) No step
Answer: a) One step

Q5. Alkenes commonly undergo:

a) Addition reactions
b) Only oxidation always
c) Only naming
d) Only polymer melting
Answer: a) Addition reactions

Topic 16: Polymerization

Explanation

Polymerization is the process in which small molecules called monomers join to form large molecules called polymers.

Types

Addition Polymerization

Monomers add together without loss of small molecules.

Condensation Polymerization

Monomers join with loss of small molecules like water.

Practice MCQs

Q1. Polymer is made from:

a) Monomers
b) Neutrons
c) Protons only
d) Gases only
Answer: a) Monomers

Q2. Polymerization means:

a) Formation of polymers
b) Breaking nucleus
c) Forming ions only
d) Boiling liquid
Answer: a) Formation of polymers

Q3. Addition polymerization occurs without:

a) Loss of small molecule
b) Electron movement
c) Bond formation
d) Monomers
Answer: a) Loss of small molecule

Q4. Condensation polymerization releases:

a) Small molecules
b) Only protons
c) Only neutrons
d) Only electrons
Answer: a) Small molecules

Q5. Biodegradable polymers are:

a) Broken down naturally
b) Never broken
c) Metals only
d) Gases only
Answer: a) Broken down naturally

Topic 17: Benzene and Aromatic Compounds

Explanation

Benzene is an aromatic compound with formula C_6H_6. It has a ring structure and shows resonance.

Important Reactions

- Electrophilic substitution
- Nitration of benzene
- Friedel-Crafts alkylation
- Halogenation

- Sulfonation

Aromatic compounds are stable due to delocalized electrons.

Practice MCQs

Q1. Formula of benzene is:

a) C_6H_6
b) CH_4
c) C_2H_6
d) C_2H_4
Answer: a) C_6H_6

Q2. Benzene mainly undergoes:

a) Electrophilic substitution
b) Nucleophilic addition
c) Only combustion
d) Only polymerization
Answer: a) Electrophilic substitution

Q3. Nitration of benzene introduces:

a) Nitro group
b) Hydroxyl group
c) Amino group
d) Carboxyl group
Answer: a) Nitro group

Q4. Benzene stability is due to:

a) Resonance
b) Ionic bond only
c) No electrons
d) Neutrons
Answer: a) Resonance

Q5. Friedel-Crafts reaction is related to:

a) Alkylation/acylation of benzene
b) Gas law

c) pH calculation
d) Electrolysis only
Answer: a) Alkylation/acylation of benzene

Topic 18: Grignard Reagents and Organic Synthesis

Explanation

Grignard reagents are important organic reagents used in organic synthesis.

General formula:

RMgX

Where R is alkyl or aryl group and X is halogen.

They are highly reactive and used to form carbon-carbon bonds.

Practice MCQs

Q1. General formula of Grignard reagent is:

a) RMgX
b) RCOOH
c) ROH
d) RCHO
Answer: a) RMgX

Q2. Grignard reagents contain:

a) Magnesium
b) Sodium only
c) Calcium only

d) Iron only
Answer: a) Magnesium

Q3. Grignard reagents are used in:

a) Organic synthesis
b) Gas law
c) pH scale only
d) Atomic radius
Answer: a) Organic synthesis

Q4. Grignard reagent is:

a) Highly reactive
b) Completely inert
c) Noble gas
d) Polymer only
Answer: a) Highly reactive

Q5. Grignard reagents help form:

a) Carbon-carbon bonds
b) Only ionic salts
c) Only water
d) Only oxygen gas
Answer: a) Carbon-carbon bonds

Topic 19: Chemical Kinetics

Explanation

Chemical kinetics is the study of rate of reaction and factors affecting it.

Important Terms

- Rate of reaction
- Rate law
- First order reaction
- Second order reaction
- Activation energy
- Collision theory
- Arrhenius equation
- Catalysis

Factors Affecting Rate

1. Temperature
2. Concentration
3. Surface area
4. Catalyst
5. Nature of reactants

Practice MCQs

Q1. Chemical kinetics studies:

a) Rate of reaction
b) Atomic number only
c) Molecular shape only
d) pH only
Answer: a) Rate of reaction

Q2. Catalyst:

a) Speeds up reaction
b) Stops all reactions
c) Becomes product always
d) Changes atomic number
Answer: a) Speeds up reaction

Q3. Activation energy is:

a) Minimum energy required for reaction
b) Total mass
c) Atomic number
d) pH value
Answer: a) Minimum energy required for reaction

Q4. Increasing temperature usually:

a) Increases reaction rate
b) Decreases rate always
c) Stops reaction
d) Changes nucleus
Answer: a) Increases reaction rate

Q5. Collision theory explains:

a) Reaction rate by particle collisions
b) Atomic mass only
c) Gas color
d) Isomerism only
Answer: a) Reaction rate by particle collisions

Topic 20: Types of Organic Reactions

Explanation

Organic compounds show different types of reactions.

Important Types

Addition Reaction

Atoms add to a double or triple bond.

Substitution Reaction

One atom or group is replaced by another.

Elimination Reaction

Atoms are removed to form a double bond.

Rearrangement Reaction

Atoms rearrange within a molecule.

Free Radical Reaction

Reaction involving free radicals.

Practice MCQs

Q1. Addition reaction occurs mostly in:

a) Alkenes and alkynes
b) Alkanes only
c) Salts only
d) Metals only
Answer: a) Alkenes and alkynes

Q2. Substitution reaction means:

a) Replacement of atom/group
b) Addition of water only
c) Breaking nucleus
d) Formation of gas always
Answer: a) Replacement of atom/group

Q3. Elimination reaction forms:

a) Double bond
b) Only ionic bond
c) Only water
d) Only salt
Answer: a) Double bond

Q4. Free radical has:

a) Unpaired electron
b) No electron
c) No mass

d) No reaction
Answer: a) Unpaired electron

Q5. Rearrangement reaction involves:

a) Change in arrangement of atoms
b) Only pH change
c) Only boiling
d) Only melting
Answer: a) Change in arrangement of atoms

AFNS Practice Test-9

Q1. Atomic number is basis of:

a) Modern periodic table
b) Old periodic table only
c) Gas laws
d) Polymerization

Q2. Covalent bond is formed by:

a) Sharing electrons
b) Transfer electrons
c) Transfer neutrons
d) No electrons

Q3. pH less than 7 shows:

a) Acidic solution
b) Basic solution
c) Neutral solution
d) Salt only

Q4. Oxidation is:

a) Loss of electrons
b) Gain of electrons
c) Gain of neutrons
d) Loss of protons only

Q5. Functional group of alcohol is:

a) -OH
b) -COOH
c) -CHO
d) $-NH_2$

Q6. Benzene formula is:

a) C_6H_6
b) CH_4
c) C_2H_2
d) C_4H_{10}

Q7. Catalyst changes:

a) Rate of reaction
b) Atomic number
c) Molecular formula always
d) Element identity

Q8. Grignard reagent contains:

a) Magnesium
b) Sodium only
c) Potassium only
d) Calcium only

Q9. One dozen molecules is not used in chemistry; mole contains:

a) 6.022×10^{23} particles
b) 12 particles only
c) 100 particles only
d) 1 particle only

Q10. Polymerization forms:

a) Polymers
b) Atoms only
c) Ions only
d) Acids only

In this lecture, we covered the complete AFNS Chemistry syllabus. Topics included atomic structure, quantum numbers, periodic table, bonding, molecular shapes, mole concept, gases, acids and bases, redox reactions, electrochemistry, nomenclature, coordination compounds, organic functional groups, isomerism, organic mechanisms, polymerization, benzene, Grignard reagents, chemical kinetics, and types of organic reactions.

Chemistry is scoring if students understand concepts, memorize key definitions, and practice MCQs regularly.