1. Atomic Structure:
   - Question: What is the atomic number of an element that has 6 protons?
   - Answer: 6
   - Explanation: The atomic number of an element is defined as the number of protons in the nucleus of an atom of that element.

2. Chemical Bonding:
   - Question: What type of bond is formed between two non-metal atoms that share electrons?
   - Answer: Covalent bond
   - Explanation: A covalent bond is a chemical bond that involves the sharing of electron pairs between atoms.

3. States of Matter:
   - Question: What is the process by which a solid directly changes into a gas called?
   - Answer: Sublimation
   - Explanation: Sublimation is the transition of a substance directly from the solid to the gas state without passing through the liquid state.

4. Chemical Reactions:
   - Question: What type of reaction is represented by the general equation: A + B → AB?
   - Answer: Combination reaction (or Synthesis reaction)
   - Explanation: In a combination reaction, two or more reactants combine to form a single product.

5. Periodic Table:
   - Question: Which group in the periodic table contains the noble gases?
   - Answer: Group 18 (or Group VIIIA)
   -
   - Explanation: Noble gases are unreactive elements found in the last group of the periodic table due to their complete outer electron shells.

6. Solutions:
   - Question: What is the molarity of a solution that contains 1 mole of solute dissolved in 1 liter of solvent?
   - Answer: 1 M (one molar)
   - Explanation: Molarity is defined as the number of moles of solute per liter of solution.

7. Organic Chemistry:
   - Question: What is the functional group present in alcohol?
   - Answer: -OH (Hydroxyl group)
   - Explanation: Alcohols are organic compounds that contain a hydroxyl (-OH) functional group attached to a carbon atom.

8. Stoichiometry:
   - Question: How many moles of oxygen gas are required to completely burn 1 mole of methane (CH_4)? (Balanced equation: $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$)
   - Answer: 2 moles
   - Explanation: According to the balanced chemical equation, 1 mole of methane reacts with 2 moles of oxygen gas to produce carbon dioxide and water.

9. Acids, Bases, and Salts:
   - Question: What is the pH value of a neutral solution at 25°C?
   - Answer: 7
   - Explanation: A neutral solution has an equal concentration of hydrogen ions (H^+) and hydroxide ions (OH^-), resulting in a pH of 7.

10. Thermodynamics in Chemistry:
   - Question: What is the term for the heat absorbed or released during a chemical reaction at constant pressure?
   - Answer: Enthalpy change (ΔH)
   - Explanation: Enthalpy change is a measure of the total heat content of a system at constant pressure.

11. Chemical Kinetics:
   - Question: What is the effect of increasing the temperature on the rate of a chemical reaction?
   - Answer: Generally, the rate of a reaction increases
   - Explanation: Increasing the temperature generally increases the kinetic energy of the reactant molecules, leading to more frequent and effective collisions, thus, increasing the reaction rate.

12. Electrochemistry:
   - Question: In an electrochemical cell, what is the electrode where reduction takes place called?
   - Answer: Cathode
   - Explanation: Reduction is the gain of electrons, and it occurs at the cathode in an electrochemical cell.

13. Coordination Compounds:
   - Question: What is the central metal ion in the coordination compound $[Cu(NH_3)_4]^{2+}$?
   - Answer: Cu^{2+} (Copper(II) ion)
   - Explanation: In a coordination compound, the central metal ion is typically a transition metal ion that is bonded to ligands.

14. Environmental Chemistry:
   - Question: What is the main component of air pollution that is produced by the incomplete combustion of fuels?

- Answer: Carbon monoxide (CO)
- Explanation: Carbon monoxide is a poisonous gas formed when fuels are burned with insufficient oxygen.

15. Polymers:
    - Question: What is the monomer unit of polyethylene?
    - Answer: Ethylene (C_2H_4)
    - Explanation: Polyethylene is a synthetic polymer made up of repeating units of ethylene molecules.

16. Biochemistry:
    - Question: What is the primary function of carbohydrates in living organisms?
    - Answer: Provide energy
    - Explanation: Carbohydrates are a major source of energy for living organisms.

17. Analytical Chemistry:
    - Question: What is the name of the laboratory apparatus used for accurate measurement of liquid volumes?
    - Answer: Pipette
    - Explanation: A pipette is a laboratory tool used to transport a measured volume of liquid.

18. Nuclear Chemistry:
    - Question: What type of radiation is emitted during the decay of a nucleus with the emission of a helium nucleus (^{24}He)?
    - Answer: Alpha radiation (or Alpha decay)
    - Explanation: Alpha particles are equivalent to helium nuclei and are emitted during alpha decay.

19. Solid State Chemistry:
    - Question: What type of solid has a regular three-dimensional arrangement of atoms, ions, or molecules?
    - Answer: Crystalline solid
    - Explanation: Crystalline solids have a well-defined and ordered structure.

20. Chemical Equilibrium:
    - Question: What does Le Chatelier's principle state about a system at equilibrium when a change in conditions is applied?
    - Answer: The system will shift in a direction that tends to counteract the change
    - Explanation: Le Chatelier's principle helps predict the effect of changes in conditions (like temperature, pressure, or concentration) on a system at equilibrium.

21. Inorganic Chemistry:
    - Question: What is the chemical formula of sodium chloride?

- Answer: NaCl
- Explanation: Sodium chloride is an ionic compound formed by the combination of a sodium cation (Na^+) and a chloride anion (Cl^-).

22. Organic Chemistry:
    - Question: What is the IUPAC name for the compound CH_3-CH_2-CH_3?
    - Answer: Propane
    - Explanation: This is a three-carbon alkane, and according to IUPAC nomenclature, it is named propane.
23. Solutions:
    - Question: If you dissolve 10 grams of NaCl in 100 grams of water, what is the mass percentage of NaCl in the solution?
    - Answer: 9.09%
    - Explanation: Mass percentage = (mass of solute/mass of solution) × 100. Mass of solution = 10 g (NaCl) + 100 g (water) = 110 g. Mass percentage = (10 g / 110 g) × 100 = 9.09%