

PRACTICE EXAM 11: PHYSICAL SETTING/CHEMISTRY SIMULATION (85 QUESTIONS)

1. The reaction $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$ is best classified as

- A. synthesis
- B. decomposition
- C. single replacement
- D. double replacement

2. Which of the following is classified as an element?

- A. oxygen (O_2)
- B. water (H_2O)
- C. salt (NaCl)
- D. air

3. Which of the following is classified as a chemical change?

- A. melting ice
- B. boiling water

- C. crushing a can
- D. burning wood

4. The bond in sodium chloride (NaCl) is classified as

- A. covalent
- B. ionic
- C. metallic
- D. hydrogen

5. Which of the following elements is classified as a metal?

- A. iron (Fe)
- B. sulfur (S)
- C. chlorine (Cl)
- D. neon (Ne)

6. The reaction $2 \text{H}_2\text{O} \rightarrow 2 \text{H}_2 + \text{O}_2$ is best classified as

- A. decomposition
- B. synthesis
- C. combustion
- D. double replacement

7. Which of the following is classified as a compound?

- A. gold (Au)
- B. a mixture of sand and salt
- C. helium (He)
- D. carbon dioxide (CO₂)

8. A solution with a pH of 3 is classified as

- A. neutral
- B. basic
- C. strongly basic
- D. acidic

9. Which of the following is classified as a physical change?

- A. dissolving sugar in water
- B. rusting of iron
- C. burning paper
- D. souring of milk

10. The reaction $\text{Zn} + 2 \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$ is best classified as

- A. synthesis
- B. single replacement
- C. decomposition
- D. double replacement

11. Which of the following elements is classified as a nonmetal?

- A. oxygen (O)
- B. copper (Cu)
- C. sodium (Na)
- D. iron (Fe)

12. The bond between two oxygen atoms in O_2 is classified as

- A. ionic
- B. metallic
- C. covalent
- D. hydrogen

13. Which of the following is classified as a mixture?

- A. pure water
- B. saltwater

C. oxygen gas

D. carbon dioxide

14. The reaction $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$ is best classified as

A. synthesis

B. decomposition

C. single replacement

D. double replacement

15. A solution with a pH of 12 is classified as

A. acidic

B. neutral

C. weakly acidic

D. basic

16. Which of the following elements is classified as a metalloid?

A. silicon (Si)

B. potassium (K)

C. argon (Ar)

D. iron (Fe)

17. Which of the following is classified as a chemical change?

- A. tearing paper
- B. baking a cake
- C. melting butter
- D. evaporating water

18. The reaction $\text{CH}_4 + 2 \text{O}_2 \rightarrow \text{CO}_2 + 2 \text{H}_2\text{O}$ is best classified as

- A. synthesis
- B. decomposition
- C. combustion
- D. single replacement

19. A sample of saltwater that looks uniform throughout is classified as a

- A. compound
- B. heterogeneous mixture
- C. homogeneous mixture
- D. pure element

20. Which of the following is classified as an element?

A. ammonia (NH_3)

B. brass

C. sugar

D. helium (He)

21. A sodium ion, Na^+ , is classified as a

A. cation

B. anion

C. neutral atom

D. molecule

22. A chloride ion, Cl^- , is classified as a

A. cation

B. neutral atom

C. molecule

D. anion

23. Which of the following is classified as a physical change?

A. iron rusting

B. wood burning

- C. ice melting
- D. milk souring

24. The reaction $\text{N}_2 + 3 \text{H}_2 \rightarrow 2 \text{NH}_3$ is best classified as

- A. decomposition
- B. synthesis
- C. single replacement
- D. combustion

25. A solution with a pH of 7 is classified as

- A. acidic
- B. basic
- C. strongly acidic
- D. neutral

26. The bonding that holds atoms together in a piece of copper metal is classified as

- A. ionic
- B. covalent
- C. metallic
- D. hydrogen

27. The compound C_2H_6 (ethane), with only single bonds, is classified as an

- A. alkane
- B. alkene
- C. alkyne
- D. alcohol

28. The compound C_2H_4 (ethene), containing one double bond, is classified as an

- A. alkane
- B. alcohol
- C. alkene
- D. alkyne

29. The compound C_2H_2 (ethyne), containing one triple bond, is classified as an

- A. alkane
- B. alkyne
- C. alkene
- D. ester

30. The element argon (Ar) is classified as a

- A. halogen
- B. noble gas
- C. alkali metal
- D. transition metal

31. The element sodium (Na), in Group 1, is classified as an

- A. alkali metal
- B. alkaline earth metal
- C. halogen
- D. noble gas

32. The element chlorine (Cl), in Group 17, is classified as a

- A. noble gas
- B. alkali metal
- C. transition metal
- D. halogen

33. The reaction $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ is best classified as

- A. synthesis
- B. single replacement

C. combustion

D. decomposition

34. A sample of sand mixed with iron filings, with visibly separate parts, is classified as a

A. compound

B. homogeneous mixture

C. heterogeneous mixture

D. pure element

35. Which of the following is classified as a chemical change?

A. dissolving salt

B. digesting food

C. bending a wire

D. freezing water

36. A positively charged particle found in the nucleus is classified as a

A. electron

B. neutron

C. ion

D. proton

37. A particle in the nucleus with no charge is classified as a

- A. proton
- B. electron
- C. neutron
- D. cation

38. The bond in hydrogen chloride (HCl), formed by unequal sharing between two nonmetals, is classified as

- A. ionic
- B. nonpolar covalent
- C. polar covalent
- D. metallic

39. The reaction $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$ between an acid and a base is best classified as

- A. synthesis
- B. neutralization
- C. decomposition
- D. combustion

40. Which of the following is classified as a pure substance?

- A. saltwater
- B. air
- C. distilled water
- D. a salad

41. The element iron (Fe), found in the central block of the periodic table, is classified as a

- A. transition metal
- B. noble gas
- C. halogen
- D. alkali metal

42. The reaction $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$ is best classified as

- A. synthesis
- B. single replacement
- C. decomposition
- D. double replacement

43. Which of the following is classified as a physical change?

- A. burning gasoline
- B. boiling water

- C. baking bread
- D. rusting iron

44. A substance that conducts electricity when dissolved in water is classified as an

- A. nonelectrolyte
- B. insulator
- C. metalloid
- D. electrolyte

45. The bond between two identical chlorine atoms in Cl_2 , with equal sharing, is classified as

- A. ionic
- B. polar covalent
- C. nonpolar covalent
- D. metallic

46. The burning of propane in oxygen, $\text{C}_3\text{H}_8 + 5 \text{O}_2 \rightarrow 3 \text{CO}_2 + 4 \text{H}_2\text{O}$, is best classified as

- A. combustion
- B. synthesis
- C. decomposition
- D. double replacement

47. A substance that has no definite shape and no definite volume is classified as a

- A. solid
- B. liquid
- C. gas
- D. crystal

48. A substance with a definite shape and a definite volume is classified as a

- A. gas
- B. solid
- C. liquid
- D. plasma

49. A substance with a definite volume but no definite shape is classified as a

- A. liquid
- B. solid
- C. gas
- D. plasma

50. A reaction that releases heat to its surroundings is classified as

- A. endothermic
- B. neutral
- C. exothermic
- D. nuclear

51. A reaction that absorbs heat from its surroundings is classified as

- A. exothermic
- B. combustion
- C. endothermic
- D. neutralization

52. Which of the following is classified as a compound?

- A. table salt (NaCl)
- B. copper (Cu)
- C. argon (Ar)
- D. a bowl of cereal

53. A type of nuclear radiation consisting of a helium nucleus is classified as

- A. beta radiation
- B. gamma radiation

- C. alpha radiation
- D. an X-ray

54. A type of nuclear radiation consisting of a high-speed electron is classified as

- A. alpha radiation
- B. beta radiation
- C. gamma radiation
- D. a proton

55. A substance like sugar that dissolves in water without conducting electricity is classified as a

- A. nonelectrolyte
- B. strong electrolyte
- C. metal
- D. salt

56. The element calcium (Ca), in Group 2, is classified as an

- A. alkali metal
- B. halogen
- C. noble gas
- D. alkaline earth metal

57. The reaction $2 \text{Mg} + \text{O}_2 \rightarrow 2 \text{MgO}$ is best classified as

- A. decomposition
- B. single replacement
- C. synthesis
- D. double replacement

58. The formation of a precipitate when two solutions are mixed is classified as evidence of a

- A. physical change
- B. phase change
- C. chemical change
- D. change in state only

59. A brass alloy that appears uniform throughout is classified as a

- A. compound
- B. homogeneous mixture
- C. heterogeneous mixture
- D. pure element

60. A bond formed when the electronegativity difference between two atoms is very large is classified as

- A. nonpolar covalent
- B. polar covalent
- C. metallic
- D. ionic

61. A negatively charged particle found outside the nucleus is classified as an

- A. electron
- B. proton
- C. neutron
- D. cation

62. The reaction $2 \text{KClO}_3 \rightarrow 2 \text{KCl} + 3 \text{O}_2$ is best classified as

- A. synthesis
- B. decomposition
- C. combustion
- D. single replacement

63. The statement "iron rusts in moist air" describes a

- A. physical property
- B. state of matter

- C. chemical property
- D. physical change

64. The statement "copper is a reddish, malleable solid" describes a

- A. chemical property
- B. physical property
- C. chemical change
- D. nuclear property

65. Which of the following is classified as a mixture?

- A. pure copper
- B. carbon dioxide
- C. distilled water
- D. Italian salad dressing

66. The reaction $\text{BaCl}_2 + \text{Na}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2 \text{NaCl}$ is best classified as

- A. synthesis
- B. double replacement
- C. decomposition
- D. combustion

67. A hydrocarbon containing only single carbon-carbon bonds is classified as

- A. unsaturated
- B. saturated
- C. aromatic
- D. ionic

68. A hydrocarbon containing a carbon-carbon double or triple bond is classified as

- A. saturated
- B. an alkane
- C. a noble gas
- D. unsaturated

69. A solution holding the maximum amount of dissolved solute at a given temperature is classified as

- A. unsaturated
- B. dilute
- C. supersaturated
- D. saturated

70. A solution that can still dissolve more solute at a given temperature is classified as

- A. unsaturated
- B. saturated
- C. supersaturated
- D. concentrated

71. The reaction $2 \text{Na} + 2 \text{H}_2\text{O} \rightarrow 2 \text{NaOH} + \text{H}_2$ is best classified as

- A. synthesis
- B. decomposition
- C. single replacement
- D. double replacement

72. At room temperature, the element oxygen (O_2) is classified as a

- A. gas
- B. liquid
- C. solid
- D. plasma

73. An element located on the far left side of the periodic table is generally classified as a

- A. metal
- B. nonmetal

C. noble gas

D. metalloid

74. An element located on the upper right side of the periodic table (excluding Group 18) is generally classified as a

A. metal

B. nonmetal

C. transition metal

D. alkali metal

75. Which of the following is classified as an element?

A. bronze

B. ammonia

C. nitrogen (N₂)

D. vinegar

76. Which of the following is classified as a physical change?

A. burning a candle wick

B. chopping wood into pieces

C. cooking an egg

D. iron corroding

77. The combustion of fuel, which gives off heat and light, is classified as

- A. endothermic
- B. nuclear
- C. a physical change
- D. exothermic

78. The bonds within a molecule of carbon dioxide (CO₂), formed between nonmetals, are classified as

- A. ionic
- B. metallic
- C. hydrogen bonds
- D. covalent

79. Lemon juice, which has a pH of about 2, is classified as

- A. basic
- B. acidic
- C. neutral
- D. a strong base

80. The direct combination of sodium and chlorine, $2 \text{Na} + \text{Cl}_2 \rightarrow 2 \text{NaCl}$, is best classified as

- A. decomposition
- B. single replacement
- C. double replacement
- D. synthesis

81. Which of the following is classified as a compound?

- A. a mixture of oxygen and nitrogen
- B. solid gold
- C. neon gas
- D. glucose ($C_6H_{12}O_6$)

82. An atom with equal numbers of protons and electrons is classified as

- A. electrically neutral
- B. a cation
- C. an anion
- D. a molecule

83. Electrolysis of water, splitting it into hydrogen and oxygen gas, is best classified as

- A. synthesis
- B. combustion

C. decomposition

D. neutralization

84. A substance that produces hydroxide ions and feels slippery, such as sodium hydroxide, is classified as a

A. acid

B. base

C. salt

D. neutral substance

85. A substance that produces hydrogen ions in water and tastes sour, such as hydrochloric acid, is classified as an

A. acid

B. base

C. salt

D. metal

Practice Exam 11 – Explained Answer Key

1. A — Two or more substances combining into a single product is a synthesis reaction. Here, hydrogen and oxygen join to form water. The single product is the signature of synthesis.
2. A — Oxygen (O_2) is an element because it is made of only one type of atom. Water and salt are compounds, and air is a mixture. An element cannot be broken into simpler substances chemically.
3. D — Burning wood is a chemical change because it forms new substances such as ash, carbon dioxide, and water vapor. The original wood is chemically transformed. The other choices only change form or state.

4. B — The bond in NaCl is ionic, formed by the transfer of an electron from sodium to chlorine. A metal bonding with a nonmetal produces oppositely charged ions. The electrostatic attraction holds them together.
5. A — Iron (Fe) is a metal, with the luster, conductivity, and malleability typical of metals. The other choices are nonmetals or a noble gas. Metals occupy the left and center of the periodic table.
6. A — One substance breaking into simpler products is a decomposition reaction. Water splits into hydrogen and oxygen gas. A single reactant yielding multiple products is its hallmark.
7. D — Carbon dioxide (CO₂) is a compound because it contains two elements chemically combined. Gold and helium are elements, and sand-and-salt is a mixture. Compounds have fixed composition.
8. D — A pH of 3 is below 7, classifying the solution as acidic. Lower pH values indicate higher acidity. The solution contains more hydrogen ions than hydroxide ions.
9. A — Dissolving sugar in water is a physical change because no new substance forms. The sugar can be recovered by evaporating the water. The other choices produce new substances.
10. B — One element replacing another in a compound is a single-replacement reaction. Zinc displaces hydrogen from hydrochloric acid. A free element and a compound react to form a new element and compound.
11. A — Oxygen (O) is a nonmetal, lacking the conductivity and luster of metals. The other choices are metals. Nonmetals lie on the upper right of the periodic table.
12. C — The bond between two oxygen atoms in O₂ is covalent, formed by shared electrons. Two nonmetal atoms share electrons rather than transferring them. Equal sharing holds the atoms together.
13. B — Saltwater is a mixture because the salt and water are physically combined and separable. The other choices are pure substances. A mixture has variable composition.
14. D — Two compounds exchanging ions is a double-replacement reaction. Silver and sodium swap partners, forming AgCl and NaNO₃. The formation of insoluble AgCl drives the reaction.
15. D — A pH of 12 is above 7, classifying the solution as basic. Higher pH values indicate stronger basicity. The solution contains more hydroxide than hydrogen ions.
16. A — Silicon (Si) is a metalloid, with properties between metals and nonmetals. The other choices are a metal or noble gases. Metalloids border the metal-nonmetal staircase.
17. B — Baking a cake is a chemical change because the heat triggers reactions that form new substances. The batter is permanently transformed. The other choices only change physical form.
18. C — A hydrocarbon reacting with oxygen to form carbon dioxide and water is a combustion reaction. Methane burns in oxygen here. Combustion releases energy as heat and light.
19. C — Saltwater that looks uniform throughout is a homogeneous mixture. Its components are evenly distributed and indistinguishable. A heterogeneous mixture would have visibly separate parts.
20. D — Helium (He) is an element because it consists of a single type of atom. Ammonia and sugar are compounds, and brass is a mixture. Elements cannot be chemically simplified.
21. A — A sodium ion, Na⁺, is a cation because it carries a positive charge. It formed by losing an electron. Cations are positively charged ions.
22. D — A chloride ion, Cl⁻, is an anion because it carries a negative charge. It formed by gaining an electron. Anions are negatively charged ions.
23. C — Ice melting is a physical change because the water's chemical identity stays the same. Only its state changes from solid to liquid. The other choices form new substances.
24. B — Nitrogen and hydrogen combining into a single product, ammonia, is a synthesis reaction. Simpler substances join into a more complex one. The single product marks synthesis.

25. D — A pH of 7 is the midpoint of the scale, classifying the solution as neutral. The concentrations of hydrogen and hydroxide ions are equal. Pure water has a neutral pH.
26. C — The bonding in copper metal is metallic, involving a shared "sea" of mobile electrons. This bonding among metal atoms explains conductivity and malleability. It is distinct from ionic or covalent bonding.
27. A — Ethane (C₂H₆), with only single carbon-carbon bonds, is an alkane. Alkanes are saturated hydrocarbons. The single bonds and "-ane" ending define the class.
28. C — Ethene (C₂H₄), containing one carbon-carbon double bond, is an alkene. The double bond and "-ene" ending define the class. Alkenes are unsaturated hydrocarbons.
29. B — Ethyne (C₂H₂), containing one carbon-carbon triple bond, is an alkyne. The triple bond and "-yne" ending define the class. Alkynes are unsaturated hydrocarbons.
30. B — Argon (Ar) is a noble gas, found in Group 18. Its full outer electron shell makes it stable and unreactive. The noble gases occupy the rightmost column.
31. A — Sodium (Na), in Group 1, is an alkali metal. Group 1 metals have one valence electron and are highly reactive. They form +1 ions.
32. D — Chlorine (Cl), in Group 17, is a halogen. The halogens have seven valence electrons and are reactive nonmetals. They form -1 ions.
33. D — Calcium carbonate breaking into calcium oxide and carbon dioxide is a decomposition reaction. A single compound yields simpler products. This is the reverse of synthesis.
34. C — Sand mixed with iron filings, with visibly separate parts, is a heterogeneous mixture. Its composition is not uniform. The components can be separated, here with a magnet.
35. B — Digesting food is a chemical change because enzymes break it into new substances. The food is chemically transformed. The other choices are physical changes.
36. D — A positively charged particle in the nucleus is a proton. Protons and neutrons make up the nucleus. The proton count defines the element.
37. C — A nuclear particle with no charge is a neutron. Neutrons share the nucleus with protons. They contribute to mass but not charge.
38. C — The bond in HCl, formed by unequal sharing between two nonmetals, is polar covalent. The more electronegative chlorine pulls the shared electrons closer. This creates partial charges without full ion formation.
39. B — An acid reacting with a base to form a salt and water is a neutralization reaction. The hydrogen and hydroxide ions combine into water. This moves the solution toward neutral.
40. C — Distilled water is a pure substance because it has a fixed composition and one type of molecule. Saltwater, air, and a salad are mixtures. Pure substances cannot be physically separated.
41. A — Iron (Fe), in the central block of the periodic table, is a transition metal. The transition metals occupy the d-block. They often form ions with more than one charge.
42. B — Iron displacing copper from copper sulfate is a single-replacement reaction. A more active free element replaces a less active one in a compound. The products are a new element and compound.
43. B — Boiling water is a physical change because the water's identity stays the same. Only its state changes from liquid to gas. The other choices form new substances.
44. D — A substance that conducts electricity when dissolved in water is an electrolyte. It produces mobile ions in solution. Salts and strong acids are common electrolytes.
45. C — The bond between two identical chlorine atoms in Cl₂, with equal sharing, is nonpolar covalent. Equal electronegativities mean the electrons are shared evenly. No charge separation forms.

46. A — Propane burning in oxygen to form carbon dioxide and water is a combustion reaction. Hydrocarbon combustion releases heat. The products are always carbon dioxide and water.
47. C — A substance with no definite shape and no definite volume is a gas. Gas particles spread to fill any container. The large spaces between particles allow expansion and compression.
48. B — A substance with a definite shape and a definite volume is a solid. Its particles are locked in a fixed arrangement. This rigidity gives solids their fixed form.
49. A — A substance with a definite volume but no definite shape is a liquid. Liquids take the shape of their container while keeping a fixed volume. Their particles are close but able to flow.
50. C — A reaction that releases heat to its surroundings is exothermic. The products hold less energy than the reactants. The released energy often warms the surroundings.
51. C — A reaction that absorbs heat from its surroundings is endothermic. The products hold more energy than the reactants. The absorbed energy often cools the surroundings.
52. A — Table salt (NaCl) is a compound because it contains two elements chemically combined. Copper and argon are elements, and cereal is a mixture. Compounds have a fixed ratio of elements.
53. C — Nuclear radiation consisting of a helium nucleus is alpha radiation. An alpha particle has two protons and two neutrons. Its emission lowers the atomic number by two.
54. B — Nuclear radiation consisting of a high-speed electron is beta radiation. A beta particle has a -1 charge. Its emission raises the atomic number by one.
55. A — Sugar dissolving in water without conducting electricity is a nonelectrolyte. It dissolves as neutral molecules rather than ions. Without ions, the solution cannot carry current.
56. D — Calcium (Ca), in Group 2, is an alkaline earth metal. Group 2 metals have two valence electrons. They form $+2$ ions.
57. C — Magnesium and oxygen combining into a single product, MgO, is a synthesis reaction. Two simpler substances join into one compound. The single product marks synthesis.
58. C — The formation of a precipitate when solutions are mixed is evidence of a chemical change. An insoluble new solid forms from the reaction. A new substance signals a chemical change.
59. B — A brass alloy that appears uniform throughout is a homogeneous mixture. Its metals are evenly distributed. Alloys are mixtures, not compounds.
60. D — A bond with a very large electronegativity difference is ionic. One atom pulls electrons away completely, forming ions. The greater the difference, the more ionic the bond.
61. A — A negatively charged particle outside the nucleus is an electron. Electrons occupy energy levels around the nucleus. Their negative charge balances the protons in a neutral atom.
62. B — Potassium chlorate breaking into potassium chloride and oxygen is a decomposition reaction. A single compound yields simpler products. One reactant producing several products is its hallmark.
63. C — "Iron rusts in moist air" describes a chemical property because it tells how iron reacts. Chemical properties describe how a substance changes into new substances. Rusting forms iron oxide.
64. B — "Copper is a reddish, malleable solid" describes a physical property because it gives observable traits without a chemical change. Color and malleability can be observed without altering the substance. Physical properties describe a substance as it is.
65. D — Italian salad dressing is a mixture because its components are physically combined and separable. The other choices are pure substances. Mixtures have variable composition.
66. B — Barium chloride and sodium sulfate exchanging ions is a double-replacement reaction. The two compounds swap partners, forming BaSO₄ and NaCl. The insoluble BaSO₄ drives the reaction.

67. B — A hydrocarbon with only single carbon-carbon bonds is saturated. It holds the maximum number of hydrogen atoms. Alkanes are the saturated hydrocarbons.
68. D — A hydrocarbon with a carbon-carbon double or triple bond is unsaturated. The multiple bond means fewer hydrogen atoms than the maximum. Alkenes and alkynes are unsaturated.
69. D — A solution holding the maximum dissolved solute at a given temperature is saturated. No additional solute will dissolve. It represents the solubility limit.
70. A — A solution that can still dissolve more solute is unsaturated. It holds less than the maximum. More solute can be added until saturation.
71. C — Sodium replacing hydrogen in water is a single-replacement reaction. A free element displaces another element from a compound. The products are a new compound and a free element.
72. A — At room temperature, oxygen (O_2) is a gas. It has no definite shape or volume under these conditions. Oxygen is one of several elemental gases.
73. A — An element on the far left of the periodic table is generally a metal. Metals dominate the left and center. They tend to lose electrons and form positive ions.
74. B — An element on the upper right (excluding Group 18) is generally a nonmetal. Nonmetals occupy this region. They tend to gain electrons and form negative ions.
75. C — Nitrogen (N_2) is an element because it consists of one type of atom. Bronze is a mixture, while ammonia and vinegar contain compounds. Elements cannot be chemically simplified.
76. B — Chopping wood into pieces is a physical change because the wood's identity stays the same. Only its size and shape change. The other choices form new substances.
77. D — The combustion of fuel, giving off heat and light, is exothermic. Energy is released to the surroundings. Exothermic reactions transfer energy outward.
78. D — The bonds within CO_2 , formed between nonmetals, are covalent. Nonmetal atoms share electrons rather than transferring them. Covalent bonding holds molecular compounds together.
79. B — Lemon juice, with a pH of about 2, is acidic. A pH below 7 indicates acidity. The low value reflects a high concentration of hydrogen ions.
80. D — Sodium and chlorine combining directly into a single product, $NaCl$, is a synthesis reaction. Two elements join into one compound. The single product marks synthesis.
81. D — Glucose ($C_6H_{12}O_6$) is a compound because it contains elements chemically combined in a fixed ratio. The oxygen-nitrogen mixture and gold and neon are not compounds. Compounds have definite composition.
82. A — An atom with equal numbers of protons and electrons is electrically neutral. The positive and negative charges balance. A net charge would make it an ion.
83. C — Electrolysis splitting water into hydrogen and oxygen is a decomposition reaction. A single compound breaks into simpler substances. Electrical energy drives the breakdown.
84. B — A substance producing hydroxide ions and feeling slippery, like sodium hydroxide, is a base. Bases release OH^- ions in water. They have a pH above 7.
85. A — A substance producing hydrogen ions and tasting sour, like hydrochloric acid, is an acid. Acids release H^+ ions in water. They have a pH below 7.