

PRACTICE EXAM 19: PHYSICAL SETTING/CHEMISTRY SIMULATION (85 QUESTIONS)

1. Proton is to positive charge as electron is to which of the following?

- A. negative charge
- B. neutral charge
- C. positive charge
- D. no mass at all

2. Solid is to definite shape as gas is to which of the following?

- A. definite shape
- B. no definite shape
- C. definite volume only
- D. rigid crystal lattice

3. Melting is to the change of solid into liquid as boiling is to which change?

- A. gas into liquid

- B. solid into gas
- C. liquid into solid
- D. liquid into gas

4. Sodium is to Group 1 as chlorine is to which of the following?

- A. Group 1
- B. Group 17
- C. Group 18
- D. Group 2

5. An acid is to hydrogen ions as a base is to which of the following?

- A. salt particles
- B. water molecules
- C. hydroxide ions
- D. hydrogen ions

6. Oxidation is to loss of electrons as reduction is to which of the following?

- A. loss of protons
- B. gain of electrons
- C. loss of electrons

D. gain of protons

7. An ionic bond is to a metal and a nonmetal as a covalent bond is to which of the following?

A. a nonmetal and a nonmetal

B. a metal and a metal

C. a metal and a nonmetal

D. a metal and a noble gas

8. A proton is to the nucleus as an electron is to which of the following?

A. the electron cloud

B. the nucleus

C. a neutron

D. another proton

9. Group 1 is to the alkali metals as Group 17 is to which of the following?

A. the noble gases

B. the alkaline earth metals

C. the halogens

D. the transition metals

10. A synthesis reaction is to one product as a decomposition reaction is to which of the following?

A. one reactant and one product

B. a salt and water

C. one reactant

D. two elements only

11. Fission is to splitting a nucleus as fusion is to which of the following?

A. decaying a nucleus

B. joining nuclei

C. ionizing a nucleus

D. neutralizing a nucleus

12. An exothermic reaction is to releasing heat as an endothermic reaction is to which of the following?

A. releasing light

B. producing a salt

C. releasing heat

D. absorbing heat

13. A pH of 3 is to acidic as a pH of 11 is to which of the following?

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

14. A cation is to a positive charge as an anion is to which of the following?

- A. a negative charge
- B. a positive charge
- C. a neutral charge
- D. no charge at all

15. An alkane is to a single bond as an alkyne is to which of the following?

- A. a triple bond
- B. a single bond
- C. a double bond
- D. an ionic bond

16. A solute is to the dissolved substance as a solvent is to which of the following?

- A. the dissolved substance
- B. the precipitate formed

C. the dissolving substance

D. the insoluble solid

17. Mass is to a balance as temperature is to which of the following?

A. a graduated cylinder

B. a thermometer

C. a barometer

D. a calorimeter

18. Water is to H_2O as table salt is to which of the following?

A. NaCl

B. NaOH

C. CaCl_2

D. KCl

19. Atomic number is to the number of protons as mass number is to which of the following?

A. the number of neutrons only

B. the number of electrons only

C. the number of protons only

D. the protons plus the neutrons

20. Diamond is to covalent bonding as sodium chloride is to which of the following?

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

21. Boyle's law is to pressure and volume as Charles's law is to which of the following?

- A. pressure and moles
- B. volume and temperature
- C. mass and volume
- D. pressure and temperature

22. Helium is to monatomic as oxygen is to which of the following?

- A. monatomic
- B. diatomic
- C. triatomic
- D. ionic

23. A catalyst is to speeding up a reaction as an inhibitor is to which of the following?

- A. having no effect
- B. being consumed
- C. slowing it down
- D. lowering activation energy

24. A solid is to the lowest energy state as a gas is to which of the following?

- A. the lowest energy state
- B. having no energy
- C. the highest energy state
- D. a fixed energy state

25. Burning is to a chemical change as melting is to which of the following?

- A. a nuclear change
- B. a chemical change
- C. combustion
- D. a physical change

26. Sodium is to a +1 ion as magnesium is to which of the following?

- A. a +2 ion
- B. a +1 ion

C. a -1 ion

D. a -2 ion

27. An alpha particle is to a helium nucleus as a beta particle is to which of the following?

A. a proton

B. a neutron

C. a photon

D. an electron

28. An element is to one type of atom as a compound is to which of the following?

A. physically mixed atoms

B. atoms chemically combined

C. a single atom

D. a mixture of gases

29. A concentrated solution is to much solute as a dilute solution is to which of the following?

A. much solute

B. a saturated state

C. no solvent present

D. little solute

30. A group is to a column as a period is to which of the following?

A. a diagonal

B. a family

C. a column

D. a row

31. A hydrogen ion is to an acid as a hydroxide ion is to which of the following?

A. a salt

B. a neutral solution

C. a base

D. pure water

32. A saturated solution is to the maximum solute as an unsaturated solution is to which of the following?

A. the maximum solute

B. no solute at all

C. less than the maximum solute

D. more than the maximum solute

33. Fluorine is to highly reactive as neon is to which of the following?

- A. unreactive
- B. highly reactive
- C. a metal
- D. a liquid

34. A single-replacement reaction is to one element as a double-replacement reaction is to which of the following?

- A. two compounds
- B. one compound only
- C. one element only
- D. a single product

35. An endothermic reaction is to absorbing energy as an exothermic reaction is to which of the following?

- A. absorbing light
- B. absorbing energy
- C. releasing energy
- D. having no energy change

36. A boiling point is to liquid changing to gas as a freezing point is to which change?

- A. gas changing to liquid
- B. solid changing to gas

- C. liquid changing to solid
- D. liquid changing to gas

37. Carbon is to the symbol C as potassium is to which symbol?

- A. P
- B. C
- C. Ca
- D. K

38. A metal is to a good conductor as a nonmetal is to which of the following?

- A. a good conductor
- B. a poor conductor
- C. a malleable solid
- D. a shiny solid

39. Temperature is to average kinetic energy as heat is to which of the following?

- A. energy transferred
- B. the mass of a sample
- C. the number of particles
- D. average kinetic energy

40. Increasing temperature is to a faster reaction as adding a catalyst is to which of the following?

- A. a slower reaction
- B. no change in rate
- C. a faster reaction
- D. higher activation energy

41. A value of 18 is to the gram-formula mass of water as a value of 44 is to which of the following?

- A. the gram-formula mass of NaOH
- B. the gram-formula mass of CO₂
- C. the gram-formula mass of O₂
- D. the gram-formula mass of H₂O

42. Filtration is to an insoluble solid as distillation is to which of the following?

- A. a magnetic metal
- B. floating oil
- C. settled sand
- D. a dissolved liquid

43. Increasing pressure is to decreasing volume as increasing temperature (at constant pressure) is to which of the following?

- A. increasing volume
- B. decreasing volume
- C. constant volume
- D. decreasing pressure

44. Na is to sodium as Fe is to which of the following?

- A. fluorine
- B. francium
- C. iron
- D. sodium

45. A polar covalent bond is to unequal sharing as a nonpolar covalent bond is to which of the following?

- A. electron transfer
- B. no bond forming
- C. equal sharing
- D. ionic attraction

46. Hydrocarbon combustion is to carbon dioxide and water as acid-base neutralization is to which of the following?

- A. carbon dioxide and water
- B. hydrogen gas only

C. an element and a compound

D. a salt and water

47. Valence electrons are to the outer shell as the nucleus is to which of the following?

A. protons and neutrons

B. electrons only

C. valence electrons

D. empty space

48. Group 18 is to a full outer shell as Group 1 is to which of the following?

A. one valence electron

B. eight valence electrons

C. seven valence electrons

D. two valence electrons

49. Adding salt to water is to lowering the freezing point as adding salt to water is to which boiling-point effect?

A. lowering the boiling point

B. no change in boiling point

C. lowering the freezing point again

D. raising the boiling point

50. A strong acid is to complete ionization as a weak acid is to which of the following?

A. complete ionization

B. slight ionization

C. no ionization

D. a neutral pH

51. Solid carbon dioxide turning to gas is to sublimation as water vapor forming frost is to which of the following?

A. melting

B. evaporation

C. deposition

D. condensation

52. An electron is to a -1 charge as a proton is to which of the following?

A. a 0 charge

B. a -1 charge

C. a -2 charge

D. a $+1$ charge

53. A mixture is to physically combined substances as a compound is to which of the following?

- A. physically combined substances
- B. chemically combined substances
- C. a single element
- D. always a gas

54. An empirical formula is to the simplest ratio as a molecular formula is to which of the following?

- A. the simplest ratio
- B. the lightest atom present
- C. the actual number of atoms
- D. only the metal atoms

55. Increasing surface area is to a faster reaction as decreasing concentration is to which of the following?

- A. a slower reaction
- B. a faster reaction
- C. no reaction at all
- D. a higher temperature

56. Au is to gold as Ag is to which of the following?

- A. argon
- B. gold

C. silver

D. aluminum

57. The reactant side is to before the reaction as the product side is to which of the following?

A. before the reaction

B. after the reaction

C. during heating only

D. at equilibrium only

58. Beta decay is to the atomic number increasing by 1 as alpha decay is to which of the following?

A. the atomic number decreasing by 2

B. the atomic number increasing by 2

C. the atomic number decreasing by 1

D. no change in atomic number

59. Sodium is to a metal as sulfur is to which of the following?

A. a metal

B. a metalloid

C. a noble gas

D. a nonmetal

60. Moving down a group is to a larger radius as moving across a period is to which of the following?

- A. a larger radius
- B. no change in radius
- C. larger atoms overall
- D. a smaller radius

61. An electrolyte is to conducting in solution as a nonelectrolyte is to which of the following?

- A. conducting as a solid
- B. not conducting in solution
- C. forming ions readily
- D. conducting when molten

62. The kelvin is to temperature as the mole is to which of the following?

- A. volume
- B. amount of substance
- C. pressure
- D. density

63. Combustion is to oxygen as neutralization is to which of the following?

- A. a metal
- B. a hydrocarbon
- C. an acid and a base
- D. a salt only

64. Ice floating is to being less dense than water as oil floating on water is to which of the following?

- A. being more dense than water
- B. being equal in density to water
- C. being dissolved in water
- D. being less dense than water

65. A coefficient is to whole molecules as a subscript is to which of the following?

- A. whole molecules
- B. atoms of an element
- C. the charge of an ion
- D. the color of a compound

66. Increasing concentration is to a faster rate as lowering temperature is to which of the following?

- A. a faster rate
- B. no change in rate

C. a slower rate

D. a higher rate

67. A hand warmer is to an exothermic process as an instant cold pack is to which of the following?

A. an exothermic process

B. combustion

C. an endothermic process

D. neutralization

68. HCl is to hydrochloric acid as HNO₃ is to which of the following?

A. hydrochloric acid

B. sulfuric acid

C. carbonic acid

D. nitric acid

69. Synthesis is to $A + B \rightarrow AB$ as decomposition is to which of the following?

A. $AB \rightarrow A + B$

B. $A + BC \rightarrow AC + B$

C. $AB + CD \rightarrow AD + CB$

D. $A + B \rightarrow AB$

70. Group 2 is to +2 ions as Group 17 is to which of the following?

A. +1 ions

B. +2 ions

C. -1 ions

D. -2 ions

71. Glucose, $C_6H_{12}O_6$, is to a molecular formula as CH_2O is to which of the following?

A. a molecular formula

B. a structural formula

C. an ionic formula

D. an empirical formula

72. Boiling water is to a physical change as rusting iron is to which of the following?

A. a chemical change

B. a physical change

C. a nuclear change

D. no change at all

73. One mole of gas is to 22.4 liters at STP as one mole of any substance is to which of the following?

- A. 11.2 particles
- B. 6.02×10^{23} particles
- C. 22.4 grams
- D. 1.0 liter

74. Conducting electricity as a solid is to metallic bonding as conducting only when molten is to which of the following?

- A. covalent bonding
- B. nonpolar bonding
- C. no bonding
- D. ionic bonding

75. A saturated hydrocarbon is to an alkane as an unsaturated hydrocarbon with a double bond is to which of the following?

- A. an alkene
- B. an alkane
- C. an alcohol
- D. an acid

76. Stomach acid is to a low pH as household ammonia is to which of the following?

- A. a low pH

- B. a high pH
- C. a neutral pH
- D. a pH of exactly 7

77. Increasing pressure is to a higher boiling point as high altitude is to which of the following?

- A. a higher boiling point
- B. no change in boiling point
- C. a higher freezing point
- D. a lower boiling point

78. A heterogeneous mixture is to visibly different parts as a homogeneous mixture is to which of the following?

- A. visibly different parts
- B. a uniform composition
- C. a single element
- D. a pure compound

79. Activation energy is to the energy needed to start a reaction as a catalyst is to which of the following?

- A. lowering the activation energy
- B. raising the activation energy
- C. being consumed in the reaction

D. stopping the reaction

80. A forward reaction is to reactants forming products as a reverse reaction is to which of the following?

A. reactants forming products

B. no reaction occurring

C. products remaining only

D. products forming reactants

81. Solid sodium chloride is to a nonconductor as molten sodium chloride is to which of the following?

A. a nonconductor

B. a solid

C. a covalent substance

D. a conductor

82. The most reactive metal sitting at the bottom of Group 1 is to its position as the most reactive halogen sitting at which position?

A. the top of Group 17

B. the bottom of Group 17

C. the middle of Group 17

D. the bottom of Group 1

83. A chemical change is to a new substance forming as a physical change is to which of the following?

- A. a new substance forming
- B. no new substance forming
- C. atoms being destroyed
- D. a nuclear change

84. Percent composition is to being fixed for any sample size as the law of conservation of mass is to which of the following?

- A. mass increasing in a reaction
- B. mass decreasing in a reaction
- C. mass being conserved in a reaction
- D. atoms being destroyed

85. A proton is to about one atomic mass unit as an electron is to which of the following?

- A. about one atomic mass unit
- B. a nearly negligible mass
- C. a greater mass than a neutron
- D. about two atomic mass units

Practice Exam 19 – Explained Answer Key

1. A — An electron carries a negative charge, paralleling the proton's positive charge. Each particle's charge is its defining electrical property. The opposite signs of proton and electron allow atoms to be neutral overall.
2. B — A gas has no definite shape, paralleling the solid's definite shape. Gas particles move freely and fill any container. The lack of a fixed arrangement defines the gaseous state.
3. D — Boiling is the change of liquid into gas, paralleling melting as the change of solid into liquid. Both add energy to advance to a higher-energy state. Boiling occurs throughout the liquid at its boiling point.
4. B — Chlorine is in Group 17, paralleling sodium's placement in Group 1. The group number reflects an element's valence electrons. Chlorine's seven valence electrons place it among the halogens.
5. C — A base produces hydroxide ions, paralleling an acid's hydrogen ions. The characteristic ion defines each. Hydroxide ions give bases their properties.
6. B — Reduction is the gain of electrons, paralleling oxidation as the loss of electrons. The two processes always occur together. Gaining electrons lowers the oxidation number.
7. A — A covalent bond forms between two nonmetals, paralleling an ionic bond between a metal and a nonmetal. Two nonmetals share electrons rather than transfer them. This sharing is the hallmark of covalent bonding.
8. A — An electron occupies the electron cloud, paralleling the proton's location in the nucleus. Electrons move in the space surrounding the nucleus. Only protons and neutrons reside inside the nucleus.
9. C — Group 17 is the halogens, paralleling Group 1 as the alkali metals. Each group name reflects shared chemical behavior. The halogens are reactive nonmetals.
10. C — A decomposition reaction starts from one reactant, paralleling synthesis producing one product. Decomposition breaks a single compound into simpler substances. It is the reverse of synthesis.
11. B — Fusion is the joining of nuclei, paralleling fission as the splitting of a nucleus. The two are opposite nuclear processes. Fusion combines light nuclei into a heavier one.
12. D — An endothermic reaction absorbs heat, paralleling an exothermic reaction releasing heat. The direction of energy flow defines each. Endothermic reactions take in energy from the surroundings.
13. B — A pH of 11 is basic, paralleling a pH of 3 being acidic. Values above 7 are basic and below 7 are acidic. The pH scale measures hydrogen ion concentration.
14. A — An anion carries a negative charge, paralleling the cation's positive charge. The charge sign defines each ion type. Anions form by gaining electrons.
15. A — An alkyne contains a triple bond, paralleling an alkane's single bond. The carbon-carbon bond order defines each hydrocarbon class. Alkynes are the most unsaturated of the three.
16. C — A solvent is the dissolving substance, paralleling the solute being dissolved. The solvent is usually the larger amount. Together they make a solution.
17. B — Temperature is measured with a thermometer, paralleling mass being measured with a balance. Each instrument matches its quantity. The thermometer reads thermal energy as temperature.
18. A — Table salt is NaCl, paralleling water being H₂O. Each formula identifies a specific compound. Sodium chloride is composed of sodium and chlorine.

19. D — The mass number is the protons plus the neutrons, paralleling the atomic number being the protons. The two nuclear particles together give the mass. Subtracting the atomic number from the mass number gives the neutrons.
20. A — Sodium chloride uses ionic bonding, paralleling diamond's covalent bonding. NaCl forms by electron transfer between a metal and a nonmetal. The ionic lattice gives salt its high melting point.
21. B — Charles's law relates volume and temperature, paralleling Boyle's law relating pressure and volume. Each gas law links a specific pair of variables. Charles's law holds at constant pressure.
22. B — Oxygen is diatomic, paralleling helium being monatomic. Oxygen exists naturally as O₂. The noble gases, by contrast, exist as single atoms.
23. C — An inhibitor slows a reaction, paralleling a catalyst speeding it up. The two have opposite effects on rate. Inhibitors interfere with the reaction pathway.
24. C — A gas is the highest-energy state, paralleling a solid being the lowest. Particle energy increases from solid to liquid to gas. Gas particles have the greatest freedom of motion.
25. D — Melting is a physical change, paralleling burning being a chemical change. Melting changes only the state, not the substance. No new material forms.
26. A — Magnesium forms a +2 ion, paralleling sodium forming a +1 ion. The group number predicts the charge. Magnesium loses two valence electrons.
27. D — A beta particle is an electron, paralleling an alpha particle being a helium nucleus. Each emission is a specific particle. The beta particle carries a -1 charge.
28. B — A compound is atoms chemically combined, paralleling an element being one type of atom. Chemical combination gives compounds fixed compositions. The bonds make the compound a new substance.
29. D — A dilute solution has little solute, paralleling a concentrated solution having much solute. Concentration describes the amount of solute per volume. Dilute solutions contain relatively few solute particles.
30. D — A period is a row, paralleling a group being a column. The two describe the table's two directions. Periods run horizontally across the table.
31. C — A hydroxide ion characterizes a base, paralleling a hydrogen ion characterizing an acid. The defining ion sets each apart. Hydroxide ions make a solution basic.
32. C — An unsaturated solution holds less than the maximum solute, paralleling a saturated solution holding the maximum. An unsaturated solution can dissolve more. It has not reached the solubility limit.
33. A — Neon is unreactive, paralleling fluorine being highly reactive. Neon's full outer shell makes it stable. Fluorine, by contrast, readily gains an electron.
34. A — A double-replacement reaction involves two compounds, paralleling a single-replacement reaction involving one element. The two compounds exchange partners. This produces two new compounds.
35. C — An exothermic reaction releases energy, paralleling an endothermic reaction absorbing energy. The direction of energy flow distinguishes them. Exothermic reactions warm the surroundings.
36. C — A freezing point marks liquid changing to solid, paralleling a boiling point marking liquid changing to gas. Each is a characteristic temperature for a phase change. Freezing removes energy from the liquid.
37. D — Potassium's symbol is K, paralleling carbon's symbol C. The symbol K comes from the Latin kalium. Each element has a unique symbol.

38. B — A nonmetal is a poor conductor, paralleling a metal being a good conductor. Nonmetals lack mobile electrons. This makes most of them insulators.
39. A — Heat is energy transferred, paralleling temperature being average kinetic energy. Heat flows from hot to cold. Temperature, by contrast, measures particle motion.
40. C — Adding a catalyst gives a faster reaction, paralleling increasing temperature speeding the reaction. Both increase the rate. The catalyst lowers the activation energy.
41. B — A value of 44 is the gram-formula mass of CO_2 , paralleling 18 being the gram-formula mass of water. Each is the sum of the atomic masses in the formula. Carbon dioxide totals 12 plus 32, or 44.
42. D — Distillation separates a dissolved liquid, paralleling filtration separating an insoluble solid. Distillation relies on differing boiling points. It recovers a dissolved or mixed liquid.
43. A — Increasing temperature at constant pressure increases volume, paralleling increasing pressure decreasing volume. Volume and temperature are directly related. The gas expands when heated.
44. C — Fe is iron, paralleling Na being sodium. The symbol Fe comes from the Latin ferrum. Each symbol identifies one element.
45. C — A nonpolar covalent bond shares electrons equally, paralleling a polar covalent bond sharing them unequally. Equal sharing produces no charge separation. Identical atoms bond nonpolarly.
46. D — Acid-base neutralization produces a salt and water, paralleling combustion producing carbon dioxide and water. Each reaction type has characteristic products. Neutralization combines an acid and a base.
47. A — The nucleus contains protons and neutrons, paralleling valence electrons being in the outer shell. The nucleus holds nearly all the atom's mass. Electrons occupy the surrounding shells.
48. A — Group 1 has one valence electron, paralleling Group 18 having a full outer shell. The valence count drives chemical behavior. A single valence electron makes Group 1 reactive.
49. D — Adding salt raises the boiling point, paralleling its lowering of the freezing point. Both are colligative effects of dissolved particles. The solute widens the liquid temperature range.
50. B — A weak acid ionizes only slightly, paralleling a strong acid ionizing completely. The degree of ionization defines acid strength. Weak acids release few hydrogen ions.
51. C — Water vapor forming frost is deposition, paralleling solid CO_2 becoming gas as sublimation. Deposition is gas directly to solid. It is the reverse of sublimation.
52. D — A proton carries a +1 charge, paralleling an electron's -1 charge. The charges are equal and opposite. This balance keeps neutral atoms uncharged.
53. B — A compound is chemically combined, paralleling a mixture being physically combined. Chemical bonds hold a compound together. A mixture's parts retain their own properties.
54. C — A molecular formula gives the actual number of atoms, paralleling an empirical formula giving the simplest ratio. The molecular formula may be a multiple of the empirical. Glucose's $\text{C}_6\text{H}_{12}\text{O}_6$ reduces to CH_2O .
55. A — Decreasing concentration gives a slower reaction, paralleling increasing surface area giving a faster one. Fewer reactant particles mean fewer collisions. The rate drops as concentration falls.
56. C — Ag is silver, paralleling Au being gold. The symbol Ag comes from the Latin argentum. Each symbol names one metal.
57. B — The product side represents after the reaction, paralleling the reactant side being before it. Reactants convert into products. The arrow points from before to after.
58. A — Alpha decay decreases the atomic number by 2, paralleling beta decay increasing it by 1. Losing an alpha particle removes two protons. The element changes accordingly.

59. D — Sulfur is a nonmetal, paralleling sodium being a metal. Sulfur lacks metallic luster and conductivity. It sits on the nonmetal side of the table.
60. D — Moving across a period gives a smaller radius, paralleling moving down a group giving a larger one. Increasing nuclear charge pulls electrons inward across a period. The atoms contract toward the right.
61. B — A nonelectrolyte does not conduct in solution, paralleling an electrolyte conducting in solution. Nonelectrolytes dissolve without forming ions. Without ions, no current flows.
62. B — The mole measures amount of substance, paralleling the kelvin measuring temperature. Each is a base unit for its quantity. One mole is 6.02×10^{23} particles.
63. C — Neutralization involves an acid and a base, paralleling combustion involving oxygen. Each reaction type has a characteristic reactant. The acid and base produce a salt and water.
64. D — Oil floating means it is less dense than water, paralleling ice floating because it is less dense. Floating indicates lower density than the liquid. Oil and ice both sit atop water.
65. B — A subscript shows atoms of an element, paralleling a coefficient showing whole molecules. The subscript applies to the element it follows. Coefficients scale the entire formula.
66. C — Lowering temperature gives a slower rate, paralleling increasing concentration giving a faster rate. Colder particles collide less often and with less energy. The rate decreases as temperature drops.
67. C — An instant cold pack is endothermic, paralleling a hand warmer being exothermic. The cold pack absorbs heat from its surroundings. This makes it feel cold.
68. D — HNO_3 is nitric acid, paralleling HCl being hydrochloric acid. The formula identifies the acid. Nitric acid contains the nitrate ion.
69. A — Decomposition follows $\text{AB} \rightarrow \text{A} + \text{B}$, paralleling synthesis following $\text{A} + \text{B} \rightarrow \text{AB}$. Decomposition splits one compound into parts. It is the reverse of synthesis.
70. C — Group 17 forms -1 ions, paralleling Group 2 forming $+2$ ions. Each group's ion charge follows from its valence electrons. Halogens gain one electron to complete their shell.
71. D — CH_2O is an empirical formula, paralleling $\text{C}_6\text{H}_{12}\text{O}_6$ being a molecular formula. The empirical formula gives the simplest ratio. Glucose's molecular formula is six times CH_2O .
72. A — Rusting iron is a chemical change, paralleling boiling water being a physical change. Rusting forms a new compound, iron oxide. A new substance signals a chemical change.
73. B — One mole of any substance is 6.02×10^{23} particles, paralleling one mole of gas being 22.4 liters at STP. Avogadro's number defines the mole. It applies to atoms, molecules, or ions.
74. D — Conducting only when molten indicates ionic bonding, paralleling conducting as a solid indicating metallic bonding. Ionic solids conduct once their ions are free to move. Melting releases the mobile ions.
75. A — An alkene has a double bond, paralleling an alkane being saturated. The double bond makes it unsaturated. Alkenes are named for that carbon-carbon double bond.
76. B — Household ammonia has a high pH, paralleling stomach acid having a low pH. Ammonia is a base. Its pH lies well above 7.
77. D — High altitude gives a lower boiling point, paralleling increasing pressure giving a higher one. Lower atmospheric pressure lets liquids boil sooner. Water boils below 100°C on a mountain.
78. B — A homogeneous mixture has a uniform composition, paralleling a heterogeneous mixture having visibly different parts. Homogeneous mixtures look the same throughout. Their components are evenly distributed.

79. A — A catalyst lowers the activation energy, paralleling activation energy being the energy needed to start a reaction. The catalyst provides an easier pathway. This speeds the reaction without being consumed.
80. D — A reverse reaction forms reactants from products, paralleling a forward reaction forming products from reactants. The two run in opposite directions. At equilibrium their rates are equal.
81. D — Molten sodium chloride is a conductor, paralleling solid sodium chloride being a nonconductor. Melting frees the ions to move. Mobile ions carry the electric current.
82. A — The most reactive halogen sits at the top of Group 17, paralleling the most reactive alkali metal at the bottom of Group 1. Fluorine, at the top, is the most reactive halogen. Halogen reactivity increases upward.
83. B — A physical change forms no new substance, paralleling a chemical change forming a new one. Physical changes alter only form or state. The original substance remains.
84. C — Conservation of mass means mass is conserved in a reaction, paralleling percent composition being fixed for any sample. Atoms are rearranged but not created or destroyed. The total mass stays constant.
85. B — An electron has a nearly negligible mass, paralleling a proton's mass of about one atomic mass unit. An electron is roughly $1/1836$ the mass of a proton. Its mass is treated as essentially zero.