PRACTICE EXAM 13: PHYSICAL SETTING/CHEMISTRY SIMULATION (85 QUESTIONS)

1. In winter, salt is spread on icy roads to help melt the ice. This works because dissolving salt in water

A. lowers the freezing point of the water

B. raises the freezing point of the water

C. has no effect on the freezing point

D. turns the ice into salt

2. An antacid tablet relieves heartburn by reacting with excess stomach acid. This is an example of a

A. combustion reaction

B. decomposition reaction

C. synthesis reaction

D. neutralization reaction

3. Food lasts longer in a refrigerator than on the counter because lowering the temperature

A. increases the rate of spoilage reactions

B. adds preservatives to the food

C. removes all bacteria instantly

D. slows the rate of spoilage reactions

4. A helium-filled balloon floats in air because helium gas is

A. less dense than the surrounding air

B. denser than the surrounding air

C. the same density as air

D. a solid at room temperature

5. When baking soda is added to vinegar, bubbles form. The bubbles are caused by the production of

A. liquid water only

B. carbon dioxide gas

C. solid salt crystals

D. hydrogen gas

6. A pressure cooker cooks food faster because increasing the pressure inside

A. lowers the boiling point of water

B. removes water from the food

C. raises the boiling point of water

D. cools the food quickly

7. Powdered sugar dissolves faster in iced tea than a sugar cube because the powder has

A. a smaller surface area

B. a greater surface area

C. a different chemical formula

D. fewer sugar molecules

8. A car battery produces electricity through a chemical reaction that transfers electrons. This type of reaction is best described as

A. a phase change

B. an oxidation-reduction reaction

C. a nuclear reaction

D. a physical change

9. A disposable hand warmer gets warm when activated because the reaction inside it

A. absorbs heat from your hand

B. is a physical change only

C. releases heat to the surroundings

D. freezes the contents

10. An instant cold pack becomes cold when squeezed because the process inside it

A. releases heat

B. is a combustion reaction

C. absorbs heat from the surroundings

D. produces a flame

11. A small fire can be smothered with a blanket because cutting off the air supply removes the

A. oxygen needed for combustion

B. carbon dioxide needed for combustion

C. nitrogen needed for combustion

D. water needed for combustion

12. Painting an iron railing helps prevent rust because the paint

A. makes the iron react faster

B. keeps oxygen and moisture away from the iron

C. adds more iron to the surface

D. cools the iron permanently

13. A bottle of soda goes flat faster when left open in a warm room because higher temperature

A. increases the gas solubility

B. adds more carbon dioxide

C. has no effect on the gas

D. decreases the solubility of the dissolved gas

14. Bread dough rises because yeast produces a gas during fermentation. That gas is

A. oxygen

B. carbon dioxide

C. hydrogen

D. nitrogen

15. Diamond is used in cutting tools because its carbon atoms are held in a strong network of

A. ionic bonds

B. covalent bonds

C. metallic bonds

D. hydrogen bonds

16. Copper is used in electrical wiring because metals conduct electricity well, owing to their

A. tightly fixed electrons

B. lack of electrons

C. mobile, delocalized electrons

D. ionic structure

17. Table salt dissolves easily in water because water is a polar molecule that

A. is nonpolar like the salt

B. chemically reacts with the salt

C. cannot interact with ions

D. attracts and surrounds the charged ions

18. Oil does not mix with water because oil is nonpolar while water is polar, and

A. polar and nonpolar substances always mix

B. oil is denser than water

C. they have the same chemical formula

D. like dissolves like, so unlike substances do not mix well

19. Fluoride is added to toothpaste and drinking water to help

A. whiten teeth by bleaching

B. add calcium to teeth

C. strengthen tooth enamel against decay

D. dissolve tooth enamel

20. The ozone layer in the upper atmosphere protects living things by absorbing harmful

A. visible light

B. ultraviolet radiation

C. radio waves

D. carbon dioxide

21. Acid rain forms when gases such as sulfur dioxide from burning fossil fuels react with water in the atmosphere, lowering the rain's

A. temperature

B. density

C. pH

D. mass

22. A carbon monoxide detector warns of a colorless, odorless gas produced by the

A. incomplete combustion of fuels

B. freezing of water

C. evaporation of alcohol

D. melting of metals

23. Steel is coated with zinc (galvanized) to prevent rust because the zinc

A. makes the steel heavier

B. is less reactive than iron

C. adds carbon to the steel

D. corrodes in place of the iron

24. Water boils at a lower temperature on a high mountain because the atmospheric pressure there is

A. higher than at sea level

B. lower than at sea level

C. exactly the same as at sea level

D. zero

25. Lemon juice is squeezed on a sliced apple to slow browning, which is caused by the apple reacting with

A. nitrogen in the air

B. water vapor

C. oxygen in the air

D. sunlight only

26. Sweating cools the body because as sweat evaporates from the skin, it

A. absorbs heat from the body

B. releases heat into the body

C. freezes on the skin

D. adds salt to the skin

27. Soap helps wash greasy dishes because soap molecules have one end that mixes with water and another end that

A. repels all oils

B. dissolves metal

C. attaches to nonpolar grease

D. evaporates instantly

28. A carbon dioxide fire extinguisher puts out a fire by

A. adding fuel to the fire

B. heating the fire

C. smothering the fire by displacing oxygen

D. supplying extra oxygen

29. A balloon taken outside on a very cold day shrinks because lowering the temperature causes the gas inside to

A. increase in volume

B. decrease in volume

C. change into a liquid instantly

D. gain mass

30. A bicycle tire can burst on a very hot day because heating the air inside increases its

A. pressure

B. mass

C. chemical identity

D. number of molecules

31. Baking powder makes cakes rise by releasing a gas when heated. The gas released is

A. oxygen

B. carbon dioxide

C. hydrogen

D. helium

32. Distillation is used to separate alcohol from water because the two liquids have different

A. colors

B. masses

C. boiling points

D. densities only

33. Filtering is used to separate sand from water because the sand is

A. dissolved in the water

B. lighter than water

C. an insoluble solid that does not dissolve

D. chemically bonded to water

34. Chlorine is added to swimming pools mainly to

A. raise the water temperature

B. kill bacteria and disinfect the water

C. change the water color

D. soften the water

35. Milk of magnesia, used to relieve indigestion, has a pH above 7, which means it is

A. a strong acid

B. neutral

C. a salt

D. a base

36. Household bleach removes stains by chemically changing the stain molecules through

A. an oxidation reaction

B. a freezing process

C. a physical change only

D. evaporation

37. Dry ice produces a fog because solid carbon dioxide changes directly into a gas, a process called

A. melting

B. sublimation

C. condensation

D. freezing

38. Vinegar can remove hard-water mineral deposits because vinegar is a weak acid that

A. is basic

B. reacts with and dissolves the mineral buildup

C. freezes the minerals

D. has a pH of 12

39. A thermos keeps drinks hot by reducing the transfer of

A. mass

B. light

C. heat

D. pressure

40. Bags of potato chips are filled with nitrogen gas instead of air to keep the chips fresh because nitrogen is

A. unreactive and will not spoil the food

B. highly reactive with the food

C. heavier than the chips

D. a strong acid

41. Gold is used in jewelry because, unlike many metals, gold

A. rusts quickly in air

B. dissolves in water

C. reacts strongly with oxygen

D. is very unreactive and resists corrosion

42. Water pipes can burst in winter because water is unusual in that it

A. expands when it freezes

B. contracts when it freezes

C. evaporates when it freezes

D. disappears when it freezes

43. An ionization smoke detector senses smoke particles using a small amount of a

A. strong acid

B. magnetic liquid

C. radioactive material

D. flammable gas

44. Neon signs glow with colored light when electricity excites the gas atoms and their electrons

A. leave the atom permanently

B. gain protons

C. fall back and release light energy

D. turn into neutrons

45. Stainless steel resists rust because it is an alloy of iron mixed with chromium, making it a

A. pure element

B. compound

C. single atom

D. homogeneous mixture

46. Antifreeze is added to a car's radiator to keep the coolant from freezing in winter and boiling in summer by

A. lowering the freezing point and raising the boiling point

B. raising the freezing point only

C. removing all the water

D. adding oxygen to the coolant

47. A car battery is harder to start on a very cold morning because lowering the temperature

A. speeds up the battery's reactions

B. adds charge to the battery

C. has no effect on the battery

D. slows the chemical reactions in the battery

48. Powdered limestone is added to acidic lakes to raise the pH because limestone acts as a

A. strong acid

B. neutral substance

C. fuel

D. base that neutralizes the acid

49. Laundry dries faster on a warm, windy day because heat and moving air increase the rate of

A. evaporation

B. condensation

C. freezing

D. melting

50. A balloon brought from the surface deep underwater shrinks because the greater water pressure

A. compresses the gas into a smaller volume

B. expands the gas

C. freezes the gas

D. adds gas to the balloon

51. The green coating on old copper statues forms when copper slowly reacts with substances in the air, an example of

A. a physical change

B. a chemical change

C. sublimation

D. melting

52. A water softener improves "hard" water by removing dissolved ions such as

A. sodium and potassium only

B. hydrogen ions

C. calcium and magnesium ions

D. nitrogen molecules

53. The bright colors in fireworks are produced when heated metal compounds emit light as their electrons

A. are removed permanently

B. gain mass

C. drop to lower energy levels

D. become protons

54. A liquid thermometer works because the liquid inside

A. changes color with temperature

B. expands when heated and contracts when cooled

C. boils at every temperature

D. freezes at body temperature

55. Many household glass cleaners contain ammonia, which makes the solution

A. a strong acid

B. neutral

C. a salt

D. basic

56. A burning candle is an example of a chemical reaction known as

A. decomposition

B. sublimation

C. neutralization

D. combustion

57. Small "do not eat" silica gel packets are placed in packaging to

A. absorb moisture and keep contents dry

B. add flavor to the product

C. release oxygen

D. heat the contents

58. Sodium metal is stored under oil rather than in open air because sodium

A. reacts vigorously with moisture and oxygen

B. is completely unreactive

C. dissolves in oil

D. is a noble gas

59. A rechargeable battery can be reused because applying electricity

A. adds new chemicals to it

B. reverses the chemical reaction inside it

C. cools it permanently

D. removes its electrodes

60. Table salt is safe to eat even though it is made from sodium and chlorine because in the compound NaCl, the elements are

A. chemically combined into a new substance with new properties

B. still present as free, reactive elements

C. only physically mixed together

D. unchanged from their original forms

61. Carbon dioxide is called a greenhouse gas because in the atmosphere it

A. blocks all sunlight

B. cools the planet

C. produces oxygen

D. traps heat near the Earth's surface

62. A soda bottle fizzes when first opened because releasing the cap lowers the pressure, allowing dissolved gas to

A. dissolve more

B. freeze

C. turn into liquid

D. escape from the solution

63. The liquid in a typical car battery contains sulfuric acid, which means it has a pH that is

A. below 7

B. exactly 7

C. above 7

D. above 14

64. A whole hard candy dissolves more slowly in the mouth than a crushed one because crushing

A. changes the candy's chemical formula

B. cools the candy

C. increases the surface area exposed to saliva

D. removes sugar from the candy

65. Natural gas is naturally odorless, so a smelly compound is added to it so that

A. it burns hotter

B. it weighs more

C. leaks can be detected by smell

D. it becomes a liquid

66. Ice cubes float in a glass of water because solid water (ice) is

A. denser than liquid water

B. heavier than liquid water

C. a different compound than water

D. less dense than liquid water

67. Passing electricity through water can break it down into two gases. This process produces hydrogen and

A. oxygen

B. nitrogen

C. carbon dioxide

D. chlorine

68. Placing a lid on a pot of water makes it boil faster because the lid

A. lowers the water's boiling point

B. traps heat and raises the temperature faster

C. adds energy to the water chemically

D. removes water from the pot

69. The classic "volcano" demonstration uses baking soda and vinegar to produce a foaming gas, which is

A. carbon dioxide

B. oxygen

C. hydrogen

D. helium

70. Sunscreen protects skin by absorbing or reflecting

A. visible light only

B. infrared heat only

C. ultraviolet radiation

D. radio waves

71. Tarnish on silver is a thin layer that forms when silver reacts with sulfur compounds in the air, which is

A. a physical change

B. melting

C. sublimation

D. a chemical change

72. An air conditioner cools a room because a refrigerant evaporates inside it, a process that

A. releases heat into the room

B. absorbs heat from the room

C. freezes the air

D. produces a flame

73. Chalk (calcium carbonate) fizzes when acid is poured on it because the reaction produces

A. carbon dioxide gas

B. oxygen gas

C. hydrogen gas

D. nitrogen gas

74. Water is often called the "universal solvent" because its polarity lets it dissolve

A. many ionic and polar substances

B. only nonpolar substances

C. only gases

D. nothing at all

75. A glow stick produces light without heat through a chemical reaction. This shows that a chemical reaction can release energy as

A. only heat

B. only sound

C. light

D. only electricity

76. Cooking an egg is an irreversible change, which indicates that it is a

A. physical change

B. phase change

C. change of state

D. chemical change

77. Frost forms on a cold window when water vapor in the air changes directly into ice, a process called

A. melting

B. deposition

C. evaporation

D. condensation

78. A vacuum-sealed food bag stays tightly collapsed because the air has been removed, so the outside air pressure

A. is lower than inside

B. presses the bag inward

C. has no effect

D. pulls the bag outward

79. Toast turning brown and giving off a burnt smell is evidence of a

A. physical change

B. phase change

C. change of state

D. chemical change

80. A metal spoon left in hot soup becomes hot to the touch because metals are good conductors of

A. electricity only

B. sound

C. heat

D. light

81. Desalination makes seawater drinkable by

A. adding more salt

B. freezing the salt

C. adding chlorine

D. removing the dissolved salt from the water

82. A candle burning under an upside-down jar goes out after a while because it uses up the

A. oxygen inside the jar

B. carbon dioxide inside the jar

C. nitrogen inside the jar

D. wax outside the jar

83. Aluminum does not corrode away like iron because it forms a thin protective layer of

A. aluminum oxide that shields the metal

B. pure aluminum gas

C. iron oxide

D. carbon

84. Pure water is classified as neutral because it has a pH of

A. 0

B. 7

C. 10

D. 14

85. Helium is used in airships and party balloons instead of hydrogen because, unlike hydrogen, helium is

A. denser than air

B. highly flammable

C. a metal

D. nonflammable and safe

Practice Exam 13 — Explained Answer Key

1. A — Dissolving salt lowers water's freezing point, so the ice melts at temperatures below 0 °C. The dissolved particles interfere with the formation of the solid ice structure. This freezing-point depression is why salt de-ices roads.
2. D — An antacid is a base that reacts with stomach acid to form a salt and water, a neutralization reaction. The base neutralizes the excess hydrogen ions. This raises the stomach's pH and relieves heartburn.
3. D — Lowering the temperature slows the rate of the spoilage reactions. Colder particles move and collide less often and with less energy. This is why refrigeration preserves food.
4. A — Helium floats because it is less dense than the surrounding air. A gas less dense than air experiences a buoyant force that lifts it. This buoyancy makes helium balloons rise.
5. B — Baking soda reacts with the acid in vinegar to release carbon dioxide gas, which forms the bubbles. The gas escapes from the liquid as foam. Carbon dioxide is the product responsible for the fizzing.
6. C — Increasing the pressure inside a pressure cooker raises the boiling point of water. The water can then reach a higher temperature before boiling, cooking food faster. Higher temperature speeds the cooking reactions.
7. B — Powdered sugar has a greater surface area than a cube of the same mass, so it dissolves faster. More exposed surface allows more contact with the liquid. Greater surface area increases the rate of dissolving.
8. B — A battery generates electricity through an oxidation-reduction reaction that transfers electrons. The flow of those electrons is the electric current. Redox reactions are the basis of all batteries.
9. C — A hand warmer releases heat to the surroundings, making it an exothermic process. The reaction gives off energy that warms your hands. Exothermic reactions transfer heat outward.
10. C — An instant cold pack absorbs heat from the surroundings, making it an endothermic process. Drawing in energy lowers the temperature of the pack. Endothermic processes cool their surroundings.
11. A — A blanket smothers a fire by cutting off the oxygen needed for combustion. Without oxygen, the burning reaction cannot continue. Removing any side of the fire triangle stops the fire.
12. B — Paint prevents rust by keeping oxygen and moisture away from the iron. Rusting requires both to react with the metal. The paint forms a protective barrier.
13. D — Higher temperature decreases the solubility of the dissolved gas, so the carbon dioxide escapes faster and the soda goes flat. Warm liquids hold less dissolved gas. The gas leaves the solution more quickly.
14. B — Yeast produces carbon dioxide gas during fermentation, which forms bubbles that make the dough rise. The trapped gas expands the dough. Carbon dioxide is the leavening gas.
15. B — Diamond's carbon atoms are held in a strong covalent network, giving it great hardness. Each carbon bonds tightly to four others in a rigid structure. This network makes diamond ideal for cutting.
16. C — Metals like copper conduct electricity well because of their mobile, delocalized electrons. These free electrons can carry an electric current. This is the basis of metallic conductivity.
17. D — Water dissolves salt because its polar molecules attract and surround the charged ions. The partial charges on water pull the ions apart and keep them in solution. This is how polar solvents dissolve ionic compounds.

18. D — Oil and water do not mix because "like dissolves like," and oil is nonpolar while water is polar. Unlike substances do not interact strongly enough to mix. The mismatch in polarity keeps them separate.
19. C — Fluoride strengthens tooth enamel, making it more resistant to decay. It hardens the enamel against acid attack from bacteria. This is why it is added to toothpaste and water.
20. B — The ozone layer protects living things by absorbing harmful ultraviolet radiation. This high-energy radiation can damage living cells. Ozone shields the surface from much of it.
21. C — Acid rain forms when sulfur dioxide reacts with atmospheric water, lowering the rain's pH. The dissolved gases produce acids. A lower pH makes the rain acidic and damaging.
22. A — Carbon monoxide is produced by the incomplete combustion of fuels when oxygen is limited. This colorless, odorless gas is dangerous to breathe. A detector warns of its buildup.
23. D — Zinc protects steel by corroding in place of the iron, acting as a sacrificial metal. Being more reactive, the zinc oxidizes first. This galvanizing keeps the iron from rusting.
24. B — Water boils at a lower temperature at high altitude because the atmospheric pressure is lower there. Less external pressure means less heat is needed to boil. Lower pressure lowers the boiling point.
25. C — A sliced apple browns when it reacts with oxygen in the air, an oxidation reaction. Lemon juice slows this by limiting the oxygen's effect. Oxygen is the reactant responsible for browning.
26. A — Sweat cools the body because evaporation absorbs heat from the skin. The escaping molecules carry energy away. This loss of heat lowers body temperature.
27. C — Soap cleans grease because one end of its molecules attaches to nonpolar grease while the other mixes with water. This lets water carry the grease away. The dual nature of soap makes it an effective cleaner.
28. C — A carbon dioxide extinguisher smothers a fire by displacing the oxygen around it. Without oxygen, combustion stops. The dense gas blankets the flames.
29. B — Cooling the gas in a balloon decreases its volume, so the balloon shrinks. Lower temperature reduces particle motion and the space they occupy. This follows Charles's law.
30. A — Heating the air in a tire increases its pressure, which can cause the tire to burst. Faster particles strike the walls more forcefully. Higher temperature raises gas pressure.
31. B — Baking powder releases carbon dioxide gas when heated, making cakes rise. The expanding gas creates air pockets in the batter. Carbon dioxide is the leavening gas.
32. C — Distillation separates alcohol from water because the two have different boiling points. Heating evaporates the lower-boiling liquid first, which is then collected. The difference in boiling points enables the separation.
33. C — Filtering separates sand from water because sand is an insoluble solid that does not dissolve. The filter traps the solid while the water passes through. Insolubility makes filtration possible.
34. B — Chlorine is added to pools to kill bacteria and disinfect the water. It destroys harmful microorganisms. This keeps the water safe for swimming.
35. D — Milk of magnesia has a pH above 7, which classifies it as a base. Bases relieve indigestion by neutralizing stomach acid. A pH above 7 indicates basic properties.
36. A — Bleach removes stains through an oxidation reaction that chemically changes the stain molecules. Oxidation breaks down the colored compounds. This makes the stains colorless.
37. B — Dry ice forms fog by changing directly from solid to gas, a process called sublimation. It bypasses the liquid state entirely. The cold gas condenses surrounding water vapor into visible fog.
38. B — Vinegar is a weak acid that reacts with and dissolves mineral deposits. The acid breaks down the basic mineral buildup. This is why vinegar cleans hard-water stains.

39. C — A thermos keeps drinks hot by reducing the transfer of heat. Its insulating design slows heat from escaping. Limiting heat flow maintains the temperature.
40. A — Nitrogen keeps chips fresh because it is unreactive and will not spoil the food. It displaces the oxygen that would cause the chips to go stale. Its inertness makes it a good packaging gas.
41. D — Gold is used in jewelry because it is very unreactive and resists corrosion. It does not tarnish or rust over time. This stability keeps gold shiny and valuable.
42. A — Water pipes burst in winter because water expands when it freezes. The ice takes up more volume than the liquid water. This expansion forces the pipes apart.
43. C — An ionization smoke detector uses a small amount of radioactive material to detect smoke. The radiation ionizes air, and smoke particles disrupt the resulting current. This triggers the alarm.
44. C — Neon signs glow when excited electrons fall back to lower energy levels and release light energy. The energy emitted appears as colored light. Each gas produces its own characteristic colors.
45. D — Stainless steel is an alloy of iron and chromium, which classifies it as a homogeneous mixture. Its components are evenly blended. The chromium gives it rust resistance.
46. A — Antifreeze works by lowering the freezing point and raising the boiling point of the coolant. This keeps it liquid in winter and prevents boiling in summer. Both effects are colligative properties.
47. D — A cold morning slows the chemical reactions in a car battery, making it harder to start. Lower temperature reduces the rate of the energy-producing reactions. This weakens the available current.
48. D — Powdered limestone is a base that neutralizes the acid in acidic lakes, raising the pH. The base reacts with and removes excess hydrogen ions. This restores a healthier water chemistry.
49. A — Laundry dries faster on a warm, windy day because heat and moving air increase the rate of evaporation. Warmth gives water molecules energy to escape, and wind carries them away. Both factors speed drying.
50. A — Greater water pressure deep underwater compresses the gas in a balloon into a smaller volume. Higher pressure squeezes the gas particles closer together. This follows Boyle's law.
51. B — The green patina on copper forms when the metal slowly reacts with air, a chemical change. New compounds form on the surface. The formation of a new substance signals a chemical change.
52. C — A water softener removes the calcium and magnesium ions that cause water hardness. These dissolved ions are exchanged for others. Removing them softens the water.
53. C — Fireworks produce color when heated metal compounds emit light as their electrons drop to lower energy levels. The released energy appears as colored light. Different metals give different colors.
54. B — A liquid thermometer works because the liquid expands when heated and contracts when cooled. The changing volume moves the liquid up or down the scale. This indicates the temperature.
55. D — Ammonia makes glass cleaner basic because it produces hydroxide ions in solution. A pH above 7 reflects this basic nature. The basic solution helps cut grease and grime.
56. D — A burning candle is a combustion reaction, in which the wax reacts with oxygen. The reaction releases heat and light. Combustion produces carbon dioxide and water.
57. A — Silica gel packets absorb moisture to keep packaged contents dry. The gel draws in water vapor that could cause damage or spoilage. This protects the product from humidity.
58. A — Sodium is stored under oil because it reacts vigorously with moisture and oxygen. The oil keeps air and water away from the reactive metal. This prevents dangerous reactions.

59. B — A rechargeable battery is reused because applying electricity reverses the chemical reaction inside it. This restores the original reactants. The battery can then discharge again.
60. A — In NaCl, sodium and chlorine are chemically combined into a new substance with new properties. The compound behaves differently from the reactive elements that form it. This is why table salt is safe to eat.
61. D — Carbon dioxide is a greenhouse gas because it traps heat near the Earth's surface. It absorbs and re-emits infrared energy. This warming effect drives climate concerns.
62. D — Opening a soda lowers the pressure, allowing dissolved gas to escape from the solution. At lower pressure, less gas stays dissolved. The escaping carbon dioxide produces the fizz.
63. A — Sulfuric acid in a car battery gives it a pH below 7, classifying it as acidic. Acids have low pH values. This strong acid enables the battery's reactions.
64. C — Crushing a hard candy increases the surface area exposed to saliva, so it dissolves faster. More surface allows more contact with the liquid. Greater surface area speeds dissolving.
65. C — A smelly compound is added to odorless natural gas so leaks can be detected by smell. This provides a safety warning. The added odor alerts people to dangerous leaks.
66. D — Ice floats because solid water is less dense than liquid water. Water expands as it freezes, lowering its density. The less dense ice rises to the surface.
67. A — Electrolysis of water breaks it into hydrogen and oxygen gas. Electrical energy splits the water molecules. The two gases form in a 2-to-1 ratio.
68. B — A lid makes water boil faster because it traps heat and raises the temperature more quickly. Less heat escapes to the surroundings. The retained energy speeds the heating.
69. A — The baking-soda-and-vinegar "volcano" produces carbon dioxide, the foaming gas. The acid-base reaction releases this gas. Carbon dioxide creates the bubbling eruption.
70. C — Sunscreen protects skin by absorbing or reflecting ultraviolet radiation. This high-energy radiation causes sunburn and skin damage. Blocking it shields the skin.
71. D — Tarnish forms when silver reacts with sulfur compounds in the air, a chemical change. A new compound forms on the surface. The formation of a new substance marks a chemical change.
72. B — An air conditioner cools a room because the evaporating refrigerant absorbs heat from the room. The heat is then carried away and released outside. This evaporative process removes heat from the indoor air.
73. A — Chalk fizzes in acid because calcium carbonate reacts to produce carbon dioxide gas. The escaping gas causes the bubbling. Carbon dioxide is the product of this acid reaction.
74. A — Water is the "universal solvent" because its polarity lets it dissolve many ionic and polar substances. The partial charges interact with charged or polar particles. This broad dissolving ability gives water its nickname.
75. C — A glow stick shows that a chemical reaction can release energy as light. The reaction produces light without significant heat. This is an example of chemiluminescence.
76. D — Cooking an egg is an irreversible change, indicating a chemical change. New substances form that cannot return to the original. Irreversibility is a sign of a chemical change.
77. B — Frost forms when water vapor changes directly into ice, a process called deposition. The gas becomes a solid without passing through the liquid state. Deposition is the reverse of sublimation.
78. B — A vacuum-sealed bag stays collapsed because the outside air pressure presses the bag inward. With the air removed, nothing inside pushes back. The external pressure holds the bag tight.
79. D — Browning and a burnt smell from toast are evidence of a chemical change. New substances with new properties have formed. These signs indicate a chemical reaction.

80. C — A metal spoon heats up in soup because metals are good conductors of heat. The energy travels quickly through the metal to the handle. This conductivity makes the spoon feel hot.
81. D — Desalination makes seawater drinkable by removing the dissolved salt. Separating the salt leaves fresh water behind. This process provides usable water from the sea.
82. A — A candle under a jar goes out because it uses up the oxygen inside. Without oxygen, combustion cannot continue. The flame dies once the oxygen is consumed.
83. A — Aluminum resists corrosion because it forms a thin protective layer of aluminum oxide. This layer shields the metal underneath from further reaction. The barrier keeps aluminum from corroding away like iron.
84. B — Pure water is neutral because it has a pH of 7, the midpoint of the scale. Its hydrogen and hydroxide ion concentrations are equal. A pH of 7 defines a neutral substance.
85. D — Helium is used instead of hydrogen because it is nonflammable and safe. Unlike flammable hydrogen, helium will not catch fire. Its safety makes it ideal for balloons and airships.