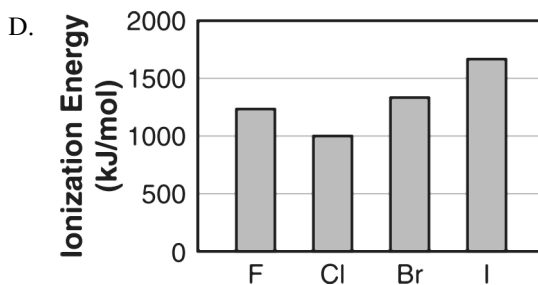
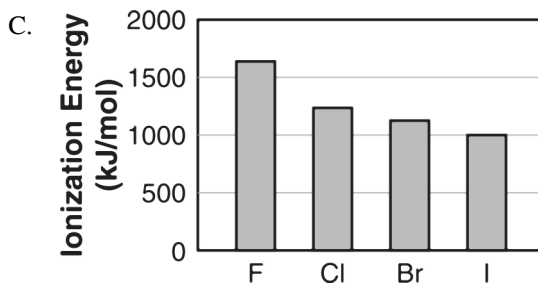
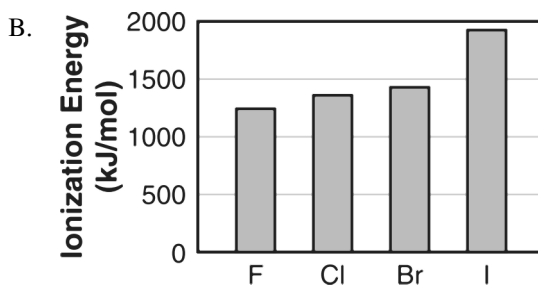
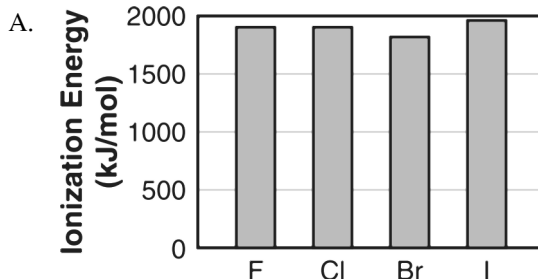


8. Which orbital notation shows the lowest energy arrangement of valence electrons for $1s^2 2s^2 2p^3$?

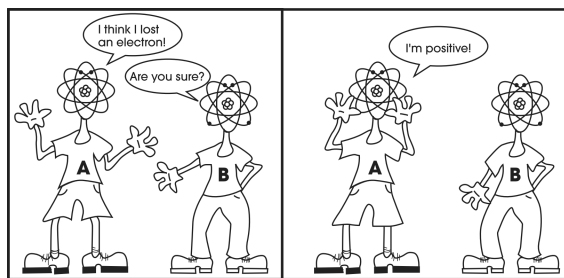
- A. $2s \uparrow \downarrow$
- B. $2s \uparrow \downarrow \quad 2p \uparrow \downarrow \quad \uparrow \quad _$
- C. $2s \uparrow \downarrow \quad 2p \uparrow \quad \downarrow \quad \uparrow$
- D. $2s \uparrow \downarrow \quad 2p \uparrow \quad \uparrow \quad \uparrow$

9. Ionization energy is the energy required to remove electrons from atoms. Fluorine (F), chlorine (Cl), bromine (Br), and iodine (I) are found in the halogen family in the periodic table.

Which graph shows the correct trend for the first ionization energy of these four elements?



10. Use the cartoon to answer the following question.



Explain the response of atom A in terms of protons and electrons. Describe how protons and electrons affect charge.

11. Use the Periodic Table of the Elements to answer the question. Which element is least likely to give away electrons?

- A. fluorine B. lithium
C. carbon D. neon

12. In which block does an element with the electron configuration $[\text{Xe}] 6s^2 4f^{14} 5d^{10} 6p^1$ belong?

- A. *s* block B. *p* block
C. *d* block D. *f* block

13. Element X reacts with potassium (K) to produce the compound K_2X . The table below shows the number of valence electrons in four elements.

**Valence Electrons
in Four Elements**

Element	Number of Valence Electrons
Hydrogen (H)	1
Nitrogen (N)	5
Oxygen (O)	6
Fluorine (F)	7

Which element listed in the table is *most likely* element X?

- A. hydrogen B. nitrogen
C. oxygen D. fluorine

14. Your teacher gives you a list of compounds to classify based on their type of chemical bonding. Which substance should you classify as *ionic*?

- A. H_2O B. CO_2 C. HCl D. NaCl

15. What is the percent by mass of iron in the compound Fe_2O_3 ?

- A. 70% B. 56% C. 48% D. 30%

16. What is the formula for iron(III) oxide?

- A. FeO_3 B. Fe_3O C. Fe_2O_3 D. FeO

17. What is the shape of a molecule which has two shared pairs of electrons and no unshared pairs?

- A. tetrahedral B. bent
C. trigonal planar D. linear

18. If two oxygen atoms combine to make a molecule, what type of bond will they form?

- A. an ionic bond
B. a hydrogen bond
C. a double covalent bond
D. a metallic bond

19. What is the correct chemical formula for sodium sulfate?

- A. NaSO_4 B. Na_2SO_4
C. $\text{Na}(\text{SO}_4)_2$ D. $\text{Na}_2(\text{SO}_4)_2$

20. Which compound contains both covalent and ionic bonds?

- A. CaCO_3 B. CO_2
C. H_2O D. NaCl

21. Based on the VSEPR theory, what is the molecular geometry of CO_2 ?

- A. linear B. tetrahedral
 C. trigonal planar D. trigonal pyramidal

22.

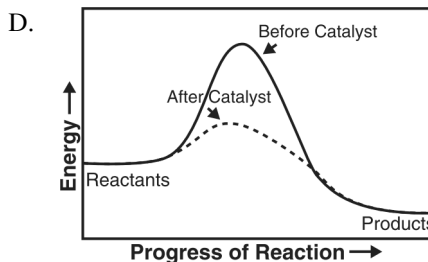
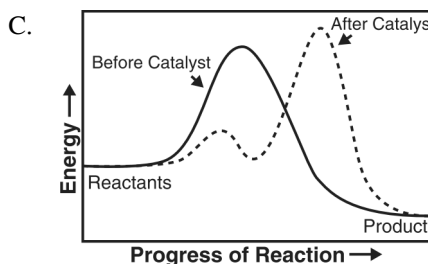
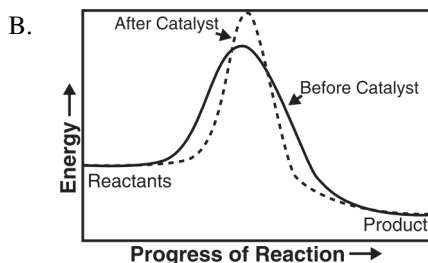
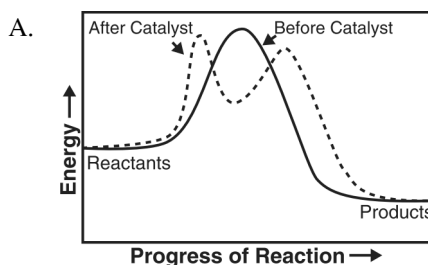
Comparison of Two Bond Types

Bond Type X	Bond Type Y
makes compounds	makes molecules
transfers, gives/takes electrons resulting in a noble configuration	shares electrons resulting in a noble configuration
made with metals and nonmetals	made of nonmetals
examples: NaCl, CaCl_2	examples: H_2O , CO_2 , NH_3 , CH_4

Which of these correctly identifies the bond types?

- A. X is ionic. Y is covalent.
 B. X is ionic. Y is hydrogen.
 C. X is covalent. Y is ionic.
 D. X is hydrogen. Y is covalent.

23. Which reaction diagram shows the effect of using the appropriate catalyst in a chemical reaction?



24. Which of the following best describes the mass of the iron oxide that is produced during a chemical reaction when a fixed amount of iron combines completely with a fixed amount of oxygen?

- A. equal to the mass of the iron plus the mass of the oxygen
 B. greater than the combined mass of the iron and the oxygen
 C. equal to the mass of the iron minus the mass of the oxygen
 D. less than the mass of the iron but greater than the mass of the oxygen

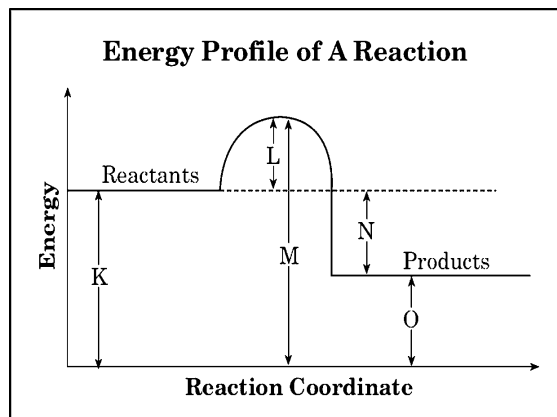
25. When methane (CH₄) is burned in the presence of oxygen (O₂), the two chemicals react together in a process called combustion.

Which of these compounds could be a possible product of this combustion reaction?

- A. NH₃ B. SO₂ C. H₂O D. CS₂
26. When silver nitrate solution is added to salt water, a reaction occurs and a milky white precipitate forms. Which statement correctly describes how the rate of this reaction can be influenced?

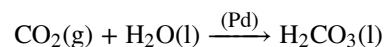
- A. An increase in the temperature of the salt water will increase the frequency and energy of collisions.
- B. A decrease in the temperature of the silver nitrate will increase the frequency and energy of collisions.
- C. An increase in the volume of salt water will increase the frequency and energy of collisions.
- D. A decrease in the volume of silver nitrate will increase the frequency and energy of collisions.

27. Use the graph below to answer the following question(s).



In the graph, which of the following is represented by the letter L?

- A. reaction heat
- B. progress of reaction
- C. catalytic effect
- D. activation energy
28. Which chemical equation is balanced?
- A. $\text{LiOH} + \text{CO}_2 \rightarrow \text{Li}_2\text{CO}_3 + \text{H}_2\text{O}$
- B. $2\text{LiOH} + \text{CO}_2 \rightarrow \text{Li}_2\text{CO}_3 + \text{H}_2\text{O}$
- C. $\text{LiOH} + 3\text{CO}_2 \rightarrow 2\text{Li}_2\text{CO}_3 + \text{H}_2\text{O}$
- D. $4\text{LiOH} + \text{CO}_2 \rightarrow \text{Li}_2\text{CO}_3 + 2\text{H}_2\text{O}$
29. This balanced equation represents a chemical reaction using palladium, Pd, as a catalyst.



Without palladium the reaction is slow and produces low concentrations of product. How does the palladium increase the speed of the reaction?

- A. The palladium reacts with the water.
- B. The palladium lowers the activation energy.
- C. The palladium purifies the carbon dioxide.
- D. The palladium increases the reaction temperature.

30. The table below shows the pH and reaction to litmus of four body fluids.

Body Fluid	pH	red litmus	blue litmus
Blood	7.4	turns blue	no change
Bile	8.2	turns blue	no change
Saliva	6.8	no change	turns red
Gastric Juice	1.7	no change	turns red

These data indicate that gastric juice is

- A. very acidic. B. very basic.
 C. positively charged. D. negatively charged.
31. A water sample was found to have a pH of 6 at 25°C. What is the hydroxide concentration in the water sample?
- A. $1 \times 10^{-8}M$ B. $6 \times 10^{-8}M$
 C. $1 \times 10^{-6}M$ D. $6 \times 10^{-6}M$
32. Lemon juice has a pH of 2.3.

Which word *best* describes lemon juice based on the pH?

- A. acid B. base
 C. neutral D. salt

33. This chart shows the effects of several solutions on litmus paper.

Solutions and Their Effects on Litmus Paper

Solution	Effect on Blue Litmus	Effect on Red Litmus
1	None	Turns Blue
2	None	Turns Blue
3	None	None
4	Turns Red	None
5	None	Turns Blue
6	None	None
7	Turns Red	None

Which solutions are *most likely* acids?

- A. Solutions 1 and 3 B. Solutions 2 and 5
 C. Solutions 3 and 6 D. Solutions 4 and 7
34. Bee venom contains acids and other compounds that cause the pain and itching from a bee sting. Calamine lotion, which is a mild base, helps relieve the symptoms. Which best explains how the calamine lotion relieves a bee sting?
- A. The calamine lotion hydrates the skin around the bee sting.
 B. The calamine lotion neutralizes the acids in the bee venom.
 C. The calamine lotion decreases the pH of the bee venom.
 D. The calamine lotion repairs the cells damaged by the bee sting.

35. The table below shows pH values of some foods.

pH Values of Some Important Foods

Vegetables	pH	Citrus	pH	Dairy/Egg	pH	Starches	pH
Asparagus	5.6	Grapefruit	3.2	Butter	6.2	Bread (white)	5.5
Beans	5.5	Lemons	2.3	Cheese	5.6	Corn	6.2
Peas	6.1	Limes	1.9	Eggs (fresh)	7.8	Crackers	7.5
Spinach	5.4	Oranges	3.5	Milk	6.5	Potatoes	5.8

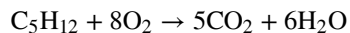
A patient has chronic indigestion due to an overproduction of stomach acid. Which foods should the patient avoid until the condition is resolved?

- A. vegetables B. citrus
 C. dairy/egg D. starches

36. Which equation represents a neutralization (acid-base) reaction?

- A. $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$
- B. $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
- C. $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- D. $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$

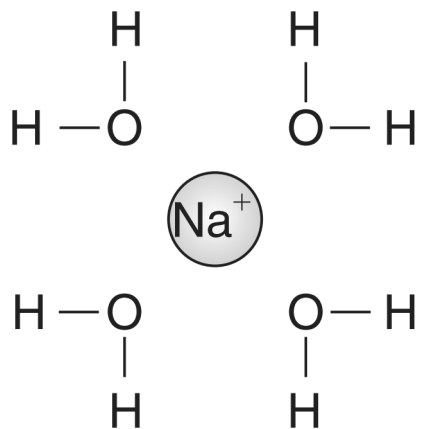
37. A balanced chemical reaction is shown below.



If 3 moles of C_5H_{12} are reacted completely, how many moles of water are formed?

- A. 3
- B. 6
- C. 12
- D. 18

38. The diagram below represents a sodium ion surrounded by several water molecules.

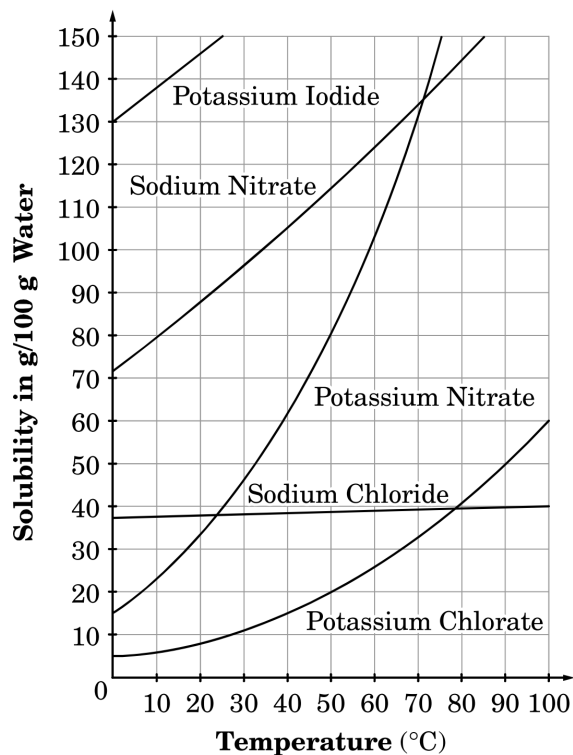


This diagram can be used to represent which of the following?

- A. how sodium ions dissolve in water
- B. how sodium is neutralized by water
- C. how sodium metal makes bubbles in water
- D. how sodium ions precipitate out as a solid in aqueous solution

39. Using the solubility graph provided, a student performs an experiment to find the solubility of a substance. The student finds the amount of substance needed to make a saturated solution in 100 g of water at different temperatures. The student's data are shown in the table below the graph.

Solubility Graph



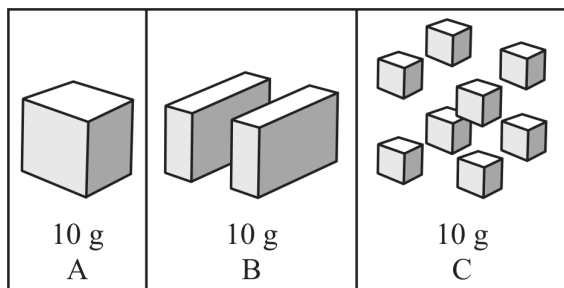
Student Data

Trial	Temperature (°C) of Water	Salt in 100 g of water (g)
1	25	40
2	68	126

What is the identity of the substance?

- A. Sodium Nitrate
- B. Potassium Nitrate
- C. Sodium Chloride
- D. Potassium Chlorate

40. Three 10 g samples of sugar are represented below.



Sample A dissolves in water more slowly than sample B. Sample B dissolves more slowly than sample C. Which of the following best explains why sample A dissolves most slowly?

- A. It has the most volume.
- B. It has the smallest surface area.
- C. It has the largest number of sugar molecules.
- D. It has the fewest bonds between sugar molecules.
41. Which of the following solutions has the highest concentration of solute?
- A. 1.0 mol solute in 200 mL solvent
- B. 2.0 mol solute in 500 mL solvent
- C. 3.0 mol solute in 1 L solvent
- D. 4.0 mol solute in 1.5 L solvent
42. How does ice cool a warm drink?
- A. Cold flows from the ice to the drink.
- B. Heat flows from the ice to the drink.
- C. Cold flows from the drink to the ice.
- D. Heat flows from the drink to the ice.
43. A student has a beaker containing 55 g of water at 100°C. How much heat is needed to convert the water to steam?
- A. 120,000 J B. 18,000 J
- C. 2,200 J D. 330 J

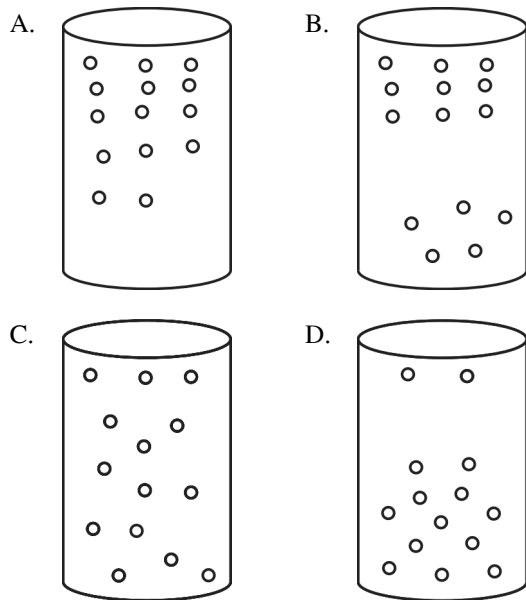
44. An 18.0-g piece of an unidentified metal was heated from 21.5°C to 89.0°C. If 292 J of heat energy was absorbed by the metal in the heating process, what was the identity of the metal?

Specific Heat Table

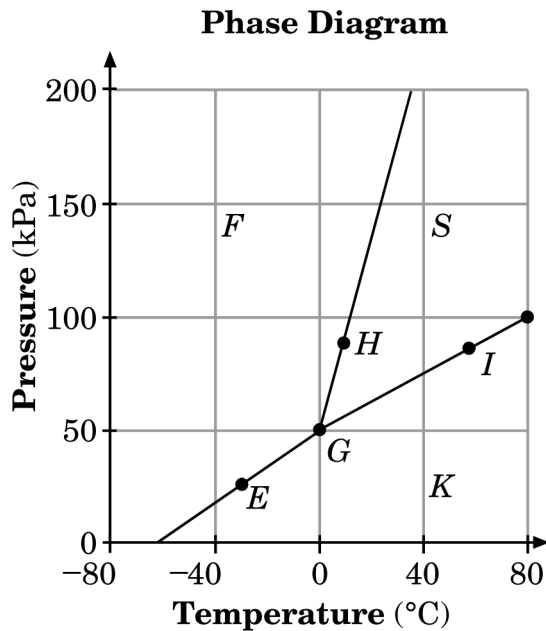
Substance	Specific Heat
Aluminum	0.90 J/g · °C
Calcium	0.65 J/g · °C
Copper	0.39 J/g · °C
Gold	0.13 J/g · °C
Iron	0.46 J/g · °C
Mercury	0.14 J/g · °C
Silver	0.24 J/g · °C

- A. calcium B. copper
- C. iron D. silver
45. Which statement *correctly* describes both gases and liquids?
- A. Their shapes stay the same in any container.
- B. Their shapes change when they are in different containers.
- C. Their volumes stay the same in any container.
- D. Their volumes change when they are in different containers.

46. Nitrogen molecules within a glass tube are allowed to move randomly. Which figure shows the molecules in a state of greatest entropy?



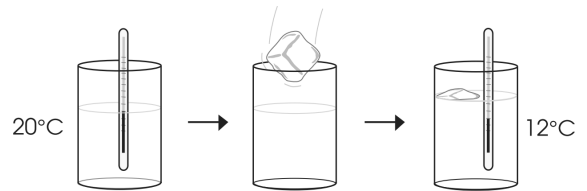
47. This graph represents a phase diagram for a substance.



What is the state of the substance at point *I*?

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

48. A student has a glass of water as shown. She takes an ice cube from the freezer. She puts the ice cube into the water.

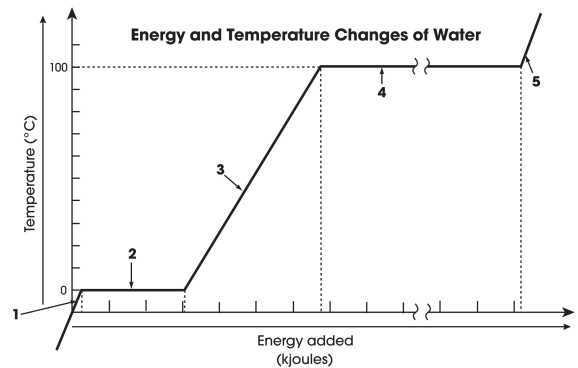


Which explains the change that happens?

- A. The ice cube melts because cold flows out of the ice cube to the water.
- B. The ice cube does not melt because cold flows into the ice cube from the water.
- C. The ice cube melts because thermal energy transfers to the ice cube from the water.
- D. The ice cube does not melt because thermal energy transfers from the ice cube to the water.

49. Use the information below to answer the following question.

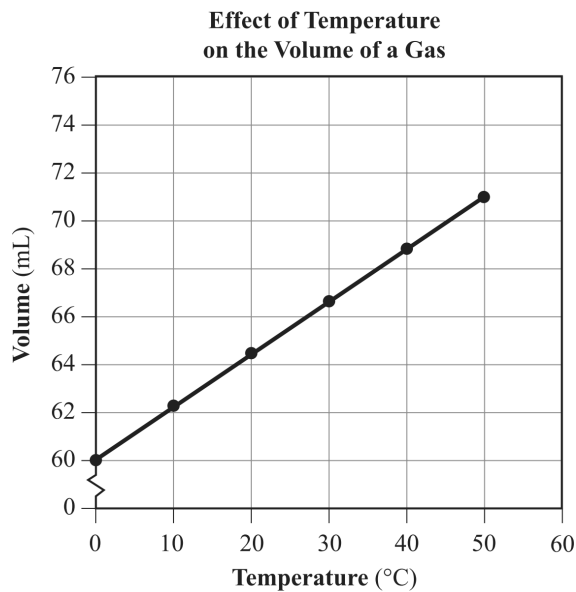
The following graph shows the change in temperature of a sample of H₂O, which begins as ice, as thermal energy is added.



Which region of the graph represents water H₂O in the liquid form only?

- A. 1
- B. 2
- C. 3
- D. 4

50. The graph below shows the effect of temperature on the volume of a gas.



Which generalization can be made about the relationship between the temperature and volume of a gas?

- A. As the temperature of a gas decreases, its volume increases.
- B. As the temperature of a gas decreases, its volume stays the same.
- C. As the temperature of a gas increases, its volume increases.
- D. As the temperature of a gas increases, its volume stays the same.
51. What happens to the pressure of a constant mass of gas at constant temperature when the volume is doubled?
- A. The pressure is doubled.
- B. The pressure remains the same.
- C. The pressure is reduced by $\frac{1}{2}$.
- D. The pressure is reduced by $\frac{1}{4}$.

52. The total pressure in a closed vessel containing N_2 , O_2 and CO_2 is 30 atm. If the partial pressure of N_2 is 4 atm, and the partial pressure of O_2 is 6 atm, what is the partial pressure of CO_2 ?

- A. 20 atm B. 30 atm
C. 40 atm D. 50 atm

53. What is the volume of two moles of hydrogen gas at STP?

- A. 44.8L B. 22.4L C. 11.2L D. 2.00L

54. An ideal gas is confined to a 10.0-L balloon at STP. What is the new volume of the balloon when it is placed under 800. mmHg at $100^\circ C$?

- A. 14.4L B. 13.0L C. 7.70L D. 7.00L

55. Which is an electron configuration of a fluorine atom in the excited state?

- A. $1s^2 2s^2 2p^4$ B. $1s^2 2s^2 2p^5$
C. $1s^2 2s^2 2p^4 3s^1$ D. $1s^2 2s^2 2p^5 3s^1$

56. As an electron in an atom moves from the ground state to an excited state, the potential energy of the electron

- A. decreases B. increases
C. remains the same

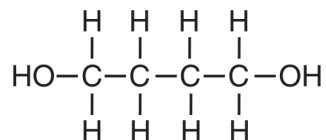
57. A compound contains 40% calcium, 12% carbon, and 48% oxygen by mass. What is the empirical formula of this compound?

- A. $CaCO_3$ B. CaC_2O_4
C. CaC_3O_6 D. $CaCO_2$

58. Which pair of formulas represents the empirical formula and the molecular formula of a compound?

- A. CH_2O , $C_4H_6O_4$ B. CHO , $C_6H_{12}O_6$
C. CH_4 , C_5H_{12} D. CH_2 , C_3H_6

59. Given the structural formula:



What is the empirical formula of this compound?

A. CH_3O B. $\text{C}_2\text{H}_5\text{O}$

C. $\text{C}_4\text{H}_{10}\text{O}_2$ D. $\text{C}_8\text{H}_{20}\text{O}_4$

60. Base your answer(s) to the following question(s) on the information below.

Naphthalene, a nonpolar substance that sublimates at room temperature, can be used to protect wool clothing from being eaten by moths.

The empirical formula for naphthalene is C_5H_4 and the molecular mass of naphthalene is 128 grams/mole. What is the molecular formula for naphthalene?

61. Which is a molecular substance?

A. CO_2 B. CaO

C. KCl D. KClO_3

62. What is the gram formula mass of $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$?

A. 106 g B. 142 g C. 266 g D. 286 g

63. What is the chemical formula for zinc carbonate?

A. ZnCO_3 B. $\text{Zn}(\text{CO}_3)_2$

C. Zn_2CO_3 D. Zn_3CO_2

64. The bond between which two atoms is most polar?

A. Br and Cl B. Br and F

C. I and Cl D. I and F

65. When $\text{NaCl}(\text{s})$ is dissolved in $\text{H}_2\text{O}(\ell)$, the sodium ion is attracted to the water's molecule's

A. negative end, which is hydrogen

B. negative end, which is oxygen

C. positive end, which is hydrogen

D. positive end, which is oxygen

66. The attraction which exists between carbon dioxide molecules in solid carbon dioxide is due to

A. van der Waals forces

B. molecule-ion forces

C. ionic bonds

D. hydrogen bonds

67. The forces of attraction that exist between nonpolar molecules are called

A. van der Waals B. ionic

C. covalent D. electrovalent

68. Given the reaction at equilibrium:



The equilibrium will shift to the right when the

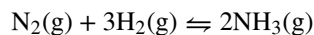
A. pressure is decreased

B. temperature is increased

C. concentration of $\text{A}(\text{g})$ is decreased

D. concentration of $\text{C}(\text{g})$ is increased

69. Given the reaction at equilibrium:



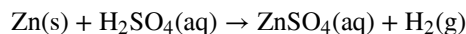
The correct equilibrium expression for this reaction is

- A. $K_{eq} = \frac{[\text{NH}_3]^2}{[\text{N}_2][\text{H}_2]}$ B. $K_{eq} = \frac{[\text{N}_2][\text{H}_2]}{[\text{NH}_3]^2}$
C. $K_{eq} = \frac{[\text{N}_2][\text{H}_2]}{[\text{NH}_3]}$ D. $K_{eq} = \frac{[\text{NH}_3]^2}{[\text{N}_2][\text{H}_2]^3}$

70. Which compound is a nonelectrolyte?

- A. KOH B. HNO₃
C. CaCl₂ D. C₁₂H₂₂O₁₁

71. Given the balanced equation representing a reaction:



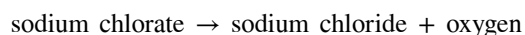
Which type of reaction is represented by this equation?

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

72. Which type of reaction will produce water and a salt?

- A. saponification B. fermentation
C. esterification D. neutralization

73. Given the word equation:



Which type of chemical reaction is represented by this equation?

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

74. Which sample is most likely to take the shape and total volume of its container?

- A. CO₂(g) B. CO₂(l)
C. CO₂(aq) D. CO₂(s)

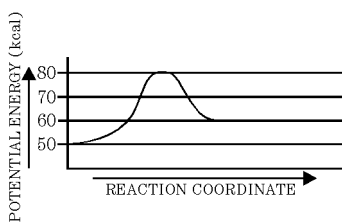
75. Elements that readily gain electrons tend to have

- A. high ionization energy and high electronegativity
B. high ionization energy and low electronegativity
C. low ionization energy and low electronegativity
D. low ionization energy and high electronegativity

76. Which element has the highest first ionization energy?

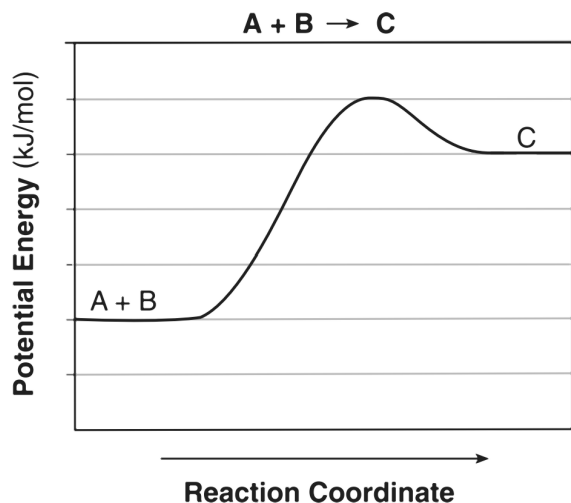
- A. sodium B. aluminum
C. calcium D. phosphorus

77. The potential energy diagram of a chemical reaction is shown. What is the minimum amount of energy required to initiate the forward reaction?



- A. 30 kcal B. 50 kcal
C. 60 kcal D. 80 kcal

78. Given the equation and potential energy diagram representing a reaction:



If each interval on the axis labeled "Potential Energy (kJ/mol)" represents 10 kJ/mol, what is the heat of reaction?

- A. +60 kJ/mol B. +20 kJ/mol
 C. +30 kJ/mol D. +40 kJ/mol
79. What is the correct name of the compound with the formula NH_4NO_2 ?
- A. ammonia nitrite B. ammonium nitrite
 C. ammonia nitrate D. ammonium nitrate
80. Which formula represents lead (II) phosphate?
- A. PbPO_4 B. Pb_4PO_4
 C. $\text{Pb}_3(\text{PO}_4)_2$ D. $\text{Pb}_2(\text{PO}_4)_3$
81. An atom in the ground state contains three electrons in its outermost principal energy level. This is an atom of an element found in Group
- A. IA B. IIB C. IIIA D. IIIB

82. As the elements are considered from the top to the bottom of Group VA, which sequence in properties occurs?

- A. metal \rightarrow metalloid \rightarrow nonmetal
 B. metal \rightarrow nonmetal \rightarrow metalloid
 C. metalloid \rightarrow metal \rightarrow nonmetal
 D. nonmetal \rightarrow metalloid \rightarrow metal

83. Which element has chemical properties that are most similar to the chemical properties of fluorine?

- A. boron B. chlorine
 C. neon D. oxygen

84. An atom of an element has 28 innermost electrons and 7 outermost electrons. In which period of the Periodic Table is this element located?

- A. 5 B. 2 C. 3 D. 4

85. The relatively high boiling point of water is primarily due to the presence of

- A. hydrogen bonds
 B. van der Waals forces
 C. molecule-ion attractions
 D. ion-ion attractions

86. The strongest forces of attraction occur between molecules of

- A. HCl B. HF C. HBr D. HI

87. What is the correct Lewis electron-dot structure for the compound magnesium fluoride?

- A. $\text{Mg} : \ddot{\text{F}} :$ B. $\text{Mg}^+ \left[\ddot{\text{F}} : \right]^-$
 C. $\left[\ddot{\text{F}} : \right]^- \text{Mg}^{2+} \left[\ddot{\text{F}} : \right]^-$ D. $:\ddot{\text{F}} : \text{Mg} : \ddot{\text{F}} :$

Final Exam Review 12/23/2013

- | | |
|--|-----------------------|
| 1.
Answer: C | 18.
Answer: C |
| 2.
Answer: A | 19.
Answer: B |
| 3.
Answer: B | 20.
Answer: A |
| 4.
Answer: A | 21.
Answer: A |
| 5.
Answer: C | 22.
Answer: A |
| 6.
Answer: D | 23.
Answer: D |
| 7.
Answer: B | 24.
Answer: A |
| 8.
Answer: D | 25.
Answer: C |
| 9.
Answer: C | 26.
Answer: A |
| 10.
Answer: If an atom loses an electron it no longer
has an equal number of electrons and
protons OR the atom has one more proton
than electrons.
AND
The atom will have a resulting positive
charge. | 27.
Answer: D |
| 11.
Answer: D | 28.
Answer: B |
| 12.
Answer: B | 29.
Answer: B |
| 13.
Answer: C | 30.
Answer: A |
| 14.
Answer: D | 31.
Answer: A |
| 15.
Answer: A | 32.
Answer: A |
| 16.
Answer: C | 33.
Answer: D |
| 17.
Answer: D | 34.
Answer: B |
| | 35.
Answer: B |
| | 36.
Answer: C |
| | 37.
Answer: D |
| | 38.
Answer: A |

39.
Answer: B

40.
Answer: B

41.
Answer: A

42.
Answer:

43.
Answer: A

44.
Answer: D

45.
Answer: B

46.
Answer: C

47.
Answer: C

48.
Answer: C

49.
Answer: C

50.
Answer: C

51.
Answer: C

52.
Answer: A

53.
Answer: A

54.
Answer: B

55.
Answer: C

56.
Answer: B

57.
Answer: A

58.
Answer: D

59.
Answer: B

60.
Answer: $C_{10}H_8$

61.
Answer: A

62.
Answer: D

63.
Answer: A

64.
Answer: D

65.
Answer: B

66.
Answer: A

67.
Answer: A

68.
Answer: B

69.
Answer: D

70.
Answer: D

71.
Answer: C

72.
Answer: D

73.
Answer: C

74.
Answer: A

75.
Answer: A

76.
Answer: D

77.
Answer: A

78.
Answer: C

79.
Answer: B

80.
Answer: C

81.
Answer: C

82.
Answer: D

83.
Answer: B

84.
Answer: D

85.
Answer: A

86.
Answer: B

87.
Answer: C