

Scientific Inquiry Analysis Teacher: _____

Chem I Summer Assignment**Multiple Choice***Identify the choice that best completes the statement or answers the question.*

- _____ 1. These three solid blocks are made of the same material and have the exact same dimensions. Which block has the greatest mass?
- A) Block A
B) Block B
C) Block C
D) They all have the same mass

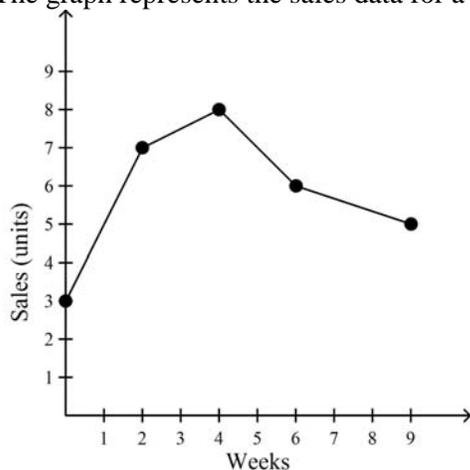
A student conducts an experiment to determine the effect of adding salt on the boiling temperature of water. The results are shown below.

Sample	Amount of Salt	Boiling Temperature
Sample 1	0 g	100.0° C
Sample 2	2 g	102.3° C
Sample 3	5 g	104.8° C
Sample 4	10 g	107.5° C

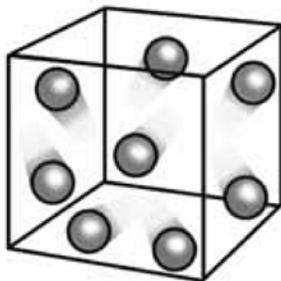
- _____ 2. Which is the independent variable in this experiment?
- A) Amount of salt added
B) Volume of water
C) Boiling temperature
D) Time required for water to boil
- _____ 3. Which is the dependent variable in this experiment?
- A) Amount of salt added
B) Volume of water
C) Boiling temperature
D) Time required for water to boil
- _____ 4. Which is a value that should remain constant for all samples in this experiment?
- A) Amount of salt added
B) Volume of water
C) Boiling temperature
D) Time required for water to boil
- _____ 5. Which is a reasonable hypothesis for this experiment?
- A) If salt is added to water, the water will boil at a higher temperature
B) Salt makes water boil
C) If water is boiling, it must have salt added to it
D) If salt is added to water, the water will get cloudy

ID: A

- ___ 10. The graph represents the sales data for a particular product. In which week were 8 units sold?



- A) 3rd week
B) 4th week
C) 6th week
D) 9th week
- ___ 11. The product of 2×10^4 cm and 4×10^{-12} cm, expressed in scientific notation is ____.
- A) 8×10^{-7} cm
B) 6×10^{-8} cm
C) 8×10^{-8} cm
D) 8×10^{-48} cm
- ___ 12. Which is the state of matter that has a definite shape and definite volume?
- A) solid
B) liquid
C) gas
D) plasma
- ___ 13. Which is the state of matter that has an indefinite shape and definite volume?
- A) solid
B) liquid
C) gas
D) plasma
- ___ 14. Which is the state of matter shown in this figure?



- A) solid
B) liquid
C) gas
D) plasma
- ___ 15. Which is an extensive physical property?
- A) color
B) length
C) density
D) boiling point
- ___ 16. Which is the state change in which a solid becomes a liquid?
- A) liquefaction
B) melting
C) condensation
D) sublimation

ID: A

- ___ 27. Which one of the following statements is correct?
A) Pure substances may be separated by filtration or distillation into at least two components.
B) A heterogeneous mixture is also known as a solution.
C) A heterogeneous mixture is composed of two or more substances in the same phase.
D) The composition is uniform throughout a homogeneous mixture.
- ___ 28. Which one of the following is most likely to be a homogeneous mixture?
A) mortar (a mixture of calcium carbonate and sand)
B) ground beef
C) the air trapped inside an inflated balloon
D) chocolate chip cookies
- ___ 29. What is the correct symbol for silicon?
A) S B) Sc C) Si D) Sm
- ___ 30. What is the name of the element with the symbol Br?
A) bromine B) boron C) bismuth D) beryllium
- ___ 31. A pure substance composed of two or more different elements is
A) an ion. C) a chemical compound.
B) a homogeneous mixture. D) a solid.
- ___ 32. A(n) ___ is a pure substance that is composed of only one type of atom.
A) ion C) element
B) homogeneous mixture D) chemical bond
- ___ 33. Which term best describes hydrogen peroxide, H_2O_2 ?
A) homogeneous mixture C) element
B) heterogeneous mixture D) chemical compound
- ___ 34. All of the following are physical properties EXCEPT
A) the viscosity of motor oil. C) the boiling point of water.
B) the rusting of iron. D) the melting point of gold.
- ___ 35. An intensive property of a substance is
A) independent of the amount present.
B) dependent on its volume, but not its mass.
C) not affected by its temperature.
D) dependent only on its temperature.
- ___ 36. Which of the following are extensive properties: mass, volume, and/or density?
A) mass only C) density only
B) volume only D) mass and volume
- ___ 37. The density of ice at $0\text{ }^\circ\text{C}$ is 0.917 g/mL . What is the volume of 225 g of ice?
A) 245 mL B) 0.00407 mL C) 18.7 mL D) 226 mL

ID: A

- ___ 38. Which of the following observations is/are examples of chemical change?
1. Sodium chloride melts at $801\text{ }^{\circ}\text{C}$.
 2. The density of water decreases when it changes from a liquid to a solid.
 3. The combustion of propane gas yields carbon dioxide and water.
- A) 1 only
B) 2 only
C) 3 only
D) 1 and 2

- ___ 39. Two electronic balances are tested using a standard weight. The true mass of the standard is 2.5000 g. The results of 5 individual measurements on each balance are recorded below.

	Balance A	Balance B
	2.4999 g	2.7022 g
	2.5003 g	2.5113 g
	2.5000 g	2.4940 g
	2.4998 g	2.2781 g
	<u>2.5002 g</u>	<u>2.5145 g</u>
average mass =	2.5000 g	2.5000 g

Which statement best describes the results?

- A) A: poor precision, good accuracy. B: good precision, good accuracy.
B) A: good precision, good accuracy. B: poor precision, good accuracy.
C) A: good precision, good accuracy. B: good precision, poor accuracy.
D) A: poor precision, good accuracy. B: good precision, poor accuracy.
E) A: good precision, poor accuracy. B: poor precision, good accuracy.
- ___ 40. Express 0.08010 in exponential notation.
A) 8.01×10^{-2} B) 8.01×10^2 C) 8.010×10^{-2} D) 8×10^{-2}
- ___ 41. Express 2.030×10^{-3} in standard notation.
A) 0.002030 B) 0.00203 C) 203000 D) 0.0203
- ___ 42. The wavelength of light emitted from a particular red diode laser is 6.72×10^{-7} m. What is the wavelength in nanometers?
A) 0.672 nm B) 6.72 nm C) 67.2 nm D) 672 nm

ID: A

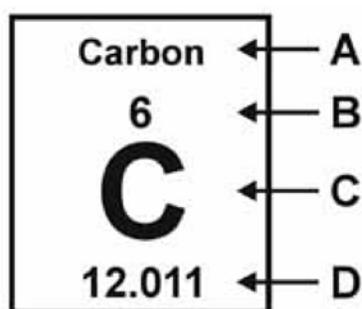
___ 43. Which method is correct for determining the gallons of gasoline required to fill an automobile's 64 liter tank?
(1.000 liter = 1.057 quarts, 4 quarts = 1 gallon)

A) $64 \text{ liters} \left(\frac{1 \text{ liter}}{1.057 \text{ quarts}} \right) \left(\frac{4 \text{ quarts}}{1 \text{ gallon}} \right) =$

B) $64 \text{ liters} \left(\frac{1 \text{ liter}}{1.057 \text{ quarts}} \right) \left(\frac{1 \text{ gallon}}{4 \text{ quarts}} \right) =$

C) $64 \text{ liters} \left(\frac{1.057 \text{ quarts}}{1 \text{ liter}} \right) \left(\frac{4 \text{ quarts}}{1 \text{ gallon}} \right) =$

D) $64 \text{ liters} \left(\frac{1.057 \text{ quarts}}{1 \text{ liter}} \right) \left(\frac{1 \text{ gallon}}{4 \text{ quarts}} \right) =$



___ 44. The box for an element from the periodic table is shown. Which is the atomic mass?

- A) A B) B C) C D) D

___ 45. The box for an element from the periodic table is shown. Which is the atomic number?

- A) A B) B C) C D) D

___ 46. Which scientist described an atom made of a solid positively charged substance with electrons dispersed throughout it?

- A) Chadwick B) Thomson C) Rutherford D) Bohr

___ 47. Which one is comprised of the other three?

- A) proton B) atom C) electron D) neutron

Atoms			
Atom	Protons	Neutrons	Electrons
1	8	10	8
2	10	9	10
3	9	9	9
4	8	11	8

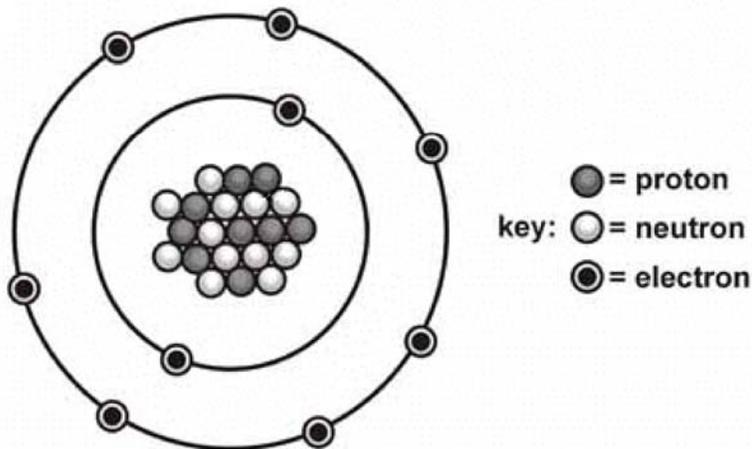
___ 48. Which two are isotopes of one another?

- A) Atoms 1 & 2 C) Atoms 1 & 3
B) Atoms 2 & 3 D) Atoms 1 & 4

ID: A

___ 49. Which two have the same mass?

- A) Atoms 1 & 2
- B) Atoms 2 & 4
- C) Atoms 1 & 4
- D) Atoms 2 & 3



___ 50. What is the mass number of the atom shown?

- A) 9
- B) 19
- C) 20
- D) 21

___ 51. Which element does this atom represent?

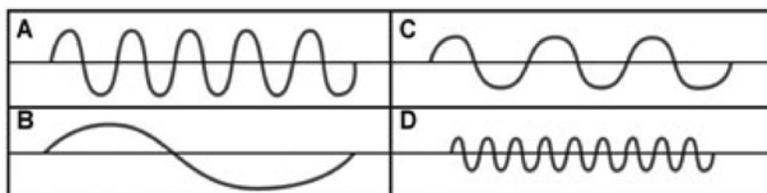
- A) potassium
- B) neon
- C) fluorine
- D) sodium

___ 52. Which is the correct symbol for this atom?

- A) ${}_{9}^{11}F$
- B) ${}_{11}^{21}F$
- C) ${}_{11}^{18}F$
- D) ${}_{9}^{21}F$

___ 53. An atom has 23 protons and 29 neutrons. Which is the correct chemical symbol for this atom?

- A) ${}_{6}^{29}C$
- B) ${}_{23}^{52}Cu$
- C) ${}_{23}^{29}V$
- D) ${}_{23}^{52}V$



___ 54. Which diagram shows a wave with the highest frequency?

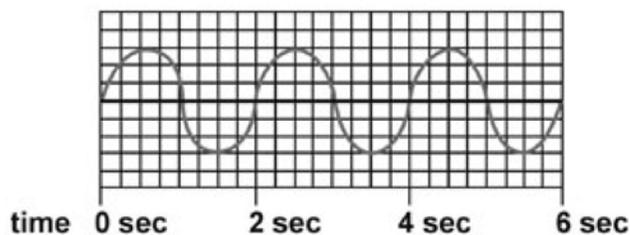
- A) A
- B) B
- C) C
- D) D

___ 55. Which diagram shows a wave with the highest wavelength?

- A) A
- B) B
- C) C
- D) D

ID: A

___ 56. Which is the frequency of the wave shown?



- A) 2 Hz B) 0.5 Hz C) 2 sec D) 3 s

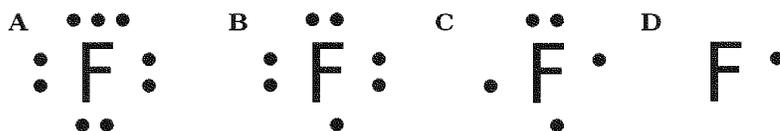
___ 57. Which is the correct number of valence electrons in the element Sulfur (S)?

- A) 16 B) 6 C) 2 D) 4

___ 58. Which element has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^4 4s^2 3d^4$?

- A) Titanium (Ti) C) Sulfur (S)
B) Chromium (Cr) D) Selenium (Se)

___ 59. Which is the correct electron dot structure for the element Fluorine (F)?



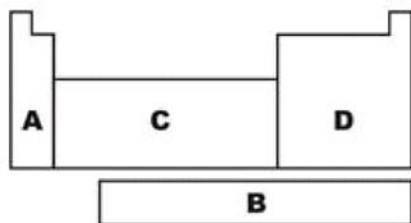
- A) B) C) D)

___ 60. Which scientist first arranged elements by atomic number?

- A) Mendeleev B) Lavoisier C) Newlands D) Mosely

___ 61. Which category of elements have the property of being malleable and ductile?

- A) gases B) metals C) metalloids D) nonmetals



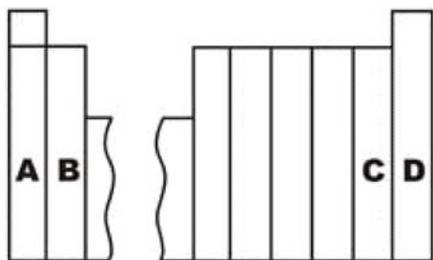
___ 62. Which region is referred to as the p-block on the diagram?

- A) A B) B C) C D) D

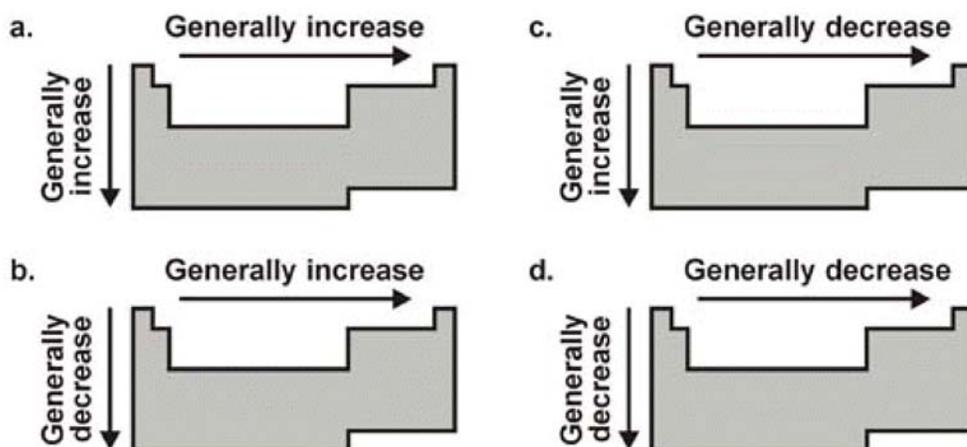
___ 63. Which region is referred to as the f-block on the diagram?

- A) A B) B C) C D) D

ID: A



64. Which region contains the halogen family of elements?
A) A B) B C) C D) D
65. Which region contains the alkaline earth metal family of elements?
A) A B) B C) C D) D



66. Which diagram correctly depicts the trend in electronegativity?
A) A B) B C) C D) D
67. Which diagram correctly depicts the general trend in first ionization energy?
A) A B) B C) C D) D
68. Which block is element Y most likely found in?

Element	Block	Characteristics
X	s	Soft, shiny grey metal; highly reactive, lightweight
Y	?	Liquid at room temperature; has the highest electronegativity in its period
Z	p	Used as a semiconductor due to its electricity-conducting properties

- A) s B) p C) d D) f

ID: A

- ___ 81. A sulfide ion has ___ electrons.
 A) 16 B) 14 C) 18 D) 17
- ___ 82. Which atom is most likely to form a 2+ ion?
 A) Sc B) Sr C) Ga D) S
- ___ 83. Which of the following regions of the electromagnetic spectrum have shorter wavelengths than visible light?
 1. infrared radiation
 2. ultraviolet radiation
 3. microwave radiation

 A) 1 only
 B) 2 only
 C) 3 only
 D) 1 and 2
- ___ 84. Which of the following colors of visible light has the highest frequency?
 A) blue B) yellow C) green D) red
- ___ 85. According to the Bohr model for the hydrogen atom, the energy necessary to excite an electron from $n = 4$ to $n = 5$ is ___ the energy necessary to excite an electron from $n = 3$ to $n = 4$.
 A) less than C) equal to
 B) greater than D) either equal to or greater than
- ___ 86. For which of the following transitions would a hydrogen atom absorb a photon with the longest wavelength?
 A) $n = 2$ to $n = 4$ C) $n = 5$ to $n = 6$
 B) $n = 7$ to $n = 6$ D) $n = 5$ to $n = 1$
- ___ 87. Which type of experiment demonstrates that an electron has the properties of a wave?
 A) nuclear fission
 B) electron diffraction
 C) light emission from atomic gases
 D) mass spectroscopy
- ___ 88. Which element has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^2$?
 A) Mg B) Si C) Ge D) Ti
- ___ 89. Which element has the following ground state electron configuration?
 [Ar]

↑↓	↑↓	↑	↑	↑
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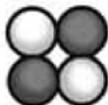
 $3d$

↑↓

 $4s$
 A) Fe B) Co C) Ni D) Cu
- ___ 90. In general, atomic radii
 A) decrease down a group and remain constant across a period.
 B) decrease down a group and increase across a period.
 C) increase down a group and decrease across a period.
 D) increase down a group and increase across a period.

ID: A

- ___ 91. Which of the following processes decreases the atomic number by one?
A) gamma-ray production
B) electron capture
C) beta-particle production
D) positron production
E) at least two of the above processes
- ___ 92. The procedure by which electrons are assigned to (or built up into) orbitals is known as the ___ principle.
A) aufbau B) Bohr C) Planck D) Hund
- ___ 93. Which group shows the correct order of first ionization energy?
A) Na > P > Cl C) K > Ca > Ge
B) Cs > Na > K D) Cs < Rb < Na
- ___ 94. Within a group, as the atomic numbers of the elements increase, the
A) ionization energies decrease C) elements become less metallic
B) atomic masses decrease D) atomic radii decrease
- ___ 95. Which type of nuclear decay releases the type of particle shown?



key: ● = proton
○ = neutron

- A) alpha C) gamma
B) beta D) proton
- ___ 96. Who was your Scientific Inquiry Analysis Teacher?
A) Mrs. Edery
B) Ms. Prinzo
C) Mr. Moskowitz
D) Ms. Paladini
E) Mr. Florance
F) Other: _____

Problems - Show your work. You will have to when we return in September!

97. A bottle contains 3.100 mL of a liquid. The total mass of the bottle and the liquid together is 6.300 g. The mass of the empty bottle is 4.240 g. What is the density of the liquid?

ID: A

98. If the fuel efficiency of an automobile is 21 miles per gallon, what is its fuel efficiency in kilometers per liter? (1 km = 0.621 mile, 1.000 L = 1.057 quarts, 4 quarts = 1 gallon)
99. The speed of light in a vacuum is 3.00×10^8 m/s. What is the speed of light in units of kilometers per hour?
100. What is the mass of sulfur-32 relative to carbon-12?
101. An unstable isotope of rhenium, ^{191}Re , has a half-life of 9.8 minutes and is a beta producer. What is the other product of the reaction?