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CORRECT ANSWERS ARE LOCATED IN THE 2ND HALF OF THIS DOC.

TRUE/FALSE - Write 'T' if the statement is true and 'F' if the statement is false.

1) Modern studies have shown that the Law of Multiple Proportions is not valid.
   - ◎ true
   - ◎ false

2) A compound must consist of 2 or more different elements
   - ◎ true
   - ◎ false

3) A neutral atom must contain an equal number of protons and electrons
   - ◎ true
   - ◎ false

4) All neutral atoms of tin have 50 protons and 50 electrons.
   - ◎ true
   - ◎ false

5) Copper (Cu) is a transition metal.
   - ◎ true
   - ◎ false

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6) Lead (Pb) is a main-group element.
   - ◎ true
   - ◎ false

7) In nature, some elements exist as molecules, while others do not.
   - ◎ true
   - ◎ false

8) Ionic compounds may carry a net positive or negative charge.
   - ◎ true
   - ◎ false

9) When an alkali metal combines with a non-metal, a covalent bond is normally formed.
   - ◎ true
   - ◎ false

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10) The molecular formula of a compound can be used to determine its structural formula.
- ◎ true
- ◎ false

11) Blood is an example of a homogeneous mixture.
- ◎ true
- ◎ false

12) Nitrogen, oxygen, and carbon dioxide gases in air are an example of a homogeneous mixture.
- ◎ true
- ◎ false

13) Sand in water is an example of a heterogeneous mixture.
- ◎ true
- ◎ false

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MULTIPLE CHOICE - Choose the one alternative that best completes the statement or answers the question.

14) In the ionic compound with the general formula M_2X_3, the likely charge on X is
- A) +1.
- B) +3.
- C) -1.
- D) -2.
- E) -3.

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15) Ammonium sulfate, $(NH_4)_2SO_4$, is a fertilizer widely used as a source of nitrogen. Calculate its molecular mass.
- A) 63.07 u
- B) 114.10 u
- C) 118.13 u
- D) 128.11 u
- E) 132.13 u

16) Sodium chromate is used to protect iron from corrosion and rusting. Determine its molecular mass.
- A) 261.97 u
- B) 238.98 u
- C) 161.98 u
- D) 138.98 u
- E) 74.99 u

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17) Select a set of numbers that represents the proton, neutron, and electron count respectively for $^{79}_{34}Se^{-2}$

A) 34, 79, 2
B) 34, 45, 36
C) 34, 45, 32
D) 36, 45, 34
E) 45, 34, 79

18) Iodine pentafluoride reacts slowly with glass and violently with water. Determine its molecular mass.

A) 653.52 u
B) 259.89 u
C) 221.90 u
D) 202.90 u
E) 145.90 u

19) Silicon, which makes up about 25% of Earth's crust by mass, is used widely in the modern electronics industry. It has three naturally occurring isotopes, ^{28}Si, ^{29}Si, and ^{30}Si. Calculate the atomic mass of silicon.

Isotope	Isotopic Mass (u)	Abundance %
^{28}Si	27.976927	92.23
^{29}Si	28.976495	4.67
^{30}Si	29.973770	3.10

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A) 29.2252 u
B) 28.9757 u
C) 28.7260 u
D) 28.0855 u
E) 27.9801 u

20) Diiodine pentaoxide is used as an oxidizing agent that converts carbon monoxide to carbon dioxide. What is its chemical formula?

A) I_2O_5
B) IO_5
C) $2IO_5$
D) I_5O_2
E) $(IO_5)_2$

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21) What are the approximate carbon:hydrogen mass ratios in methane (CH_4) and ethyne (C_2H_2)?
A) 1:4 and 1:1
B) 3:2 and 6:1
C) 3:1 and 12:1
D) 3:2 and 12:1
E) 3:1 and 6:1

22) Kaolinite, a clay mineral with the formula $Al_4Si_4O_{10}(OH)_8$, is used as a filler in slick-paper for magazines and as a raw material for ceramics. Analysis shows that 14.35 g of kaolinite contains 8.009 g of oxygen. Calculate the mass percent of oxygen in kaolinite.
A) 1.792 mass %
B) 24.80 mass %
C) 30.81 mass %
D) 34.12 mass %
E) 55.81 mass %

23) Determine the molecular mass of iron (III) bromide hexahydrate, a substance used as a catalyst in organic reactions.
A) 403.65 u
B) 355.54 u
C) 317.61 u
D) 313.57 u
E) 295.56 u

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24) What is the formula for sodium sulfite?
A) $NaSO_3$
B) Na_2SO_3
C) $NaSO_4$
D) Na_2SO_4
E) Na_2S

25) Lithium forms compounds which are used in dry cells and storage batteries and in high-temperature lubricants. It has two naturally occurring isotopes, ^6Li (isotopic mass = 6.015121 u) and ^7Li (isotopic mass = 7.016003 u). Lithium has an atomic mass of 6.9409 u. What is the percent abundance of lithium-6?
A) 92.50%
B) 86.66%
C) 46.16%
D) 7.503%
E) 6.080%

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26) Tetrasulfur dinitride decomposes explosively when heated. What is its formula?

A) S_2N_4
B) S_4N_2
C) $4SN_2$
D) S_4N
E) S_2N

27) Bromine has two naturally-occurring isotopes. ^{79}Br has a mass of 78.9 u and accounts for 50.3% of bromine atoms. If the atomic mass of bromine is 79.9 u, what is the mass of an atom of the second bromine isotope?

A) 77.9 u
B) 80.0 u
C) 80.1 u
D) 80.9 u
E) 88.9 u

28) Bromine is the only nonmetal that is a liquid at room temperature. Consider the isotope bromine-81,

$^{81}_{35}Br$

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. Select the combination which lists the correct atomic number, neutron number, and mass number, respectively.

A) 35, 46, 81
B) 35, 81, 46
C) 81, 46, 35
D) 46, 81, 35
E) 35, 81, 116

29) Silver (I) chloride is used in photographic emulsions. What is its formula?

A) Ag_2Cl_3
B) Ag_2Cl
C) $AgCl_3$
D) $AgCl_2$
E) $AgCl$

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30) Which of the following compounds is covalent?
A) $CaCl_2$
B) MgO
C) Al_2O_3
D) Cs_2S
E) PCl_3

31) The compound, $(NH_4)_2S$, can be used in analysis for trace amounts of metals present in a sample. What is its name?
A) ammonium sulfide
B) diammonium sulfide
C) ammonium sulfite
D) ammonia(I) sulfite
E) ammonium(I) sulfide

32) After an atom has lost an electron it becomes a/an _____ and has a _____ charge.
A) anion, positive
B) isotope, negative
C) anion, negative
D) cation, positive
E) nucleus, positive

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33) Group one elements are known as the
A) Alkali metals
B) Alkaline Earth metals
C) Transition Metals
D) Lanthanides
E) Halogens

34) When an atom is represented by the symbol

, the value of *A* is the
A) number of neutrons in the atom.
B) number of protons in the atom.
C) atomic mass of the element.
D) total number of electrons and neutrons in the atom.
E) total number of protons and neutrons in the atom.

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35) In the modern periodic table, the order in which the elements are placed is based on
A) atomic mass
B) mass number
C) atomic number
D) atomic size
E) chemical reactivity

36) Barium sulfate is used in manufacturing photographic paper. What is its formula?
A) $BaSO_4$
B) $Ba(SO_4)_2$
C) Ba_2SO_4
D) $Ba_2(SO_4)_3$
E) $BaSO_3$

37) Barium fluoride is used in embalming and in glass manufacturing. Which of the following gives the formula and bonding for barium fluoride?
A) BaF_2, ionic compound
B) BaF_2, covalent compound
C) BaF, ionic compound
D) BaF, covalent compound
E) Ba_2F, ionic compound

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38) The compound, BaO, absorbs water and carbon dioxide readily and is used to dry gases and organic solvents. What is its name?
A) barium oxide
B) barium(II) oxide
C) barium monoxide
D) baric oxide
E) barium peroxide

39) What is the name of BBr_3?
A) boron bromide
B) boric bromide
C) boron tribromide
D) tribromoboride
E) bromine triboride

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40) Which of the following represents the name of the compound $Fe(HSO_4)_2$

A) Iron (II) hydrogen sulfate
B) Iron (III) hydrogen sulfate
C) Iron (II) sulfate
D) Iron (III) sulfate
E) Iron hydrogen sulfate

41) The formula of heptane is

A) C_6H_{12}
B) C_6H_{14}
C) C_7H_{14}
D) C_7H_{16}
E) C_8H_{16}

42) Calcium hydroxide is used in mortar, plaster, and cement. What is its formula?

A) CaOH
B) $CaOH_2$
C) Ca_2OH
D) $Ca(OH)_2$
E) $CaHO_2$

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43) The substance, CaSe, is used in materials which are electron emitters. What is its name?

A) calcium monoselenide
B) calcium(II) selenide
C) calcium selenide
D) calcium(I) selenide
E) calcium(II) selenium

44) What is the name of the acid formed when $HClO_4$ liquid is dissolved in water?

A) hydrochloric acid
B) perchloric acid
C) chloric acid
D) chlorous acid
E) hydrochlorate acid

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45) Chlorine dioxide is a strong oxidizer that is used for bleaching flour and textiles and for purification of water. What is its formula?

A) $(ClO)_2$
B) Cl_2O
C) Cl_2O_2
D) Cl_2O_4
E) ClO_2

46) Which one of the following combinations of names and formulas of ions is incorrect?

A) O^{2-} oxide
B) Cd^{2+} cadmium
C) ClO_3^- chlorate
D) HCO_3^- hydrogen carbonate
E) NO_2^- nitrate

47) Which one of the following combinations of names and formulas of ions is incorrect?

A) Ba^{2+} barium
B) S^{2-} sulfate
C) CN^- cyanide
D) ClO_4^- perchlorate
E) HCO_3^- bicarbonate

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48) Which one of the following combinations of names and formulas of ions is incorrect?

A) NH_4^+ ammonium
B) S^{2-} sulfide
C) CN^- cyanide
D) $Cr_2O_7^{2-}$ dichromate
E) ClO_3^- perchlorate

49) The substance, $CoCl_2$, is useful as a humidity indicator because it changes from pale blue to pink as it gains water from moist air. What is its name?

A) cobalt dichloride
B) cobalt(II) chloride
C) cobalt chloride
D) cobaltic chloride
E) copper(II) chloride

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50) What is the name of the acid formed when HCN gas is dissolved in water?
A) cyanic acid
B) hydrocyanic acid
C) cyanous acid
D) hydrocyanous acid
E) hydrogen cyanide

51) Which separation technique uses the difference in particle size between substances in order to separate mixtures?
A) chromatography
B) filtration
C) distillation
D) crystallization
E) extraction

52) Which separation technique uses the difference in volatility between substances to separate mixtures?
A) chromatography
B) filtration
C) distillation
D) crystallization
E) extraction

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53) What is the formula for bromous acid?
A) HBr
B) HBrO
C) $HBrO_2$
D) $HBrO_3$
E) $HBrO_4$

54) Which separation technique uses a mobile phase and a stationary phase to separate mixtures?
A) chromatography
B) filtration
C) distillation
D) crystallization
E) extraction

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55) Iron (III) chloride hexahydrate is used as a coagulant for sewage and industrial wastes. What is its formula?

A) $Fe(Cl \bullet 6H_2O)_3$
B) $Fe_3Cl \bullet 6H_2O$
C) $FeCl_3(H_2O)_6$
D) $Fe_3Cl(H_2O)_6$
E) $FeCl_3 \bullet 6H_2O$

56) Ferric oxide is used as a pigment in metal polishing. Which of the following is its formula?

A) FeO
B) Fe_2O
C) FeO_3
D) Fe_2O_5
E) Fe_2O_3

57) Which of the following is a metalloid?

A) carbon, C, $Z = 6$
B) sulfur, S, $Z = 16$
C) germanium, Ge, $Z = 32$
D) iridium, $Z = 77$
E) bromine, Br, $Z = 35$

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58) Which of the following is a transition metal?

A) Na
B) Ca
C) Pb
D) B
E) Pd

59) Which of the following compounds is ionic?

A) PF_3
B) CS_2
C) C_4H_{10}
D) H_2SO_4
E) $Mg(OH)_2$

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60) What is the chemical symbol for the group 17 element that lies in period 5?
A) Cl
B) Br
C) I
D) Se
E) Te

61) What is the name of the acid formed when HBr gas is dissolved in water?
A) bromic acid
B) bromous acid
C) hydrobromic acid
D) hydrobromous acid
E) hydrobromidic acid

62) An isotope of which of the following elements is chosen as a standard in measuring atomic mass?
A) carbon
B) oxygen
C) hydrogen
D) Neon
E) helium

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63) The name for HF(*g*) is
A) hydrofluoric acid
B) hydrogen(I) fluoride
C) hydrogen fluoride
D) hydrogen fluorine
E) fluoric acid

64) What is the name of the acid formed when H_2S gas is dissolved in water?
A) sulfuric acid
B) sulfurous acid
C) hydrosulfuric acid
D) hydrosulfurous acid
E) sulfidic acid

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65) What is the name of IF_7?
A) iodine fluoride
B) iodic fluoride
C) iodine heptafluoride
D) heptafluoroiodide
E) heptafluorine iodide

66) A column of the periodic table is called a
A) group.
B) period.
C) isotopic mixture.
D) pillar.
E) shell.

67) A row of the periodic table is called a
A) group.
B) period.
C) isotopic mixture.
D) family.
E) subshell.

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68) Potassium permanganate is a strong oxidizer that reacts explosively with easily oxidized materials. What is its formula?
A) $KMnO_3$
B) $KMnO_4$
C) K_2MnO_4
D) $K(MnO_4)_2$
E) $K_2Mn_2O_7$

69) What is the formula for lithium nitrite?
A) $LiNO_2$
B) Li_2NO_2
C) $LiNO_3$
D) Li_2NO_3
E) $LiNO_4$

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70) The colorless substance, MgF_2, is used in the ceramics and glass industry. What is its name?
A) magnesium difluoride
B) magnesium fluoride
C) magnesium(II) fluoride
D) monomagnesium difluoride
E) none of the other choices, since they are all misspelled

71) J. J. Thomson studied cathode ray particles (electrons) and was able to measure the mass/charge ratio. His results showed that
A) the mass/charge ratio varied with as the cathode material was changed.
B) the charge was always a whole-number multiple of some minimum charge.
C) matter included particles much smaller than the atom.
D) atoms contained dense areas of positive charge.
E) atoms are largely empty space.

72) Which of the following is a non-metal?
A) lithium, Li, $Z = 3$
B) bromine, Br, $Z = 35$
C) mercury, Hg, $Z = 80$
D) bismuth, Bi, $Z = 83$
E) sodium, Na, $Z = 11$

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73) What is the formula for magnesium sulfide?
A) MgS
B) MgS_2
C) Mg_2S
D) Mg_2S_3
E) $MgSO_4$

74) Which one of the following formulas of ionic compounds is the least likely to be correct?
A) $CaCl_2$
B) $NaSO_4$
C) $MgCO_3$
D) KF
E) $Cu(NO_3)_2$

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75) Which, if any, of the following elements do not occur in the major classes of organic compounds?
A) H
B) C
C) N
D) O
E) All the above elements occur in the major classes of organic compounds

76) Which of the following is the formula for calcium peroxide?
A) CaO
B) Ca_2O_2
C) Ca_2O
D) CaO_2
E) $Ca(O_2)_2$

77) Sodium oxide combines violently with water. Which of the following gives the formula and the bonding for sodium oxide?
A) NaO, ionic compound
B) NaO, covalent compound
C) Na_2O, ionic compound
D) Na_2O, covalent compound
E) Na_2O_2, ionic compound

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78) Sodium peroxide is an oxidizer used to bleach animal and vegetable fibers. What is its formula?
A) NaO
B) NaO_2
C) Na_2O_2
D) Na_2O
E) NaH_2O_2

79) Which one of the following formulas of ionic compounds is the least likely to be correct?
A) NH_4Cl
B) $Ba(OH)_2$
C) Na_2SO_4
D) Ca_2NO_3
E) $Cu(CN)_2$

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80) Which one of the following combinations of names and formulas is incorrect?
- A) H_3PO_4 phosphoric acid
- B) HNO_3 nitric acid
- C) $NaHCO_3$ sodium carbonate
- D) H_2CO_3 carbonic acid
- E) KOH potassium hydroxide

81) Which one of the following combinations of names and formulas of ions is incorrect?
- A) O_2^- oxide
- B) Al^{3+} aluminum
- C) NO_3^- nitrate
- D) PO_4^{3-} phosphate
- E) CrO_4^{2-} chromate

82) Which of the following ions occurs commonly?
- A) N^{3+}
- B) S^{6+}
- C) O^{2-}
- D) Ca^+
- E) Cl^+

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83) Hydroxyapatite is the principle mineral found in human teeth, and has a formula of $Ca_5(PO_4)_3(OH)$. Calculate the percent mass of Calcium in hydroxyapatite.
- A) 7.97%
- B) 23.9%
- C) 48.2%
- D) 6.17%
- E) 18.5%

84) Which of the following elements doesn't exist as a diatomic with itself?
- A) Oxygen
- B) Helium
- C) Chlorine
- D) Nitrogen
- E) Bromine

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85) Which one of the following is a polyatomic cation?
A) nitrate
B) chromate
C) permanganate
D) hydronium
E) potassium

86) The compound, P_4S_{10}, is used in the manufacture of safety matches. What is its name?
A) phosphorus sulfide
B) phosphoric sulfide
C) phosphorus decasulfide
D) tetraphosphorus decasulfide
E) phosphorus pentasulfide

87) What is the name of PCl_3?
A) phosphorus chloride
B) phosphoric chloride
C) phosphorus trichlorate
D) trichlorophosphide
E) phosphorus trichloride

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88) The substance, $KClO_3$, is a strong oxidizer used in explosives, fireworks, and matches. What is its name?
A) potassium chlorite
B) potassium chloride
C) potassium(I) chlorite
D) potassium(I) chlorate
E) potassium chlorate

89) Millikan's oil-drop experiment
A) established the charge on an electron.
B) showed that all oil drops carried the same charge.
C) provided support for the nuclear model of the atom.
D) suggested that some oil drops carried fractional numbers of electrons.
E) suggested the presence of a neutral particle in the atom.

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90) The chemical symbol for potassium is
A) P
B) Po
C) Pt
D) Pm
E) K

91) The compound, NaH_2PO_4, is present in many baking powders. What is its name?
A) sodium biphosphate
B) sodium hydrogen phosphate
C) sodium dihydrogen phosphate
D) sodium hydrophosphate
E) sodium dihydride phosphate

92) What is the name of Na_2O?
A) disodium monoxide
B) sodium monoxide
C) sodium dioxide
D) sodium(I) oxide
E) sodium oxide

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93) What is the name of P_4Se_3?
A) phosphorus selenide
B) phosphorus triselenide
C) tetraphosphorus selenide
D) phosphoric selenide
E) tetraphosphorus triselenide

94) Select the incorrect statement about elements and compounds.
A) All ionic compounds are neutral.
B) Some elements exist as molecules.
C) The bonding in compounds may be covalent or ionic.
D) The molecular formula of a compound provides more information than the structural formula.
E) Among the elements, there are more metals than non-metals.

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95) Which best describes the formation of $CaCl_2$ from neutral calcium and chlorine atoms
- A) Each chlorine atom gained 1 electron, and each calcium atom lost 1 electron
- B) Each chlorine atom gained 1 electron, and each calcium atom lost 2 electrons
- C) Each chlorine atom lost 1 electron, and each calcium atom gained 1 electron
- D) Each chlorine atom lost 1 electron, and each calcium atom gained 2 electrons
- E) Each chlorine atom lost 2 electrons, and each calcium atom gained 1 electron

96) Which one of the following statements about atoms and subatomic particles is correct?
- A) Rutherford discovered the atomic nucleus by bombarding gold foil with electrons.
- B) The proton and the neutron have identical masses.
- C) The neutron's mass is equal to that of a proton plus an electron.
- D) A neutral atom contains equal numbers of protons and electrons.
- E) An atomic nucleus contains equal numbers of protons and neutrons.

97) Rutherford bombarded gold foil with alpha (a) particles and found that a small percentage of the particles were deflected. Which of the following was not accounted for by the model he proposed for the structure of atoms?
- A) the small size of the nucleus
- B) the charge on the nucleus
- C) the total mass of the atom
- D) the existence of protons
- E) the presence of electrons outside the nucleus

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98) What best describes the electrostatic attraction between ions in ionic compounds?
- A) The attraction between ions increases as the size of the ions increases and the charge of the ions increases
- B) The attraction between ions increases as the size of the ions decreases and the charge of the ions increases
- C) The attraction between ions increases as the size of the ions increases and the charge of the ions decreases
- D) The attraction between ions increases as the size of the ions decreases and the charge of the ions decreases
- E) Ions in ionic compounds are not attracted to each other in any way

99) Who is credited with first measuring the charge of the electron?
- A) Dalton
- B) Gay-Lussac
- C) Thomson
- D) Millikan
- E) Rutherford

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100) Who is credited with discovering the atomic nucleus?
A) Dalton
B) Gay-Lussac
C) Thomson
D) Millikan
E) Rutherford

101) What is the chemical symbol for the group 16 element that lies in period 4?
A) Cr
B) Hf
C) W
D) Ti
E) Se

102) Atoms X, Y, Z, and R have the following nuclear compositions:

$^{410}_{186}X$ $^{410}_{183}Y$ $^{412}_{186}Z$ $^{412}_{185}R$

Which two are isotopes?
A) X & Y
B) X & R
C) Y & R
D) Z & R
E) X & Z

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103) Zinc acetate is used in preserving wood and in manufacturing glazes for porcelain. What is its formula?
A) $ZnAc_2$
B) $ZnCH_3COO$
C) $Zn(CH_3COO)_2$
D) Zn_2CH_3COO
E) $ZnCH_3COCH_3$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

104) Name the three important "laws" that were accounted for by Dalton's atomic theory.

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105) Dalton's atomic theory has required some modifications in the light of subsequent discoveries. For any three appropriate postulates of Dalton's atomic theory

a. state the postulate in its original form.
b. in one sentence, describe why the postulate has needed modification.

106) For the elements represented below, fill in the blank spaces and write out all the symbols in the left hand column in full, in the form



(i.e., include the appropriate values of *Z* and *A* as well as the correct symbol X).

Symbol	# protons	# neutrons	# electrons
…	17	18	…
Au	…	118	…
…	…	20	20

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107) The following charges on individual oil droplets were obtained during an experiment similar to Millikan's. Use them to determine a charge for the electron in coulombs (C), showing all your working.

Charges (C): -3.184×10^{-19}; -4.776×10^{-19}; -7.960×10^{-19}

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108) State the two important experimental results (and the names of the responsible scientists) which enabled the mass of the electron to be determined.

109) For each of the following elements, indicate whether it is a metal, a non-metal, or a metalloid:

a. S
b. Ge
c. Ga
d. H
e. I
f. Si

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110) Give the common name of the group in the periodic table to which each of the following elements belongs:

a. Rb
b. Br
c. Ba
d. Ar

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111) a. Give the names of the following ions:

(i) NH_4^+
(ii) SO_3^{2-}
b. Write down the formulas of the following ions:
(i) aluminum
(ii) carbonate

112) a. Give the names of the following acids:
(i) HBrO
(ii) H_2S
b. Write down the formulas of the following acids:
(i) chromic acid
(ii) phosphorous acid

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113) For each of the following names, write down the corresponding formula, including charge where appropriate (atomic numbers and mass numbers are not required):

a. zinc ion
b. nitrite ion
c. carbonic acid
d. cyanide ion

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114) Calculate the molecular masses of the following:

a. Cl_2
b. H_2O_2
c. $(NH_4)_2SO_4$
d. $Ba(NO_3)_2$

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Answer Key

Test name: Chapter 02

1) FALSE
2) FALSE
3) FALSE
4) TRUE
5) TRUE
6) TRUE
7) TRUE
8) FALSE
9) FALSE
10) FALSE
11) FALSE
12) TRUE
13) TRUE
14) D
15) E
16) C
17) B
18) C
19) D
20) A
21) C
22) E
23) A
24) B
25) D
26) B
27) D
28) A
29) E
30) E
31) A
32) D
33) A
34) E
35) C
36) A
37) A

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38) A
39) C
40) A
41) D
42) D
43) C
44) B
45) E
46) E
47) B
48) E
49) B
50) B
51) B
52) C
53) C
54) A
55) E
56) E
57) C
58) E
59) E
60) C
61) C
62) A
63) C
64) C
65) C
66) A
67) B
68) B
69) A
70) B
71) C
72) B
73) A
74) B
75) E
76) D
77) C

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78) C
79) D
80) C
81) A
82) C
83) B
84) B
85) D
86) D
87) E
88) E
89) A
90) E
91) C
92) E
93) E
94) D
95) B
96) D
97) C
98) B
99) D
100) E
101) E
102) E
103) C
104) Short Answer
laws of conservation of mass; definite composition; multiple proportions

105) Short Answer
1. Matter consists of atoms which are indivisible, cannot be created or destroyed. But, atoms are divisible, as the existence of subatomic particles shows.
2. Atoms of one element cannot be converted into atoms of another element. They can be converted in various nuclear reactions, including radioactive decay.
3. Atoms of an element are identical in mass and other properties. Isotopes of an element differ in their masses and other properties.

106) Short Answer

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Symbol	# protons	# neutrons	# electrons
%media:formula5.mml%	17	18	17
%media:formula6.mml%	79	118	79
%media:formula7.mml%	20	20	20

107) Short Answer
-1.59×10^{-19} C

108) Short Answer
Thomson measured *m*/ *e*, the mass-to-charge ratio. Millikan measured *e*, the charge. Thus, the mass *m* could be calculated.

109) Short Answer
a. nonmetal
b. metalloid
c. metal
d. nonmetal
e. nonmetal
f. metalloid

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110) Short Answer
a. alkali metals
b. halogens
c. alkaline earth metals
d. noble gases

111) Short Answer

a.	(i) ammonium
	(ii) sulfite
b.	(i) Al^{3+}
	(ii) CO_3^{2-}

112) Short Answer

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a.	(i) hypobromous acid
	(ii) Hydrosulfuric acid
b.	(i)$H_2CrO_4^+$
	(ii) H_3PO_3

113) Short Answer
a. Zn^{2+}
b. NO_2^-
c. H_2CO_3
d. CN^-

114) Short Answer
a. 70.90 u
b. 34.02 u
c. 132.15 u
d. 261.32 u

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