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Principles of Chemistry: A Molecular Approach, 3e **(Tro)**
Chapter 2 Atoms and Elements

1) Which of the following is an example of the law of multiple proportions?
A) A sample of chlorine is found to contain three times as much Cl-35 as Cl-37.
B) Two different compounds formed from carbon and oxygen have the following mass ratios: 1.33 g O: 1 g C and 2.66 g O: 1 g C.
C) Two different samples of table salt are found to have the same ratio of sodium to chlorine.
D) The atomic mass of bromine is found to be 79.90 amu.
E) Nitrogen dioxide always has a mass ratio of 2.28 g O: 1 g N.
Answer: B
Diff: 1 Var: 1 Page Ref: 2.2
Global: G1, G8
LO: 2.2b

2) Which of the following statements is **false** according to Dalton's Atomic Theory?
A) Atoms combine in simple whole number ratios to form compounds.
B) All atoms of chlorine have identical properties that distinguish them from other elements.
C) One carbon atom will combine with one oxygen atom to form a molecule of carbon monoxide.
D) Atoms of sodium do not change into another element during chemical reaction with chlorine.
E) An atom of nitrogen can be broken down into smaller particles that will still have the unique properties of nitrogen.
Answer: E
Diff: 1 Var: 1 Page Ref: 2.2
Global: G2

3) Identify the element that has an atomic number of 40.
A) neon
B) calcium
C) zirconium
D) bromine
Answer: C
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

4) The atomic mass for cadmium is _____.
A) 48
B) 112.41
C) 40.08
D) 20
Answer: B
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

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5) The mass number is equal to
A) the sum of the sum of the electrons and protons.
B) the sum of the sum of the neutrons and electrons.
C) the sum of the number of protons, neutrons, and electrons.
D) the sum of the number of protons and neutrons.
Answer: D
Diff: 1 Var: 1 Page Ref: 2.5
Global: G1
LO: 2.5

6) What element is defined by the following information?

$p^+ = 11$ $n^\circ = 12$ $e^- = 11$

A) sodium
B) vanadium
C) magnesium
D) titanium
Answer: A
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

7) What element is defined by the following information?

$p^+ = 20$ $n^\circ = 20$ $e^- = 20$

A) zirconium
B) calcium
C) potassium
D) neon
E) argon
Answer: B
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

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8) What does "X" represent in the following symbol?

$$^{80}_{35}X$$

A) mercury
B) chlorine
C) scandium
D) bromine
E) selenium
Answer: D
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

9) What does "X" represent in the following symbol?

$$^{28}_{14}X$$

A) silicon
B) sulfur
C) zinc
D) ruthenium
E) nickel
Answer: A
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

10) Which of the following statements about subatomic particles is **true**?
A) A neutral atom contains the same number of protons and electrons.
B) Protons have about the same mass as electrons.
C) Electrons make up most of the mass of an atom.
D) Protons and neutrons have opposite, but equal in magnitude, charges.
E) Neutrons and electrons are found in the nucleus of an atom.
Answer: A
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Global: G1
LO: 2.5

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11) Determine the number of protons, neutrons and electrons in the following:

$^{40}_{18}X$

A) $p^+ = 18$ n° = 18 $e^- = 22$
B) $p^+ = 18$ n° = 22 $e^- = 18$
C) $p^+ = 22$ n° = 18 $e^- = 18$
D) $p^+ = 18$ n° = 22 $e^- = 40$
E) $p^+ = 40$ n° = 22 $e^- = 18$
Answer: B
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

12) Determine the number of protons, neutrons and electrons in the following:

$^{25}_{12}X$

A) $p^+ = 12$ n° = 25 $e^- = 12$
B) $p^+ = 12$ n° = 12 $e^- = 13$
C) $p^+ = 12$ n° = 13 $e^- = 12$
D) $p^+ = 25$ n° = 12 $e^- = 13$
E) $p^+ = 12$ n° = 13 $e^- = 25$
Answer: C
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

13) Determine the number of protons, neutrons and electrons in the following:

$^{65}_{29}X$

A) $p^+ = 36$ n° = 29 $e^- = 36$
B) $p^+ = 29$ n° = 29 $e^- = 36$
C) $p^+ = 36$ n° = 36 $e^- = 29$
D) $p^+ = 29$ n° = 36 $e^- = 29$
E) $p^+ = 29$ n° = 36 $e^- = 36$
Answer: D
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

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14) Which of the following statements about isotopes is **true**?
A) Isotopes of the same element differ only in the number of electrons they contain.
B) An isotope of an atom with a larger number of neutrons is larger than an isotope of the same atom that contains fewer neutrons.
C) Isotopes of the same element have the same mass.
D) Isotopes of the same element don't usually have the same properties.
E) Some elements have 3 or more naturally occurring isotopes.
Answer: E
Diff: 1 Var: 1 Page Ref: 2.5
Global: G1
LO: 2.5

15) Identify a cation.
A) an atom that has lost an electron
B) an atom that has gained an electron
C) an atom that has lost a proton
D) an atom that has gained a proton
Answer: A
Diff: 1 Var: 1 Page Ref: 2.5
Global: G1
LO: 2.5

16) What element is defined by the following information?

$p^+ = 17$ $n^\circ = 20$ $e^- = 17$

A) calcium
B) rubidium
C) chlorine
D) neon
E) oxygen
Answer: C
Diff: 2 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

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17) What species is represented by the following information?

$p^+ = 12$ $n° = 14$ $e^- = 10$

A) Si^{4+}
B) Mg
C) Ne
D) Si
E) Mg^{2+}
Answer: E
Diff: 2 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

18) What species is represented by the following information?

$p^+ = 47$ $n° = 62$ $e^- = 46$

A) Ag^+
B) Nd
C) Pd
D) Ag
E) Pd^+
Answer: A
Diff: 2 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

19) What species is represented by the following information?

$p^+ = 17$ $n° = 18$ $e^- = 18$

A) Cl
B) Cl^-
C) Ar
D) Ar^+
E) Kr
Answer: B
Diff: 2 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

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20) Give the number of electrons for carbon-14, with a -2 charge.
A) 7
B) 4
C) 6
D) 8
Answer: D
Diff: 2 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

21) Give the number of neutrons for carbon-14, with a -2 charge.
A) 7
B) 4
C) 6
D) 8
Answer: D
Diff: 2 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

22) What does "X" represent in the following symbol?

$$^{235}_{92}\mathrm{X}$$

A) tin
B) copper
C) palladium
D) niobium
E) uranium
Answer: E
Diff: 2 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

23) Predict the charge that an aluminum ion would have.
A) 5-
B) 1+
C) 1-
D) 2+
E) 3+
Answer: E
Diff: 2 Var: 1 Page Ref: 2.6
Global: G2
LO: 2.6

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24) Predict the charge that a calcium ion would have.
A) 6-
B) 2-
C) 3+
D) 2+
E) 1+
Answer: D
Diff: 2 Var: 1 Page Ref: 2.6
Global: G2
LO: 2.6

25) Predict the charge that an ion formed from sulfur would have.
A) 1-
B) 6+
C) 3-
D) 4+
E) 2-
Answer: E
Diff: 2 Var: 1 Page Ref: 2.6
Global: G2
LO: 2.6

26) Predict the charge that the ion formed from bromine would have.
A) 1-
B) 2+
C) 1+
D) 4+
E) 2-
Answer: A
Diff: 2 Var: 1 Page Ref: 2.6
Global: G2
LO: 2.6

27) Which of the following elements is **not** a metal?
A) Ba
B) Mg
C) Xe
D) Pb
E) Ga
Answer: C
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Global: G2

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28) Which of the following elements is a metal?
A) As
B) C
C) I
D) Sn
E) Se
Answer: D
Diff: 1 Var: 1 Page Ref: 2.6
Global: G2

29) Which of the following elements is a nonmetal?
A) Zn
B) Cs
C) Ca
D) Co
E) P
Answer: E
Diff: 1 Var: 1 Page Ref: 2.6
Global: G2

30) Which of the following elements is a noble gas?
A) Ar
B) Br
C) N
D) O
E) K
Answer: A
Diff: 1 Var: 1 Page Ref: 2.6
Global: G2

31) Which of the following elements is a halogen?
A) Ne
B) I
C) O
D) Mg
E) K
Answer: B
Diff: 1 Var: 1 Page Ref: 2.6
Global: G2

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32) Which of the following elements is an alkaline earth metal?
A) Cs
B) Cu
C) Mg
D) Ti
E) Br
Answer: C
Diff: 1 Var: 1 Page Ref: 2.6
Global: G2

33) Which of the following elements is an alkali metal?
A) Zn
B) Xe
C) F
D) Li
E) Ca
Answer: D
Diff: 1 Var: 1 Page Ref: 2.6
Global: G2

34) Which of the following elements is a metalloid?
A) Al
B) Ge
C) C
D) Sn
Answer: B
Diff: 1 Var: 1 Page Ref: 2.6
Global: G2

35) Which of the following elements is an actinide?
A) U
B) Pm
C) Rf
D) Po
Answer: A
Diff: 1 Var: 1 Page Ref: 2.6
Global: G2

36) Which of the following elements is a lanthinide?
A) U
B) Pm
C) Rf
D) Po
Answer: B
Diff: 1 Var: 1 Page Ref: 2.6
Global: G2

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37) Which of the following statements is **false**?
A) Anions are usually larger than their corresponding atom.
B) Metals tend to form cations.
C) Atoms are usually larger than their corresponding cation.
D) The halogens tend to form 1+ ions.
E) Nonmetals tend to gain electrons.
Answer: D
Diff: 1 Var: 1 Page Ref: 2.6
Global: G2

38) Which of the following statements is **false**?
A) Halogens are very reactive elements.
B) The alkali metals are fairly unreactive.
C) Sulfur is a main group element.
D) Noble gases do not usually form ions.
E) Zn is a transition metal.
Answer: B
Diff: 1 Var: 1 Page Ref: 2.6
Global: G2

39) Which of the following does **not** describe a metal?
A) Good conductor of heat
B) Good conductor of electricity
C) Tends to gain electrons
D) Forms ionic compounds with nonmetals
E) Found on the left side of the periodic table
Answer: C
Diff: 1 Var: 1 Page Ref: 2.6
Global: G2

40) Which of the following does **not** describe a nonmetal?
A) Tend to gain electrons
B) Found in the upper right hand corner of the periodic table.
C) Poor conductor of electricity
D) Nonmetals are generally unreactive.
E) Poor conductor of heat
Answer: D
Diff: 1 Var: 1 Page Ref: 2.6
Global: G2

41) Semiconductors usually are
A) metalloids.
B) noble gases.
C) nonmetals.
D) metals.
Answer: A
Diff: 1 Var: 1 Page Ref: 2.6
Global: G1

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42) Silver has an atomic mass of 107.868 amu. The Ag-109 isotope (108.905 amu) is 48.16%. What is the amu of the other isotope?
A) 106.905 amu
B) 106.908 amu
C) 106.903 amu
D) 106.911 amu
Answer: A
Diff: 3 Var: 1 Page Ref: 2.7
Global: G4
LO: 2.7

43) Gallium has an atomic mass of 69.723 amu. The Ga-69 isotope (68.926 amu) is 60.11%. What is the amu of the other isotope?
A) 70.924 amu
B) 70.928 amu
C) 70.932 amu
D) 70.920 amu
Answer: A
Diff: 3 Var: 1 Page Ref: 2.7
Global: G4
LO: 2.7

44) Calculate the atomic mass of element "X", if it has 2 naturally occurring isotopes with the following masses and natural abundances:

X-45	44.8776 amu	32.88%
X-47	46.9443 amu	67.12%

A) 46.26 amu
B) 45.91 amu
C) 46.34 amu
D) 46.84 amu
E) 44.99 amu
Answer: A
Diff: 3 Var: 1 Page Ref: 2.7
Global: G4
LO: 2.7

45) Which of the following contains the **most** atoms? You shouldn't need to do a calculation here.
A) 10.0 g Ne
B) 10.0 g He
C) 10.0 g Ar
D) 10.0 g Kr
E) 10.0 g Mg
Answer: B
Diff: 1 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.7a

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46) Which of the following contains the **fewest** atoms? You shouldn't need to do a calculation here.
A) 4.0 g Li
B) 4.0 g Na
C) 4.0 g Rb
D) 4.0 g K
E) 4.0 g Ca
Answer: C
Diff: 1 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.7a

47) How many silver atoms are contained in 3.75 moles of silver?
A) 6.23×10^{24} silver atoms
B) 2.26×10^{24} silver atoms
C) 1.61×10^{23} silver atoms
D) 2.44×10^{26} silver atoms
E) 6.50×10^{25} silver atoms
Answer: B
Diff: 2 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.7a

48) How many xenon atoms are contained in 2.36 moles of xenon?
A) 3.92×10^{24} xenon atoms
B) 2.55×10^{23} xenon atoms
C) 1.42×10^{24} xenon atoms
D) 7.91×10^{25} xenon atoms
E) 1.87×10^{26} xenon atoms
Answer: C
Diff: 2 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.7a

49) How many argon atoms are contained in 7.66×10^{5} mmol of argon?
A) 4.61×10^{26} Ar atoms
B) 1.84×10^{28} Ar atoms
C) 1.15×10^{28} Ar atoms
D) 7.86×10^{20} Ar atoms
E) 3.24×10^{26} Ar atoms
Answer: A
Diff: 2 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.7a

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50) What mass (in g) does 3.99 moles of Kr have?
A) 334 g
B) 476 g
C) 211 g
D) 240 g
E) 144 g
Answer: A
Diff: 2 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.8a

51) How many moles of potassium are contained in 449 g of potassium?
A) 11.5 moles
B) 17.6 moles
C) 69.2 moles
D) 23.9 moles
E) 41.5 moles
Answer: A
Diff: 2 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.8a

52) What mass, in kg, does 5.84 moles of titanium (Ti) have?
A) 0.352 kg
B) 0.122 kg
C) 0.820 kg
D) 0.280 kg
E) 0.632 kg
Answer: D
Diff: 3 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.8a

53) What mass, in mg, does 2.63 moles of nickel have?
A) 44.8 mg
B) 2.23×10^4 mg
C) 129 mg
D) 3.56×10^5 mg
E) 1.54×10^5 mg
Answer: E
Diff: 3 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.8a

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54) How many moles of Kr are contained in 398 mg of Kr?
A) 4.75×10^{-3} moles Kr
B) 33.4 moles Kr
C) 2.11×10^{-4} moles Kr
D) 2.99×10^{-3} moles Kr
E) 1.19×10^{-4} moles Kr
Answer: A
Diff: 3 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.8a

55) How many moles of Cs are contained in 595 kg of Cs?
A) 2.23×10^{2} moles Cs
B) 4.48×10^{3} moles Cs
C) 7.91×10^{4} moles Cs
D) 1.26×10^{3} moles Cs
E) 5.39×10^{2} moles Cs
Answer: B
Diff: 3 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.8a

56) How many Li atoms are contained in 97.9 g of Li?
A) 5.90×10^{25} Li atoms
B) 7.09×10^{21} Li atoms
C) 8.49×10^{24} Li atoms
D) 4.27×10^{22} Li atoms
E) 4.18×10^{24} Li atoms
Answer: C
Diff: 3 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.8b

57) How many iron atoms are contained in 354 g of iron?
A) 2.62×10^{25} Fe atoms
B) 2.13×10^{26} Fe atoms
C) 4.69×10^{24} Fe atoms
D) 3.82×10^{24} Fe atoms
E) 9.50×10^{22} Fe atoms
Answer: D
Diff: 3 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.8b

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58) How many phosphorus atoms are contained in 158 kg of phosphorus?
A) 3.07×10^{27} phosphorus atoms
B) 2.95×10^{27} phosphorus atoms
C) 3.25×10^{28} phosphorus atoms
D) 1.18×10^{24} phosphorus atoms
E) 8.47×10^{24} phosphorus atoms
Answer: A
Diff: 3 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.8b

59) Calculate the mass, in g, of 1.9×10^{24} atoms of Pb.
A) 3.9×10^{2} g
B) 2.4×10^{2} g
C) 3.2×10^{2} g
D) 1.5×10^{2} g
E) 6.5×10^{2} g
Answer: E
Diff: 3 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.8b

60) Calculate the mass, in kg, of 4.87×10^{25} atoms of Zn.
A) 5.29 kg
B) 1.89 kg
C) 8.09 kg
D) 1.24 kg
E) 1.09 kg
Answer: A
Diff: 4 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.8b

61) Calculate the mass (in ng) of 2.33×10^{20} atoms of oxygen.
A) 6.19×10^{6} ng
B) 1.62×10^{7} ng
C) 2.25×10^{3} ng
D) 3.73×10^{6} ng
E) 4.69×10^{7} ng
Answer: A
Diff: 4 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.8b

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62) Describe an atom and what it is made up of according to modern atomic theory.
Answer: An atom is made up of a nucleus surrounded by electrons. The nucleus contains protons (positively charged particles) and neutrons (neutral particles) and is where most of the mass of an atom comes from, but is a tiny fraction of an atom's volume. The nucleus is surrounded by negatively charged electrons, the same number as there are protons in the nucleus. An atom is therefore neutral overall.
Diff: 2 Var: 1 Page Ref: 2.4
Global: G1, G8

63) Why do the isotopes of the same element have the same atomic size?
Answer: Isotopes only differ in the number of neutrons contained within the nucleus. Since the size of an atom is determined by the electrons, isotopes of the same element should be the same size.
Diff: 1 Var: 1 Page Ref: 2.5
Global: G1, G8
LO: 2.5

64) Why doesn't a mass spectrum of silver have a peak at 107.9 amu?
Answer: The average atomic mass of silver is 107.9 amu, but there are no atoms of silver that weigh 107.9 amu. One isotope weighs more and another weighs less.
Diff: 1 Var: 1 Page Ref: 2.5
Global: G1, G8
LO: 2.5

65) Are anions typically larger or smaller than their corresponding atom? Why?
Answer: Anions are larger than their corresponding atom because the anion contains more electrons than the atom. Since electrons repel one another **and** determine the size of the atom or ion, adding electrons to the atom to form an anion makes it larger.
Diff: 1 Var: 1 Page Ref: 2.5
Global: G1, G8
LO: 2.5

66) Give the name of the element whose symbol is Na.
Answer: sodium
Diff: 2 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.5

67) Describe the difference between ions and isotopes.
Answer: Ions have the loss or gain of electrons; isotopes differ in the number of neutrons.
Diff: 2 Var: 1 Page Ref: 2.5
Global: G1, G8
LO: 2.5

68) Why do elements in the same group tend to have similar chemical properties?
Answer: Since elements in the same group have the same number of valence electrons (similar electron configurations) they tend to have similar chemical reactivity, since chemical reactions typically involve valence electrons.
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Global: G1, G8

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69) What group of elements in the periodic table are the most unreactive and why?
Answer: The noble gases are the most unreactive since they do not combine with other elements to form compounds.
Diff: 1 Var: 1 Page Ref: 2.6
Global: G1, G8

70) Define atomic mass.
Answer: The atomic mass represents the average mass of the isotopes that compose that element weighted according to the natural abundance of each isotope.
Diff: 1 Var: 1 Page Ref: 2.7
Global: G1, G8
LO: 2.7

71) An atom of ^{14}C contains _____ protons.
A) 6
B) 20
C) 8
D) 10
E) 14
Answer: A
Diff: 1 Var: 17 Page Ref: 2.5
Global: G2
LO: 2.5

72) An atom of ^{131}Xe contains _____ electrons

.

A) 131
B) 185
C) 77
D) 123
E) 54
Answer: E
Diff: 1 Var: 17 Page Ref: 2.5
Global: G2
LO: 2.5

73) The atomic number of an atom of ^{80}Br is _____.
A) 115
B) 35
C) 45
D) 73
E) 80
Answer: B
Diff: 1 Var: 17 Page Ref: 2.5
Global: G2
LO: 2.5

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74) An ion has 8 protons, 9 neutrons, and 10 electrons. The symbol for the ion is _____.
A) $^{17}O^{2-}$
B) $^{17}O^{2+}$
C) $^{19}F^{+}$
D) $^{19}F^{-}$
E) $^{17}Ne^{2+}$
Answer: A
Diff: 1 Var: 10 Page Ref: 2.5
Global: G2
LO: 2.5

75) How many electrons does the Al^{3+} ion possess?
A) 16
B) 10
C) 6
D) 0
E) 13
Answer: B
Diff: 1 Var: 10 Page Ref: 2.5
Global: G2
LO: 2.5

76) How many protons does the Br^- ion possess?
A) 34
B) 36
C) 6
D) 8
E) 35
Answer: E
Diff: 1 Var: 10 Page Ref: 2.5
Global: G2
LO: 2.5

77) Predict the charge of the most stable ion of bromine.
A) 2+
B) 1+
C) 3+
D) 1-
E) 2-
Answer: D
Diff: 1 Var: 10 Page Ref: 2.6
Global: G2
LO: 2.6

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78) Predict the charge of the most stable ion of potassium.
A) 3+
B) 1-
C) 2+
D) 2-
E) 1+
Answer: E
Diff: 1 Var: 10 Page Ref: 2.6
Global: G2
LO: 2.6

79) What is the chemical symbol for titanium?
A) Th
B) Ti
C) Tl
D) Tm
Answer: B
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

80) What is the chemical symbol for mercury?
A) Ag
B) Au
C) Hg
D) Pb
Answer: C
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

81) What is the chemical symbol for copper?
A) Co
B) Cr
C) Cu
D) C
Answer: C
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

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82) Which element has the chemical symbol, Ru?
A) rubidium
B) ruthenium
C) rutherfordium
D) rhodium
Answer: B
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

83) Which element has the chemical symbol, S?
A) selenium
B) silicon
C) sulfur
D) scandium
Answer: C
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

84) Which are isotopes? An atom that has an atomic number of 20 and a mass number of 42 is an isotope of an atom that has
A) an atomic number of 21 and a mass number of 42.
B) an atomic number of 20 and a mass number of 40.
C) 22 neutrons and 20 protons.
D) 22 protons and 20 neutrons.
Answer: B
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

85) Which of the following represent isotopes?
A: $^{32}_{15}\mathrm{X}$ B: $^{32}_{16}\mathrm{X}$ C: $^{31}_{15}\mathrm{X}$ D: $^{34}_{17}\mathrm{X}$

A) A and B
B) A and C
C) A and D
D) C and D
Answer: B
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

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86) How many protons (p) and neutrons (n) are in an atom of $^{90}_{38}Sr$?

A) 38 p, 52 n
B) 38 p, 90 n
C) 52 p, 38 n
D) 90 p, 38 n
Answer: A
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

87) How many protons (p) and neutrons (n) are in an atom of barium-130?
A) 56 p, 74 n
B) 56 p, 130 n
C) 74 p, 56 n
D) 130 p, 56 n
Answer: A
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

88) What is the element symbol for an atom that has 5 protons and 6 neutrons?
A) B
B) C
C) H
D) Na
Answer: A
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

89) How many electrons are in a neutral atom of bromine-81?
A) 1
B) 35
C) 36
D) 81
Answer: B
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90) Identify the chemical symbol of element Q in $^{80}_{34}Q$.

A) Br
B) Hg
C) Pd
D) Se
Answer: D
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

91) An atom of ^{118}Xe contains _____ neutrons.
A) 54
B) 172
C) 64
D) 110
E) 118
Answer: C
Diff: 2 Var: 17 Page Ref: 2.5
Global: G2
LO: 2.5

92) The mass number of an atom of ^{128}Xe is _____.
A) 54
B) 182
C) 74
D) 128
E) 120
Answer: D
Diff: 2 Var: 17 Page Ref: 2.5
Global: G2
LO: 2.5

93) What is the identity of element Q if the ion Q^{2+} contains 10 electrons?
A) C
B) O
C) Ne
D) Mg
Answer: D
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

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94) How many electrons are in the ion, Cu^{2+}?
A) 27
B) 29
C) 31
D) 64
Answer: A
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

95) How many electrons are in the ion, P^{3-}?
A) 12
B) 18
C) 28
D) 34
Answer: B
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

96) In which of the following sets do all species have the same number of electrons?
A) F^-, Ne, Mg^{2+}
B) Ge, Se^{2-}, Br^-
C) K^+, Rb^+, Cs^+
D) Br, Br^-, Br^+
Answer: A
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

97) In which of the following sets do all species have the same number of protons?
A) F^-, Ne, Mg^{2+}
B) Ge, Se^{2-}, Br^-
C) K^+, Rb^+, Cs^+
D) Br, Br^-, Br^+
Answer: D
Diff: 2 Var: 5 Page Ref: 2.5
Global: G2
LO: 2.5

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98) Cesium belongs to the _____ group of the periodic table.
A) alkali metal
B) alkaline earth metal
C) halogen
D) noble gas
Answer: A
Diff: 1 Var: 5 Page Ref: 2.6
Global: G2

99) Iodine belongs to the _____ group of the periodic table.
A) alkali metal
B) alkaline earth metal
C) halogen
D) noble gas
Answer: C
Diff: 1 Var: 5 Page Ref: 2.6
Global: G2

100) Argon belongs to the _____ group of the periodic table.
A) alkali metal
B) alkaline earth metal
C) halogen
D) noble gas
Answer: D
Diff: 1 Var: 5 Page Ref: 2.6
Global: G2

101) Barium belongs to the _____ group of the periodic table.
A) alkali metal
B) alkaline earth metal
C) halogen
D) noble gas
Answer: B
Diff: 1 Var: 5 Page Ref: 2.6
Global: G2

102) Which of the following elements has chemical properties similar to tellurium?
A) fluorine
B) hydrogen
C) nitrogen
D) sulfur
Answer: D
Diff: 1 Var: 5 Page Ref: 2.6
Global: G2

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103) Which of the following elements is a gas at room temperature?
A) bromine
B) carbon
C) helium
D) sodium
Answer: C
Diff: 1 Var: 5 Page Ref: 2.6
Global: G2

104) Which of the following elements is **not** a solid at room temperature?
A) Ag
B) Al
C) Xe
D) Fe
Answer: C
Diff: 1 Var: 5 Page Ref: 2.6
Global: G2

105) Which of the following elements is classified as a semimetal?
A) calcium
B) boron
C) fluorine
D) uranium
Answer: B
Diff: 1 Var: 5 Page Ref: 2.6
Global: G2

106) Which of the following elements is a good conductor of heat and electricity?
A) carbon
B) chlorine
C) neon
D) aluminum
Answer: D
Diff: 1 Var: 5 Page Ref: 2.6
Global: G2

107) Which one of the following elements is a **poor** conductor of heat and electricity?
A) copper
B) fluorine
C) iron
D) lead
Answer: B
Diff: 1 Var: 5 Page Ref: 2.6
Global: G2

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108) All of the following elements are nonmetals **except**
A) barium.
B) carbon.
C) hydrogen.
D) oxygen.
Answer: A
Diff: 1 Var: 5 Page Ref: 2.6
Global: G2

109) Identify an anion.
A) an atom that has lost an electron
B) an atom that has gained an electron
C) an atom that has lost a neutron and a proton
D) an atom that has gained a neutron
Answer: B
Diff: 2 Var: 9 Page Ref: 2.6
Global: G2

110) Give the number of neutrons in Al^{3+}.
A) 10
B) 16
C) 17
D) 13
E) 14
Answer: E
Diff: 2 Var: 5 Page Ref: 2.6
Global: G2
LO: 2.6

111) How many electrons are in nickel?
A) 28
B) 30
C) 31
D) 30.7
E) 58.7
Answer: A
Diff: 1 Var: 5 Page Ref: 2.6
Global: G2
LO: 2.6

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112) The U.S. Mint produced pure silver quarter commemorative coins in 1992, each coin weighing 5.67 g. How many silver atoms are present in each coin?

A) 6.02×10^{23}

B) 3.15×10^{22}

C) 1.14×10^{23}

D) 1.14×10^{-23}

Answer: B
Diff: 2 Var: 1 Page Ref: 2.8
Global: G4
LO: 2.8

113) Which set has the same number of protons?

A) Br, Br^-, Br^+

B) N, O, F

C) Na^+, Mg^{2+}, Al^{3+}

D) K^+, Rb^+, Cs^+

Answer: A
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2
LO: 2.3

114) Which of the following statements is **not** correct?

A) Atoms are invisible.

B) Atoms are made of subatomic particles.

C) Each element contains different atoms.

D) An atom has mass.

Answer: A
Diff: 1 Var: 1 Page Ref: 2.1
Global: G2

115) Which of the following assumptions of Dalton's Atomic Theory are no longer valid?

A) Each element is composed of atoms.

B) All atoms of a given element have the same mass and other properties that distinguish them from the atoms of other elements.

C) Atoms combine in simple, whole-number ratios to form compounds.

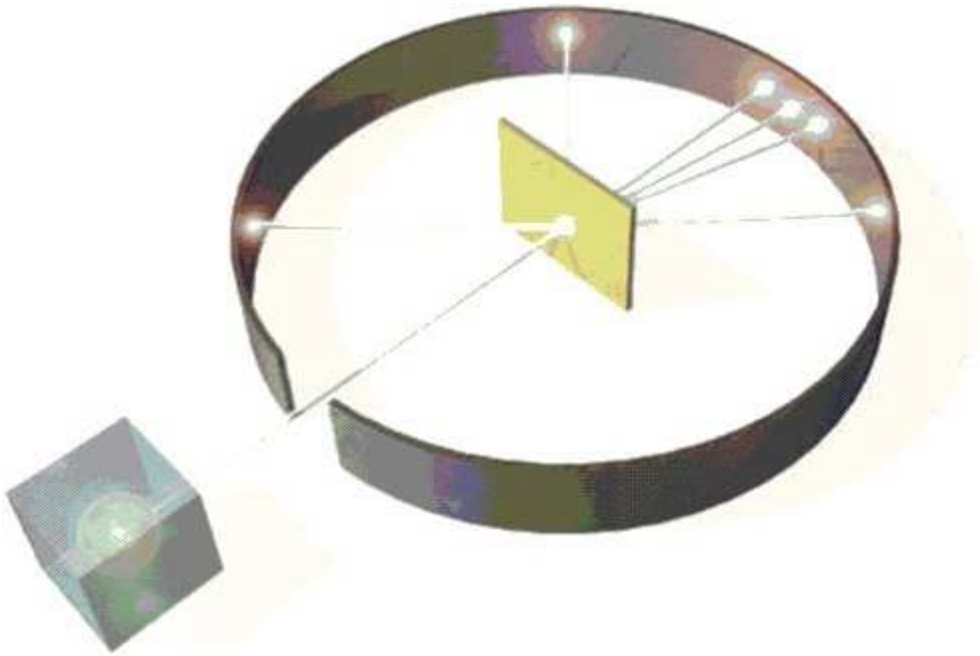
D) Atoms of one element cannot change into atoms of another element.

Answer: A
Diff: 1 Var: 1 Page Ref: 2.2
Global: G2, G5
LO: 2.2

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116) Rutherford's gold foil experiment and results are given in the following figure (Rutherford's Gold Foil Experiment: Rutherford directed alpha particles at a thin sheet of gold foil. Most of the particles passed through the foil, but a small fraction was deflected, and a few even bounced backward.) (Figure 2.6, page 51; Tro P3e).
Which of the following statements best explains the experimental results?



A) Positively and negatively charged particles are uniformly distributed in the atom.
B) Most of the atom's mass and all of its negative charge are contained in a small core.
C) Most of the atom's mass and all of its positive charge are contained in a small core.
D) All of the atom's mass and all of its positive and negative charges are contained in a small core.
Answer: C
Diff: 1 Var: 1 Page Ref: 2.4
Global: G2

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