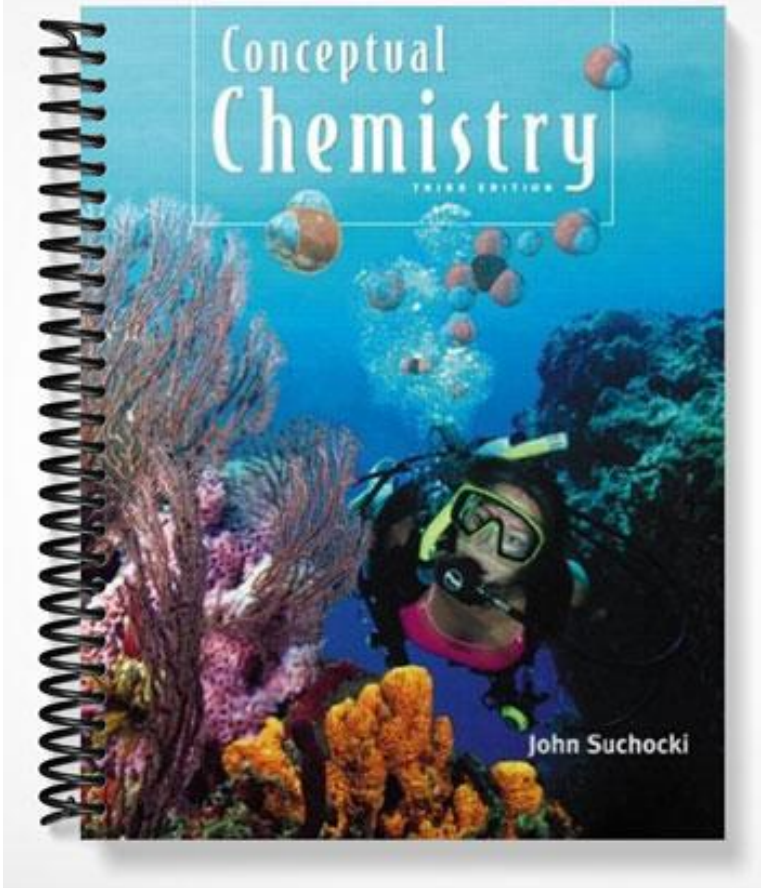
TEST BANK



Conceptual Chemistry, 3e (Suchocki)

Chapter 2 Elemetns of Chemistry

2.1 Matter Has Physical and Chemical Properties

1) Which of the following would be considered a physical property?
   A) density
   B) flammability
   C) corrosion resistance
   D) reactivity towards acid
   E) oxygen sensitivity
   Answer: A
   Diff: 1

2) Which of the following would *not* be considered a physical property?
   A) temperature at which a material catches on fire
   B) color
   C) conductivity
   D) hardness
   E) temperature at which a material melts
   Answer: A
   Diff: 1

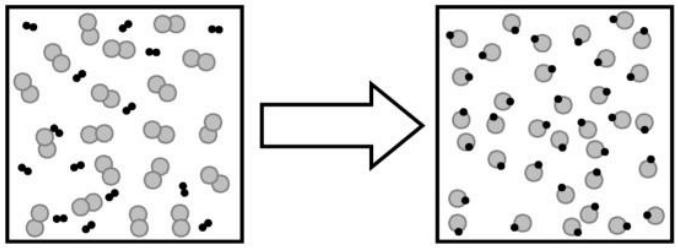
3) Which of the following would be considered a chemical property?
   A) reactivity towards water
   B) melting temperature
   C) boiling temperature
   D) conductivity
   E) flexibility
   Answer: A
   Diff: 1

4) Which of the following would *not* be considered a chemical property?
   A) the temperature at which a liquid will boil
   B) light sensitivity
   C) whether a metal will *rust* or not
   D) whether a material will *dissolve* in acid or not
   E) the tendency of a material to explode
   Answer: A
   Diff: 1

5) Which of the following is an example of a physical change?
   A) water boiling and being converted into steam
   B) water being electrolyzed and being converted in hydrogen and oxygen
   C) iron metal reacting with oxygen to form rust
   D) a candy bar being digested by a student
   E) charcoal being converted into ash
   Answer: A
   Diff: 1

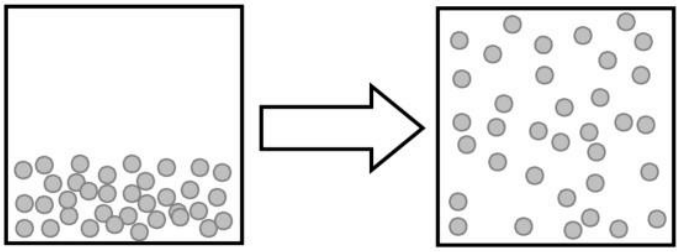
6) Which of the following is an example of a chemical change?
A) gasoline being used in the engine of a car producing exhaust
B) water freezing into ice crystals
C) aftershave or perfume on your skin generating a smell
D) a piece of metal expanding when heated, but returning to original size when cooled
E) breaking a glass window
Answer: A
Diff: 1

7) The following image describes what type of change?



A) a chemical change
B) a physical change
C) a change in state
D) no change
E) an elemental change
Answer: A
Diff: 1

8) The following image describes which type of change?



A) a physical change
B) a chemical change
C) an elemental change
D) a change in reactivity
E) no change
Answer: A
Diff: 1

9) The boiling point of methanol is 65°C and the boiling point of ethanol is 78°C. Which of the following statements is true?
   A) At 70°C you would have methanol gas and liquid ethanol.
   B) At 90°C you would have methanol and ethanol as solids.
   C) At 50°C you would have methanol and ethanol as gases.
   D) At 40°C the methanol reacts with the ethanol.
   E) none of the above
   Answer: A
   Diff: 1

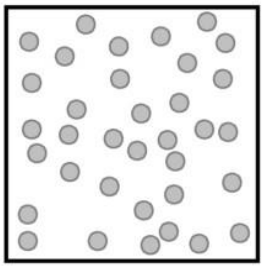
10) Water and ethanol can be separated by heating the ethanol until it boils away from the water. What type of change is this?
   A) a physical change
   B) a chemical change
   C) a molecular change
   D) a decomposition
   E) none of the above
   Answer: A
   Diff: 1

11) Which of the following is *not* a chemical change?
   A) a rock being crushed to powder
   B) grass growing
   C) grape juice turning into wine
   D) a loaf of bread growing mold
   E) wood burning to ash
   Answer: A
   Diff: 1

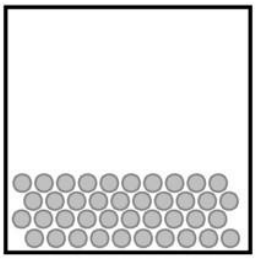
2.2 Atoms Are the Fundamental Components of Elements

1) Which of the following images could describe an element at the atomic level?

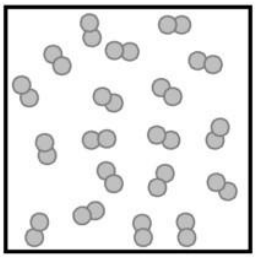
A)



B)



C)



D) none of the images

E) all of the images

Answer: E

Diff: 2

2) Which of the following statements best describes an element?

A) a material consisting of only one type of atom

B) a material that is pure

C) a material that has consistent physical properties

D) a material with more than one type of atom

E) a material that has consistent chemical properties

Answer: A

Diff: 2

3) The element silicon has a melting point of 1,410°C and a boiling point of 2,355°C. It is a weak conductor of electricity, its density is 2.3 grams per cubic centimeter and it easily forms silicon dioxide when exposed to air. Which of the following is a *chemical property* of silicon?
   A) its ability to conduct electricity
   B) its density
   C) its melting point
   D) its ability to react with oxygen
   E) C and D
   Answer: D
   Diff: 2

4) Which of the following elements should exhibit some *metallic* properties and some *nonmetallic* properties?
   A) Zn
   B) S
   C) Ga
   D) C
   E) Si
   Answer: E
   Diff: 1

2.3 Elements Can Combine to Form Compounds

1) Which statement best describes a compound?
   A) a material that is made up of a combination of atoms bonded together
   B) a mixture of more than one element
   C) a mixture of atoms
   D) a material that is made up of a single type of atom
   E) none of the above
   Answer: A
   Diff: 2

2) What is the name of the following compound?
   NaF
   A) sodium fluoride
   B) natural fosfate
   C) natrium fluoride
   D) nitrogen afleck
   E) sodium phosphide
   Answer: A
   Diff: 3

3) What is the name of the following compound?
$CaCl_2$

A) calcium chloride
B) carbon chloride
C) dichlorocalcium
D) calc two
E) dicalcium chloride

Answer: A
Diff: 3

4) What is the name of the following compound?
CO_2

A) carbon dioxide
B) dicobalt
C) dioxocarbon
D) calcium oxide
E) calcium dioxide

Answer: A
Diff: 3

5) What is the name of the following compound?
SF_3

A) sulfur trifluoride
B) sulfur fluoride
C) trifluorosulphide
D) fluorine sulphide
E) none of the above

Answer: A
Diff: 3

6) How many atoms are in one molecule of Na_2SO_4?

A) 7
B) 2
C) 4
D) 3
E) 24

Answer: A
Diff: 2

7) How many atoms of Oxygen (O) are in H_3OClO_4

A) 5
B) 2
C) 3
D) 7
E) 1

Answer: A
Diff: 2

8) How many different elements are in the compound $C_6H_{12}O_6$?
A) 3
B) 6
C) 24
D) none of the above
E) All of the elements are the same.
Answer: A
Diff: 2

9) If you have *two molecules* of TiO_2, how many oxygen atoms would you have?
A) 4
B) 2
C) 3
D) 6
E) none
Answer: A
Diff: 3

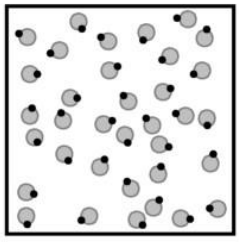
10) If you have one molecule of TiO_2, how many molecules of O_2 does it contain?
A) None, O_2 is a different molecule than TiO_2.
B) One, TiO_2 is a mixture of Ti and O_2.
C) Two, TiO_2 is a mixture of Ti and 2 O.
D) Three, TiO_2 contains three molecules.
E) none of the above
Answer: A
Diff: 3

2.4 Most Materials Are Mixtures

1) What is the difference between a *compound* and a *mixture*?
A) A mixture can be physically separated into its components; a compound cannot be physically separated into its components.
B) A compound can be physically separated into its components; a mixture cannot be physically separated into its components.
C) A compound is just a mixture of elements.
D) The components of a mixture do not have the same properties individually as they do when mixed.
E) The components of a compound have the same properties individually as they do when mixed.
Answer: A
Diff: 2

2) Which of the following is a mixture?
A) air
B) gold
C) salt
D) iron
E) helium
Answer: A
Diff: 2

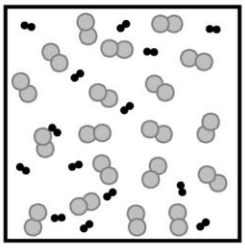
3) The following image represents which kind of matter?



A) a compound
B) a mixture
C) an element
D) none of the above
E) all of the above

Answer: A
Diff: 1

4) The following image represents which kind of matter?



A) a mixture
B) a compound
C) an element
D) none of the above
E) all of the above

Answer: A
Diff: 1

5) A combination of two or more substances in which they no longer retain their chemical properties is called a(n) _____.

A) mixture
B) compound
C) heterogeneous mixture
D) periodic trend
E) suspension

Answer: B
Diff: 1

2.5 Chemists Classify Matter as Pure or Impure

1) Which of the following is a pure substance?
   A) baking soda
   B) salt water
   C) cooking oil
   D) duct tape
   E) orange juice
Answer: A
Diff: 2

2) Which of the following would be considered a heterogeneous mixture?
   A) salad dressing
   B) water
   C) milk
   D) vegetable oil
   E) vinegar
Answer: A
Diff: 1

3) How would you classify the following material?

swimming pool water
   A) homogenous mixture
   B) heterogeneous mixture
   C) a pure element
   D) a pure compound
   E) depends on how many children have been in it
Answer: A
Diff: 1

4) Which of the following would be considered a homogeneous mixture?
   A) wine
   B) hydrogen cyanide
   C) rusty iron
   D) pretzel
   E) sugar
Answer: A
Diff: 1

5) When blue food coloring is dissolved in water, the result is a _____.
   A) homogeneous mixture called a solution
   B) homogeneous mixture called a suspension
   C) heterogeneous mixture called a solution
   D) heterogeneous mixture called a suspension
   E) pure liquid
Answer: A
Diff: 2

6) If you filter sea water to remove all of the particles you would be left with a clear _____.
A) homogenous mixture called a solution
B) homogeneous mixture called a suspension
C) heterogeneous mixture called a solution
D) heterogeneous mixture called a suspension
E) pure liquid
Answer: A
Diff: 2

7) How would you classify the following material?

milk
A) a suspension
B) a heterogeneous mixture
C) a solution
D) an element
E) a compound
Answer: A
Diff: 2

8) How would you classify the following material?

coffee (black)
A) a suspension
B) a heterogeneous mixture
C) a solution
D) an element
E) a compound
Answer: C
Diff: 2

9) How would you classify the following material?

coffee (with milk)
A) a suspension
B) a heterogeneous mixture
C) a solution
D) an element
E) a compound
Answer: A
Diff: 2

10) How would you classify the following material?

a cappuccino (with foam)

A) a suspension
B) a heterogeneous mixture
C) a solution
D) an element
E) a compound

Answer: B
Diff: 2

2.6 Elements Are Organized in the Periodic Table by Their Properties

1) Which of these *does not* describe a metal at room temperature?

A) gas
B) solid
C) liquid
D) shiny
E) bendable

Answer: A
Diff: 1

2) Which of these is not a metal?

A) selenium (atomic no. = 34)
B) gallium (atomic no. = 31)
C) lithium (atomic no. = 3)
D) potassium (atomic no. = 19)
E) vanadium (atomic no. = 23)

Answer: A
Diff: 1

3) Which of these properties describes a metal?

A) conducts heat very well
B) brittle
C) fragile
D) transparent
E) doesn't conduct electricity very well

Answer: A
Diff: 1

4) Which of the following describes a nonmetal?

A) poor conductor of electricity
B) shiny
C) malleable
D) ductile
E) good conductor of heat

Answer: A
Diff: 1

5) Which of the following is not a nonmetal?
A) titanium (atomic no. = 22)
B) sulfur (atomic no. = 16)
C) selenium (atomic no. = 34)
D) xenon (atomic no. = 54)
E) helium (atomic no. = 2)
Answer: A
Diff: 1

6) What are metaloids?
A) elements that have some properties like metals and some like nonmetals
B) elements that are smaller than metals
C) elements found in asteroids
D) elements that are larger than nonmetals
E) elements that have properties different than either the metals or the nonmetals
Answer: A
Diff: 1

7) Which of the following is a metalloid?
A) antimony (atomic no. = 51)
B) zinc (atomic no. = 30)
C) iodine (atomic no. = 53)
D) uranium (atomic no. = 92)
E) sulfur (atomic no. = 16)
Answer: A
Diff: 1

8) Which atom is largest?
A) Rb
B) K
C) Na
D) Li
E) H
Answer: A
Diff: 1

9) Which atom is smallest?
A) Be
B) Mg
C) Ca
D) Sr
E) All are the same size.
Answer: A
Diff: 1

10) Which of the following elements are in the same period as magnesium (Mg)?
A) Cl
B) Ca
C) Mn
D) Sr
E) none of the above
Answer: A
Diff: 1

11) Which of the following elements are in the same group as silicon (Si)?
A) C
B) P
C) As
D) B
E) none of the above
Answer: A
Diff: 1

12) Elements that are in the same _____ have a tendency to have very similar chemical properties due to periodic trends.
A) group
B) period
C) textbook
D) compound
E) row
Answer: A
Diff: 1

13) Which of the following is not the name of a chemical family?
A) heavy metals
B) transition metals
C) alkali metals
D) alkaline-earth metals
E) noble gases
Answer: A
Diff: 1

14) Which chemical family is composed almost entirely of *man-made* elements?
A) the actinides
B) the lanthanides
C) the halogens
D) all of the above
E) none of the above
Answer: A
Diff: 3

15) Which element would have chemical properties the most similar to chlorine (Cl)?
A) Br
B) O
C) Ar
D) S
E) Na
Answer: A
Diff: 3

16) The repeating trends that take place when examining the elements are called _____.
A) periodicity
B) the family cycle
C) the metal shift
D) a group conscience
E) none of the above
Answer: A
Diff: 2

17) Which of the following elements is a gas at room temperature?
A) argon (Ar)
B) lead (Pb)
C) cesium (Cs)
D) indium (In)
E) lithium (Li)
Answer: A
Diff: 2

18) Which of the following elements is a halogen?
A) argon (Ar)
B) lead (Pb)
C) chlorine (Cl)
D) indium (In)
E) lithium (Li)
Answer: C
Diff: 2

19) Which of the following elements is an alkali metal?
A) argon (Ar)
B) lead (Pb)
C) cerium (Cr)
D) indium (In)
E) lithium (Li)
Answer: E
Diff: 2

20) Which of the following elements is a transition metal?
A) xenon (Xe)
B) lead (Pb)
C) chlorine (Cl)
D) silver (Ag)
E) lithium (Li)
Answer: D
Diff: 2

21) Which of the following elements is in the fourth period?
A) chromium (Cr)
B) hydrogen (H)
C) beryllium(Be)
D) carbon (C)
E) zirconium (Zr)
Answer: A
Diff: 2

22) Which of the following elements will most likely be shiny and flexible?
A) rhodium (Rh)
B) hydrogen (H)
C) helenium (Se)
D) iodine (I)
E) silicon (Si)
Answer: A
Diff: 2

23) Which of the following physical properties would you expect for krypton (Kr)?
A) a gas at room temperature
B) hard
C) brittle
D) shiny
E) conducts electricity
Answer: A
Diff: 2

2.7 End-of-Chapter Concept Builders and Supporting Calculations

Multiple Choice with Text References

1) While visiting a foreign country a foreign-speaking citizen tries to give you verbal directions to a local museum. After multiple attempts he is unsuccessful because
   A) you are not smart enough to understand simple directions.
   B) it is difficult to navigate through an unfamiliar city.
   C) you don't understand the language.
   D) none of the above

   Answer: C

   Explanation: A)
   B)
   C) See Concept Building 2-31. You simply don't yet understand the language. Likewise, don't assume chemistry is difficult because you are not yet familiar with its language.
   D)

   Diff: 1

2) If someone is able to explain an idea to you using small familiar words, what does this say about how well that person understands the idea?
   A) Small words simply mask the complexity of the idea revealing how little the person truly understands the concept.
   B) A person who completely understands an idea uses complex words to express complex ideas.
   C) A person who completely understands an idea is capable of explaining it using language that is familiar to both of you.
   D) A person who uses small familiar words to explain an idea is usually hiding a lack of understanding.

   Answer: C

   Explanation: A)
   B)
   C) See Concept Building 2-33. It is easy to hide a lack of understanding by using big words you know others are not familiar with. If you have truly mastered a concept, you should be able to explain that concept to others using a language that is familiar to you both.
   D)

   Diff: 1

3) What is the best way to really prove to yourself that you understand an idea?
   A) Tape record your explanation and play it back for yourself to be sure it makes sense.
   B) Formulate questions concerning the idea and see if your friends can answer them.
   C) Articulate the idea to others and confirm their understanding when you finish.
   D) Ask someone else to explain the idea to you to see if their explanation matches yours.

   Answer: C

   Explanation: A)
   B)
   C) See Concept Building 2-35. If you can adequately articulate this idea to others, then you have passed the ultimate test of understanding.
   D)

   Diff: 1

4) A skillet is lined with a thin layer of cooking oil followed by a layer of unpopped popcorn kernels. Upon heating the kernels all pop thereby escaping the skillet. Which of the following physical and/or chemical changes occurred?
   A) The water within each kernel is heated to the point that it would turn into water vapor as the kernels popped (physical change).
   B) The starches within the kernels are cooked by the high temperatures (chemical change).
   C) Both A and B occur.
   D) Physical and chemical changes cannot occur without a real chemical reaction taking place.

   Answer: C

   Explanation: A)
   B)
   C) See Concept Building 2-37. As each kernel is heated, the water within each kernel is also heated to the point that it would turn into water vapor. The shell of the kernel, however, is air tight and this keeps the water as a superheated liquid. Eventually the pressure exerted by the superheated water exceeds the holding power of the kernel and the water bursts out as a vapor, which causes the kernel to pop. These are physical changes. The starches within the kernel, however, are also cooked by the high temperatures, and this is an example of a chemical change.
   D)

   Diff: 2

5) Alcohol wiped across a table top rapidly disappears. Which of the following is true?
   A) As the alcohol evaporates it soaks up energy from the table top which is thus cooled.
   B) The alcohol is absorbed by the table top in a reaction that releases heat.
   C) The alcohol and table top undergo a chemical reaction producing a fragrant vapor.
   D) Alcohol is an organic substance composed of continuous matter without empty space and is immediately annihilated when it comes into contact with the table top.

   Answer: A

   Explanation: A) See Concept Building 2-39 & 2-41. The alcohol evaporates as it soaks up energy from the table top which is thus cooled. This transfer of energy that occurs during a change in phase is discussed in more detail in Chapter 8.
   B)
   C)
   D)

   Diff: 2

6) Red colored Kool-aid crystals are added to a still glass of hot water. The same amount of crystals are added to a second still glass filled with the same amount of cold water. With no stirring, which of the following would occur?
   A) Without stirring, both glasses will reach uniform color in the same amount of time since they both contain identical amounts of water.
   B) The glass of cold water will reach a uniform red color first since there are no heat convection currents to impede the distribution of the dye.
   C) The glass of hot water will reach a uniform red color first since the higher kinetic energy provides for faster moving molecules to more quickly distribute the dye.
   D) The Kool-aid crystals will never dissolve in either glass until the glasses are stirred.

   Answer: C

   Explanation: A)
   B)
   C) See Concept Building 2-43. The dye should become dispersed uniformly within the hot water first. The higher the temperature, the greater the average kinetic energy of the molecules. Because the molecules within the hot water are moving faster they have a quicker effect on the dye of the Kool-aid crystals. Furthermore, the hot water will tend to have more convection currents that will also help to distribute the dye throughout the water.
   D)

   Diff: 1

7) The same amount of red colored Kool-aid crystals are added to a still glass of thick sugar water and a still glass of distilled water. Both are the same temperature. Neither is stirred. Which should become uniform in color first?
   A) The glass of distilled water should become uniform in color first.
   B) The glass of thick sugar water should become uniform in color first.
   C) Both glasses will become uniform in color at exactly the same time.
   D) Without stirring, it is unlikely that either glass will ever become uniform in color.

   Answer: A

   Explanation: A) See Concept Building 2-45. Sugar molecules are much more massive than are water molecules. As such, they have more inertia and are not moving so fast as are the water molecules of the same temperature. In a sense, they ?impede? the dispersion of the dye throughout the glass. This is why you can expect the glass containing distilled water to become uniform in color first.
   B)
   C)
   D)

   Diff: 3

8) You take 50 mL of small BB's and combine them with 50mL of large BB's and you get a total of 90 mL of BB's of mixed size. Which of the following statements best explains this?
A) Since the density of the small BB's is less than that of the large BB's their volumes do not add directly to one another.
B) This is not possible since the Law of Conservation of Volume would be violated.
C) The total volume actually gets larger since mixing the BB's would leave additional air space because of the difference in size of the two BB sets.
D) Many of the smaller BB's are able to fit within the pockets of space that were empty within the 50mL of large BB's.

Answer: D

Explanation: A)
B)
C)
D) See Concept Building 2-47. The 50mL plus 50mL do not add up to 100mL because within the mix, many of the smaller BB's are able to fit within the pockets of space that were empty within the 50mL of large BB's

Diff: 2

9) In the winter Vermonters make a tasty treat called "sugar on snow" in which they pour boiled-down maple syrup onto a scoop of clean fresh snow. As the syrup hits the snow it forms a delicious taffy. Which of the following changes are involved in the making of sugar on snow?
A) Boiling down the maple syrup involves the evaporation of water.
B) The syrup warms the snow causing it to melt while the syrup becomes more viscous.
C) As the maple syrup is boiled the sugar within the syrup begins to carmelize, which is an example of a chemical change.
D) All of the above changes are involved in the making of sugar on snow.

Answer: D

Explanation: A)
B)
C)
D) See Concept Building 2-49. Boiling down the maple syrup involves the evaporation of water. As the syrup hits the snow it warms the snow causing it to melt while the syrup becomes more viscous. These are all examples of physical changes. Interestingly, as the maple syrup is boiled the sugar within the syrup begins to carmelize, which is an example of a chemical change.

Diff: 2

10) What happens to the properties of elements across any period of the periodic table?
A) The elements tend to become more metallic in nature since they are increasing in atomic number.
B) The elements get much larger in size because of the addition of more protons and electrons.
C) The properties of the elements gradually change across any period of the periodic table.
D) All of the above are true.
Answer: C
Explanation: A)
B)
C) See Concept Building 2-51. Across any period (horizontal row), the properties of elements gradually change until the end of the period. The next element in the next period has properties that are abruptly different.
D)
Diff: 1

11) Each night you measure your height just before going to bed. When you arise each morning, you measure your height again and consistently find that you are 1 inch taller than you were the night before but only as tall as you were 24 hours ago! Is what happens to your body in this instance best described as a physical change or a chemical change?
A) chemical change because it involves your body
B) physical change because it readily reverses
C) chemical change because it involves changes in your bone structure
D) physical change because water expands as it freezes
Answer: B
Explanation: A)
B) See Concept Building 2-53. That this process is so reversible suggests a physical change. As you sleep in a reclined position, pressure is taken off of the discs within your spinal column, which allows them to expand so that you are significantly taller in the morning. Astronauts returning from extended space visits may be up to two inches taller upon their return.
C)
D)
Diff: 1

12) Classify the following changes as physical or chemical. Wood burns to ashes; water begins to boil; grass grows; a rock is crushed to powder.

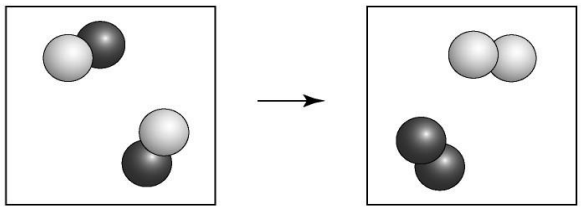
A) chemical; physical; chemical; chemical
B) chemical; physical; physical; physical
C) physical; physical; chemical; physical
D) chemical; physical; chemical; physical

Answer: D

Explanation: A)
B)
C)
D) See Concept Building 2-54. Remember, that when a substance changes its chemical identity, this is a chemical change and you no longer that what you had. During a physical change, the substance in question maintains its chemical identity (its made of the same molecules, for example) but its physical attributes, such as phase, are now different.

Diff: 2

13) Is the following transformation representative of a physical change or a chemical change?



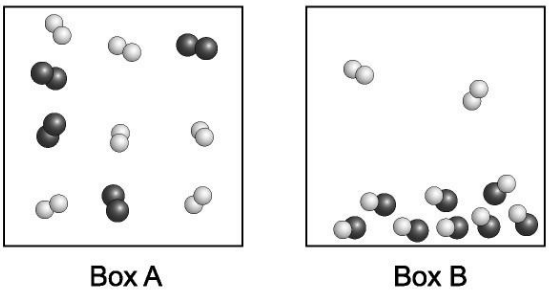
A) chemical change because of the formation of elements
B) physical change because a new material has been formed
C) chemical change because the atoms are connected differently
D) physical change because of a change in phase

Answer: C

Explanation: A)
B)
C) See Concept Building 2-55. The atoms are connected differently in B than they are in A, which means that this represents a chemical change.
D)

Diff: 2

14) Each sphere in the diagrams below represents an atom. Joined spheres represent molecules. Assume the two boxes are at the same temperature. Which box contains a higher boiling point liquid?



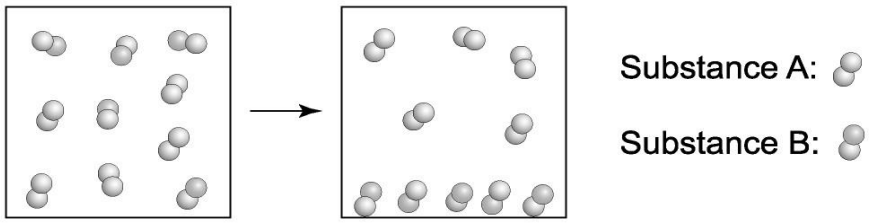
A) Box A
B) Box B
C) both Box A and Box B
D) neither box

Answer: B

Explanation: A)
B) See Concept Building 2-56. Box B appears to contain a liquid as evidenced by the randomly oriented molecules condensed at the bottom of the box. These molecules in the liquid phase of Box B represent a compound because they consist of different types of atoms joined together. The physical properties of the compound in Box B will be markedly different from the elements in Box A. For example, if the two boxes are of the same temperature, we would see that the compound of Box B has a higher boiling point.
C)
D)

Diff: 1

15) Based on the information given in the following diagrams, which substance has the lower boiling point: one made from molecule A or one made from molecule B?



A) molecule A because it is the first to transform into a liquid
B) molecule B because it is first to transform into a liquid
C) molecule A because it remains in the gaseous phase
D) molecule B because it remains in the gaseous phase

Answer: A

Explanation: A) See Concept Building 2-57. The change from A to B represents a physical change because no new types of molecules are formed. The collection of blue/yellow molecules on the bottom of B represents these molecules in the liquid or solid phase after having been in the gaseous phase in A. This must occur with a decrease in temperature. At this lower temperature the purely yellow molecules are still in the gaseous phase which means that they have a lower boiling point, while the blue/yellow molecules have a higher boiling point.

B)

C)

D)

Diff: 2

16) What chemical change occurs when a wax candle burns?

A) The wax near the flame melts.

B) The molten wax is pulled upwards through the wick.

C) The wax within the wick is heated to about 600°C.

D) The heated wax molecules combine with oxygen molecules.

Answer: D

Explanation: A)

B)

C)

D) See Concept Building 2-58. The melting of the wax near the flame is an example of a physical change. This liquid wax is drawn up the wick where it is burned, which is an example of a chemical change.

Diff: 1

17) The oldest known elements in the periodic table are the ones with

A) the lowest atomic numbers.

B) the highest atomic numbers.

C) odd looking atomic symbols.

D) atomic symbols that match their modern names.

Answer: C

Explanation: A)

B)

C) See Concept Building 2-59. The ones that have atomic symbols that don't match their modern atomic names. Examples include iron, Fe, gold, Au, and copper, Cu.

D)

Diff: 1

18) Oxygen atoms are used to make water molecules. Does this mean that oxygen, O_2, and water, H_2O, have similar properties?

A) Yes, and this explains how fish are able to breathe water.

B) Yes, but that their properties are similar is only a coincidence.

C) No, but their similar properties are only a coincidence.

D) No, compounds are uniquely different from the elements from which they're made.

Answer: D

Explanation: A)

B)

C)

D) See Concept Building 2-60. All the oxygen present in this material is bound to hydrogen atoms making water molecules. This water is uniquely different from the elements oxygen, O_2, and hydrogen, H_2, from which it is made.

The oxygen our bodies are designed to breathe is gaseous molecular oxygen, O_2. We drown when we breathe in water because it contains so little O_2.

Diff: 1

19) Oxygen, O_2, is certainly good for you. Does it follow that if small amounts of oxygen are good for you then large amounts of oxygen would be especially good for you?

A) Yes. This is the reason patients are given pure (100%) oxygen during medical procedures.

B) Yes. Increased oxygenation of the bloodstream is good for you and can increase your life span.

C) No. Breathing 100% oxygen for extended periods of time can be damaging to the body.

D) No. Large amounts of oxygen will absorb hydrogen from the body and increase the amount of water in the body causing an imbalance in electrolytes.

Answer: C

Explanation: A)

B)

C) See Concept Building 2-61. No, it doesn't follow that what is good for you in small quantities is also good for you in large quantities. Small amounts of aspirin can cure a headache or help ward against heart disease. Eating the whole bottle of aspirin, however, is lethal. Likewise, breathing air that is 21% oxygen is good, but breathing 100% oxygen for extended times can be damaging because oxygen, O_2, is a rather reactive molecule. Too much of it can cause a multitude of unwanted side effects, including premature aging.

D)

Diff: 2

20) A sample of water that is 99.9999 percent pure contains 0.0001 percent impurities. Consider from Chapter 1 that a glass of water contains on the order of a trillion trillion (1×10^{24}) molecules. If 0.0001 percent of these molecules were the molecules of some impurity, about how many impurity molecules would this be?

A) 1000 (one thousand: 1×10^3)

B) 1,000,000 (one million: 1×10^6)

C) 1,000,000,000 (one billion: 1×10^9)

D) 1,000,000,000,000,000,000 (one million trillion: 1×10^{18})

Answer: D

Explanation: A)

B)

C)

D) See Concept Building 2-63. A percentage is transformed into a fraction by dividing by 100. To find 50 percent of something, for example, you multiply that something by 50/100 = 0.50. The percentage 0.0001 percent transforms into the fraction 0.000001, which when multiplied by 1×10^{24} equals 1×10^{18}. This is certainly a lot of pesticide molecules in your glass of water. The number of water molecules, however, far exceeds this number (see Exercise 10) and so these pesticides are not problematic. As an analogy, consider that there were about 12 billion pennies minted in 1990. This is certainly a lot of pennies, but they are still, nonetheless, relatively rare because the total number of pennies in circulation is far greater--on the order of over 300 billion.

Diff: 3

21) What can be said about drinking water that is 99.9999 percent free of some poison, such as a pesticide?

A) In each 10,000 parts of the contaminated water there is one part pesticide and 9999 parts pure water.

B) In each 100,000 parts of the contaminated water there is one part pesticide and 99,999 parts pure water.

C) The ratio of water molecules to pesticide molecules in the glass is so great that drinking the water is not problematic.

D) The water is highly contaminated and surely not fit to drink.

Answer: C

Explanation: A)

B)

C) See Concept Building 2-65. There are certainly a lot of pesticides molecules in your glass of water. The number of water molecules, however, far exceeds this number and so these pesticides are not problematic. As an analogy, consider that there were about 12 billion pennies minted in 1990. This is certainly a lot of pennies, but they are still, nonetheless, relatively rare because the total number of pennies in circulation is far greater-on the order of over 300 billion.

D)

Diff: 3

22) What do chicken noodle soup and garden soil have in common?
A) They are both examples of heterogeneous mixtures.
B) They both contain elements.
C) They are both examples of compounds.
D) nothing
Answer: A
Explanation: A) See Concept Building 2-66. Chicken noodle soup and soil both consist of many different component all mixed together. In both of these materials one can visually distinguish many of these components.
B)
C)
D)
Diff: 2

23) Read carefully. Twice as much as one million trillion is two million trillion. One thousand times as much is 1000 million trillion. One million times as much is 1,000,000 million trillion, which is the same as one trillion trillion. Thus, one trillion trillion is a million times greater than a million trillion. Got that? So how many more water molecules than impurity molecules are there in a glass of water that is 99.9999 percent pure?
A) 1000 (one thousand: 1×10^3) more water molecules than impurities molecules
B) 1,000,000 (one million: 1×10^6) more water molecules than impurities molecules
C) 1,000,000,000 (one billion: 1×10^9) more water molecules than impurities molecules
D) 1,000,000,000,000,000,000 (one million trillion: 1×10^{18}) more water molecules than impurities molecules
Answer: B
Explanation: A)
B) See Concept Building 2-67. Find the number of water molecules in the glass and then compare them to the number of impurity molecules. According to Exercise 9, there are a trillion trillion water molecules in a glass of water. If this water is 99.9999 percent pure, then it also contains a million trillion impurity molecules. A trillion trillion is a million times more than a million trillion, therefore, there are a million times more water molecules than there are impurity molecules. In other words, for every million water molecules, there is only one impurity molecule. Thus, in a sample of water that is 99.9999 percent pure, the number of water molecules far exceeds the number of impurity molecules, even though there are trillions of each.
C)
D)
Diff: 3

24) Someone argues that he or she doesn't drink tap water because it contains thousands of molecules of some impurity in each glass. How would you respond in defense of the water's purity, if it indeed does contain thousands of molecules of some impurity per glass?
A) Impurities aren't necessarily bad, in fact, they may be good for you.
B) The water contains water molecules and each water molecule is pure.
C) There's no defense. If the water contains impurities it should not be drunk.
D) Compared to the billions and billions of water molecules, a thousand molecules of something else is practically nothing.

Answer: D

Explanation: A)
B)
C)
D) See Concept Building 2-68. Study the solution to Exercise 9 to make a strong case that this sample of water is ultra ultra pure!

Diff: 2

25) Classify the following as element, compound, or mixture, and justify your classifications: table salt, stainless steel, table sugar, aluminum, ice.
A) mixture; element; compound; element; element
B) compound; mixture; compound element; compound
C) mixture; compound; mixture; element; compound
D) compound; element; compound; element; compound

Answer: B

Explanation: A)
B) See Concept Building 2-69. Salt, sodium chloride; classification: compound. Stainless steel, mix of iron and carbon; Sugar, chemical name: sucrose; classification: compound. Aluminum, metal; classification: in pure form--element (Sold commercially as a mixture of mostly aluminum with trace metals, such as magnesium.) Ice, dihydrogen oxide; classification: in pure form--compound.
C)
D)

Diff: 2

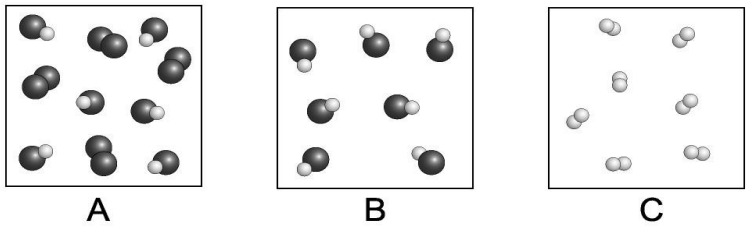
26) If you eat metallic sodium or inhale chlorine gas, you stand a strong chance of dying. Let these two elements react with each other, however, and you can safely sprinkle the compound on your popcorn for better taste. What is going on?
A) After these two elements react they lose the potential energy to cause harm.
B) All elements are inherently dangerous
C) Sodium and chlorine from the elemental form is more concentrated than the sodium and chlorine we get from sodium chloride.
D) Sodium chloride has nothing in common with sodium and chlorine.

Answer: D

Explanation: A)
B)
C)
D) See Concept Building 2-70. Chemical compounds have physical and chemical properties that are different from the elements from which they are made. Oxygen, for example, is a gas at room temperature, as is hydrogen. These two elements combine, however, to make water, which is a liquid at room temperature. Similarly sodium and chlorine, although toxic by themselves, react to form a chemical compound, sodium chloride, that is uniquely different.

Diff: 2

27) Each circle represents an atom. Which of the following boxes contains an element? A compound? A mixture?



A) element: A, C; compound: A, B, C; mixture: A, B
B) element: C; compound: A, B; mixture: B
C) element: A, C; compound: A, B; mixture: A
D) element: A, C; compound: A, B; mixture: A, B

Answer: C

Explanation: A)
B)
C) See Concept Building 2-71. Box a: mixture. Box b: compound. Box c: element. There are three different types of molecules shown altogether in all three boxes: one with two open circles joined, one with a solid and open circle joined, and one with two solid circles joined.
D)

Diff: 2

28) The systematic names for water, ammonia, and methane are dihydrogen monoxide, H_2O; trihydrogen nitride, NH_3; and tetrahydrogen carbide, CH_4. Why do most people, including chemists, prefer to use the common names for these compounds?

A) The common names are shorter and easier to pronounce.
B) These compounds are encountered frequently.
C) The common names are more widely known.
D) all of the above

Answer: D

Explanation: A)
B)
C)
D) See Concept Building 2-72. Because they are commonly encountered, most people, including chemists, prefer to use the common names of these compounds. The systematic names, however, are more descriptive because they describe what elements are used to make these compounds.

Diff: 1

29) What is the difference between a compound and a mixture?
A) They both consist of atoms from different elements.
B) The way in which their atoms are bonded together.
C) One is a solid and the other is a liquid.
D) The components of a mixture are not chemically bonded together.

Answer: D

Explanation: A)
B)
C)
D) See Concept Building 2-73. The atoms within a compound are chemically bonded together and do not come apart through the course of a physical change. The components of a mixture, however, may be separated from each other by physical means.

Diff: 2

30) How might you separate a mixture of sand and salt?
A) with tweezers and a magnifying glass
B) just add water
C) heat the mixture until one of the components melts
D) Two of the above answers are reasonable.

Answer: D

Explanation: A)
B)
C)
D) See Concept Building 2-74. Add the mixture of sand and salt to some water. Stir, and then filter the sand. Rinse the sand several times with fresh water to make sure that all of the salt has been removed. Collect all the salty water and evaporate away the water. The residue that remains will be the salt. After the sand dries, you've got just the sand. For a mixture of iron and sand, take advantage of the fact that only iron is attracted to a magnet.

Diff: 2

31) Mixtures can be separated into their components by taking advantage of differences in the chemical properties of the components. Why might this separation method be less convenient than taking advantage of differences in the physical properties of the components?
A) A chemical property involves a chemical change so that you no longer have what you had.
B) Chemical properties are not as apparent as are physical properties.
C) The chemical properties of the components of a mixture are too similar to each other.
D) The chemical properties of the components of a mixture are too different from each other.
Answer: A
Explanation: A) See Concept Building 2-75. The chemical property involves a chemical change. Through a chemical change, the material changes its fundamental identity. Thus, you may have separated it, but now it is something else, which means that you need to convert it back to what it was through a second chemical change. This can be an energy and time intensive process that is much less efficient than separating based upon differences in physical properties.
B)
C)
D)
Diff: 1

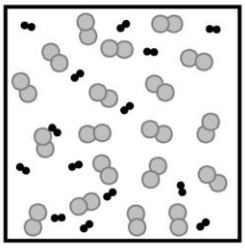
32) Why can't the elements of a compound be separated from one another by physical means?
A) They are too homogeneous when found within a compound.
B) Their atoms are too tightly bound to one another.
C) Elements found within a compound tend to be inert.
D) Elements tend not to be soluble in water.
Answer: B
Explanation: A)
B) See Concept Building 2-76. The transformation of elements into a compound is necessarily a chemical change. To go backwards--from the compound back into the elements--would also be an example of a chemical change. The only way to separate an element from a compound, therefore, would be by chemical means.
C)
D)
Diff: 2

33) How does a suspension differ from a solution?
A) A suspension is a heterogeneous mixture whose components can be separated by simple filtration. A solution is a homogeneous mixture which cannot be separated by simple filtration.
B) A suspension is a heterogeneous mixture consisting of different phases whereas a solution is a homogeneous mixture consisting of a single phase.
C) Although a solution and suspension are both homogeneous mixtures, only the components of a suspension will separate by spinning the mixture in a centrifuge.
D) The difference between a suspension and a solution can only be determined by chemical means.
Answer: C

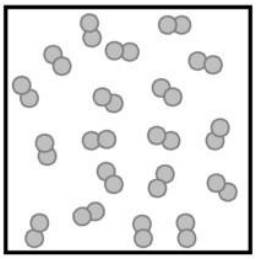
Explanation: A)
B)
C) See Concept Building 2-77. A centrifuge can be used to determine if a mixture is a solution or a suspension because it will separate the components of a suspension.
D)

Diff: 1

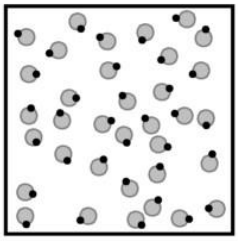
34) Which of the following boxes represents a suspension?



A



B



C

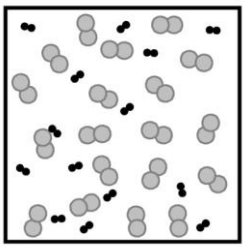
A) Only A represents a suspension.
B) Only B represents a suspension.
C) Only C represents a suspension.
D) All of the boxes represent a suspension.

Answer: A

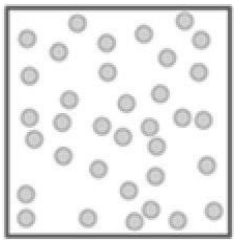
Explanation: A) See Concept Building 2-79. Box "A" shows oval molecules dissolved within smaller circle molecules.
B)
C)
D)

Diff: 1

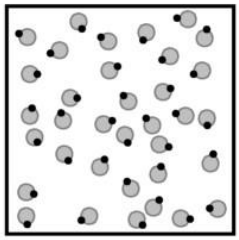
35) Which of the following boxes represents a compound?



A



B



C

A) only A
B) only B
C) only C
D) both A and C

Answer: C

Explanation: A)
B)
C) See Concept Building 2-81. Boxes "B" and "C" each show a pure material, which may be indicative of a compound.
D)

Diff: 1

36) Germanium, Ge (number 32), computer chips operate faster than silicon, Si (number 14), computer chips. So how might a gallium, Ga (number 31), chip compare with a germanium chip?
A) A gallium chip would be even faster because the gallium is more metallic.
B) A gallium chip would be slower because its electrons are more loosely held.
C) Gallium is located just below aluminum, which is widely known to be an electrical insulator.
D) Gallium is more nonmetallic and so it does not conduct electrons very well.

Answer: A

Explanation: A) See Concept Building 2-83. Based upon its location in the periodic table we find that gallium, Ga, is more metallic in character than germanium, Ge. This means that gallium should be a better conductor of electricity. Computer chips manufactured from gallium, therefore, operate faster than chips manufactured from germanium. (Gallium has a low melting point of 30°C, which makes it impractical for use in the manufacture of computer chips. Mixtures of gallium and arsenic, however, have found great use in the manufacture of ultra fast, though relatively expensive, computer chips.)
B)
C)
D)

Diff: 2

37) Is the air in your house a homogeneous or heterogeneous mixture?
A) homogeneous because it is mixed very well
B) heterogeneous because of the dust particles it contains
C) homogeneous because it is all at the same temperature
D) heterogeneous because it consists of different types of molecules

Answer: B

Explanation: A)
B) See Concept Building 2-84. A shaft of strong light, such as sunlight, passing through the air of your house reveals the presence of many floating dust particles. Because of these dust particles, we can say that the air inside your house is an example of a heterogeneous mixture. Fortunately, our nasal passage ways serve to filter out much of this dust.
C)
D)

Diff: 2

38) Helium, He, is a nonmetallic gas and the second element in the periodic table. Rather than being placed adjacent to hydrogen, H, however, helium is placed on the far right of the table because
A) hydrogen and helium repel one another.
B) the sizes of their atoms are vastly different.
C) they come from different sources.
D) helium is most similar to other group 18 elements.
Answer: D
Explanation: A)
B)
C)
D) See Concept Building 2-85. Helium is placed over to the far right-hand side of the periodic table in group 18 because it has physical and chemical properties most similar to those of the other elements of group 18.
Diff: 1

39) About how many elements do you have access to as a consumer of market goods.
A) none
B) one
C) ten
D) one hundred
Answer: C
Explanation: A)
B)
C) See Concept Building 2-86. Here is a list of sixteen. aluminum (as in aluminum foil); tin (as in tin foil and tin cans); carbon (as in graphite and diamond); helium (as in a helium balloon); nitrogen (which comprises about 78 percent of the air we breathe); oxygen (which comprises about 21 percent of the air we breathe); argon (which comprises about 1 percent of the air we breathe); silicon (as in integrated circuits for computers and calculators); sulfur (a mineral used for many industrial processes); iron (as in most metal structures); chromium (as in chromium bumpers on cars); zinc (as in the coating of any galvanized nail or as the insides of any post 1982 copper penny); copper (as in copper pennies); nickel (as in nickel nickels); silver (as in jewelry and old silver coins); gold (as in jewelry); platinum (as in jewelry); mercury (as in mercury thermometers).
D)
Diff: 1

40) Strontium, Sr (number 38), is especially dangerous to humans because it tends to accumulate in calcium-dependent bone marrow tissues (calcium, Ca, number 20). This fact relates to the organization of the periodic table in that strontium and calcium are both
A) metals.
B) in group 2 of the periodic table.
C) made of relatively large atoms.
D) soluble in water.
Answer: B
Explanation: A)
B) See Concept Building 2-87. Calcium is readily absorbed by the body for the building of bones. Since calcium and strontium are in the same atomic group they have similar physical and chemical properties. The body, therefore, has a hard time distinguishing between the two and strontium is absorbed just as though it were calcium.
C)
D)
Diff: 2

41) How many different Chapter 2 key terms are found within the following description about the element selenium, Se (number 34): Selenium is a nonmetallic element found just adjacent to the metalloids in the periodic table. Its atomic symbol is Se and it has physical and chemical properties similar to those of other elements in its group. A material containing nothing but selenium, Se, is defined as a pure sample, which is an ideal state not practically achieved. Other materials found within this sample would make it impure. If these impurities are all mixed together in the same phase, it is a homogeneous mixture. If selenium reacts with another element it may form a compound, which will have different physical and chemical properties. This element is found in the fourth period and its atoms are likely smaller than those of the elements to its left, which is an example of a periodic trend.
A) none
B) about six
C) about twelve
D) about thirty
Answer: C
Explanation: A)
B)
C) See Concept Building 2-88. Selenium is a nonmetallic element found just adjacent to the metalloids in the periodic table. Its atomic symbol is Se and it has physical and chemical properties similar to those of other elements in its group. A material containing nothing but selenium, Se, is defined as a pure sample, which is an ideal state not practically achieved. Other materials found within this sample would make it impure. If these impurities are all mixed together in the same phase, it is a homogeneous mixture. If selenium reacts with another element it may form a compound, which will have different physical and chemical properties. This element is found in the fourth period and its atoms are likely smaller than those of the elements to its left, which is an example of a periodic trend. Check out that vocabulary!
D)
Diff: 1

42) Why isn't dirt listed in the periodic table?
A) The periodic table lists only elements made of one kind of material. Dirt is a mixture of elements and compounds.
B) Elements like dirt and air are so common that there is no need to list them in the periodic table.
C) Dirt **IS** listed in the periodic table but is not easily recognized because it is listed as one of the rare earths with its old scientific name, dysprosium, symbol Dy.
D) None of the above is true.
Answer: A
Explanation: A)
B)
C) See Concept Building 2-89. Dirt is a mixture of chemical compounds and much more. The periodic table is used to show elements, which are materials that consists of only one kind of atom.
D)
Diff: 1

43) Should the periodic table be memorized? Why?
A) Yes. Like the alphabet, we need to memorize the periodic table in order to easily write the language of chemistry.
B) Yes. Without memorizing the periodic table, one would not have any real understanding of how and why chemical compounds are put together.
C) No. The periodic table changes every year. Memorizing it would be a waste of time.
D) No. The periodic table is a reference to be used, not memorized.
Answer: D
Explanation: A)
B)
C)
D) See Concept Building 2-91. You need not memorize the periodic table any more than you need to memorize a dictionary. Both the periodic table and the dictionary should be readily available to you when you need them.
Diff: 1

44) Half-frozen fruit punch is always sweeter than the same fruit punch completely melted because
A) the sugar sinks to the bottom.
B) crystallization is a purifying process.
C) the half-frozen fruit punch is warmer.
D) sugar molecules are less soluble in a half-frozen solution.
Answer: B
Explanation: A)
B) See Concept Building 2-93. Fruit punch is a mixture and mixtures can be separated into their components by differences in physical properties. Initially, freezing water molecules selectively bind to themselves to form ice crystals. This excludes the sugar molecules. The effect is that the liquid phase loses water molecules to the ice crystals. The proportion of sugar molecules in the liquid phase, therefore, increases, which makes the liquid phase tastes sweeter. Upon complete freezing, the sugar become trapped within the ice crystals and the frozen juice can be used as a popsicle. Suck hard on a frozen popsicle, however, and you'll find that only the concentrated sugar solution pulls into your mouth.
C)
D)
Diff: 2

45) Many dry cereals are fortified with iron, which is added to the cereal in the form of small iron particles. How might these particles be separated from the cereal?
A) add water and the iron particles will float to the top
B) blend the cereal to a fine consistency and pass through a filter
C) collect the iron filings with a magnet
D) heat the cereal so that the iron particles melt and thereby coalesce
Answer: C
Explanation: A)
B)
C) See Concept Building 2-94. Based upon the differences in physical properties. The iron fillings are attracted to a magnet while the cereal is not. Try this with your next box of iron fortified cereal.
D)
Diff: 1

46) Is aging primarily an example of a physical or chemical change?
A) Aging is an example of a physical change since it involves our physical bodies getting older each day.
B) Aging is an example of a chemical change involving the chemical reformation of our biomolecules.
C) Aging cannot be classified as either a physical or chemical change.
D) None of the above is true.

Answer: B

Explanation: A)
B) See Concept Building 2-95. The changes that occur as we age involve the chemical reformation of our biomolecules. These are chemical changes
C)
D)

Diff: 2

47) Which of the following would most likely be true concerning drugs that help to extend the human life span?
A) The drug companies could argue that the cost of researching and developing the drugs was very expensive.
B) If the demand for these drugs is very high, then the cost of the drugs would be high.
C) Both A and B are true.
D) Neither A nor B is true.

Answer: C

Explanation: A)
B)
C) See Concept Building 2-97. The drug companies could argue that the cost of researching and developing the drugs was most expensive. The high price of the drugs would allow these companies to recoup their loses and thus remain in business to produce even more wonder drugs. Also, if the demand for these drugs is very high, then people would be willing to pay the high prices. Furthermore, the cost of keeping some one alive via more traditional means is already very expensive. The drug companies could use this expense as a starting point for their pricing structure. For example, if it costs $10,000 to keep you alive without the drug, then they could charge you $9,000 for the drug. Their advertisements could focus on the fact that not only are they saving your life, but they are saving you $1,000 as well. What a deal!
D)

Diff: 1

48) Which problem is best addressed by scientists and which is best addressed by politicians: How to increase the human life span; How to get food and medicine to the needy?
A) Both problems are best addressed by scientists because scientists are trained to solve problems.
B) Both problems are social issues and therefore best addressed by politicians.
C) Scientists are best suited to address the issue of increasing the human life span while politicians would be best equipped to deal with how to get food and medicine to the needy.
D) Scientists are best suited to deal with how to get food and medicine to the needy while politicians would be best equipped to address the issue of increasing the human life span.

Answer: C

Explanation: A)
B)
C) See Concept Building 2-99. Scientists are well equipped to answer the question of how to increase the human life span, as they are to answer how to get crops to be more productive, or how to create better medicines, or how to make our water safer to drink. The problem of getting food and medicine to the needy is better addressed by the politician. Scientists, however, like all citizens, are free to help with worthy causes as they see fit to the best of their abilities.
D)

Diff: 1

49) The Colorado River water in Colorado has a salinity of about 50ppm. By the time this water passes into Mexico its salinity has increased to about 1000ppm. How many milligrams of salts have been added to each liter of water?
A) 95 milligrams have been added to each liter of water.
B) 950 milligrams have been added to each liter of water.
C) 9500 milligrams have been added to each liter of water.
D) 9.5 milligrams have been added to each liter of water.

Answer: B

Explanation: A)
B) See Supporting Calculations 2-101. The difference between these two concentrations is 950 ppm or 950 milligrams per liter. The amount of salts added to the river water is 950 milligrams.
C)
D)

Diff: 1

50) Dioxins are highly toxic compounds that form upon the burning of certain plastics, especially PVC. Dioxins bioaccumulate, which means that animals higher in the food chain tend to have greater concentrations. Most of our exposure to dioxins comes from the food we eat rather than the air we breathe. How many milligrams of dioxins are there in a liter of milk containing 0.16ppt?

A) 0.16 mg

B) 1.6×10^{-3} mg = 0.0016 mg

C) 1.6×10^{-7} mg = 0.00000016 mg

D) 1.6×10^{-5} mg = 0.000016 mg

Answer: C

Explanation: A)

B)

C) See Supporting Calculations 2-103. A concentration of 0.16 ppt is 0.16 nanograms per liter. Convert nanograms to milligrams by the following equalities: 1 gram = 10^3 mg, 1 gram = 10^9 ng.

(0.16 ng)(1 gram/10^9 ng)(10^3 mg/1 gram) = 1.6×10^{-7} mg = 0.00000016 mg

D)

Diff: 2

51) Does the concentration of chlorine in drinking water tend to increase or decrease as it leaves the water treatment plant and disperses into the community? Why?

A) Increases. As the chlorine reacts with the bacteria in the water, more chlorine is produced.

B) Increases. As the water evaporates the chlorine concentration would increase in the remaining water.

C) Decreases. Evaporative processes and reaction with organic bacteria would decrease the chlorine concentration.

D) Neither. The chlorine concentration in the water does not vary as the water is dispersed into the community.

Answer: C

Explanation: A)

B)

C) See Supporting Calculations 2-105. The concentration of chlorine in drinking water tends to decrease as it leaves the water treatment plant because of evaporative processes but also because the chlorine is reacting with the organic tissues of bacteria. The greater the bacterial content, the quicker the chlorine concentration decreases. Technicians can gauge the bacterial content of water by monitoring changes in chlorine concentration along the delivery system.

D)

Diff: 2