1) Which of the following are electrically neutral?
A) proton  B) electron  C) neutron  D) all of these  E) none of these
Answer: C

2) Which of these atoms has the most mass?
A) lead  B) iron  C) hydrogen  D) uranium  E) All have the same mass.
Answer: D

3) What makes an element distinct?
A) the number of neutrons  B) the number of electrons  C) the total mass of all the particles
D) the number of protons  E) none of these
Answer: D

4) Which has the greatest number of protons in its nucleus?
A) lead  B) gold  C) mercury  D) silver
Answer: A

5) If two protons are removed from an oxygen nucleus, the result is
A) carbon  B) neon  C) helium  D) nitrogen  E) none of these.
Answer: A

6) The atomic number of an element is the same as the number of its
A) protons  B) nucleons  C) neutrons  D) neither of these.
Answer: A

7) Different isotopes of an element have different numbers of
A) neutrons  B) neutrinos  C) photons  D) protons  E) none of these.
Answer: A

8) The half-life on an isotope is one day. At the end of three days, how much of the isotope remains?
A) one-quarter  B) none  C) one-half  D) one-eighth  E) none of these
Answer: D

9) When an alpha particle is ejected from a nucleus, the nucleus then has less
A) mass  B) charge  C) both of these  D) neither of these.
Answer: C

10) There is a greater proportion of carbon-14 in
A) old bones  B) new bones  C) same in each.
Answer: B

11) Carbon-14 is produced in the atmosphere principally by
A) plants and animals  B) nitrogen bombardment  C) cosmic ray bombardment.
D) photosynthesis  E) none of these.
Answer: C

12) Most of the radioactivity we personally encounter comes from
A) fallout from past and present testing of nuclear weapons  B) medical X rays.
C) nuclear power plants  D) the natural environment.
Answer: D

13) Radioactivity in the world is something
A) as old as the world itself  B) relatively new.
Answer: A

14) It's impossible for a hydrogen atom to emit an alpha particle.
A) True  B) False
Answer: A

15) A certain radioactive isotope placed near a Geiger counter registers 120 counts per minute. If the half-life of the isotope is 1 day, what will the count rate be at the end of 4 days?
A) 5 counts/min  B) 7.5 counts/min  C) 30 counts/min  D) 10 counts/min  E) 15 counts/min
Answer: B

16) A solid is not considered fluid because
A) of the heavy nature of its atoms or molecules  B) of the fixed arrangement of its atoms or molecules.
C) its atoms or molecules are under too much pressure  D) its atoms or molecules are bound as close together as possible.
Answer: B

17) Gases are so much easier to squeeze into smaller volumes than liquids or solids because
A) their atoms or molecules are already moving at high speeds  B) they are so much lighter.
C) there is so much space in between the submicroscopic particles  D) they are always warmer than liquids or solids.
Answer: C
18) How is a physical change different from a chemical change?
A) The physical properties of a substance are not altered during a chemical change.
B) The chemical identity of a substance is altered during a physical change.
C) A physical change involves changes in chemical properties.
D) The chemical identity of a substance is not altered during a physical change.
Answer: D

19) During a chemical reaction
A) old atoms stick around merely switching partners.
B) old atoms transform into new ones.
C) old atoms disappear to be replaced by new ones.
D) none of the above.
Answer: A

20) One element is distinguished from another by the number of
A) electrons. B) protons. C) neutrons. D) all of the above.
Answer: B

21) What is the difference between an element and a chemical compound?
A) Only elements are normally found in nature.
B) A chemical compound is always more massive than an element.
C) An element consists of only one type of atom.
D) Only chemical compounds are normally found in nature.
Answer: C

22) When two different elements combine to form a compound, the resulting properties of the compound are
A) about the average of the properties of the two elements.
B) not necessarily anything like those of the elements.
C) predictable based upon the nature of the combining elements.
D) most like the element given in the greatest amount.
Answer: B

23) The components of a mixture are most efficiently separated from one another based upon their
A) similarities in chemical properties. B) similarities in physical properties.
C) differences in physical properties. D) differences in chemical properties.
Answer: C

24) Of the four boxes shown above, which contain(s) chemical compounds?
A) d only B) b and c C) b, c, and d D) b and d E) all of them
Answer: C

25) The proper name for the chemical compound N₂O is
A) nitrogen dioxide B) dinitrogen oxide.
C) nitrogen nitrate. D) nitrogen oxide.
Answer: B

26) Clean dry air is an example of a
A) heterogeneous mixture. B) suspension. C) solution. D) homogeneous mixture. E) two of the above are correct.
Answer: E

In the boxes below, solid circles represent the atoms of one element, while the hollow circles represent the atoms of a second element.
27) Pure material is found in box(es):
   A) b only.    B) a, b, and c.    C) a and c.    D) a only.    E) none of them.
   Answer: B

28) Each solid circle in the boxes below represents an atom of the same element. Each hollow circle represents an atom of a second element. The transformation from left to right is best viewed as a

[Diagram of two boxes with atoms]

A) physical change because there are the same number of atoms in both boxes.
B) chemical change because the atoms are connected differently in each box.
C) chemical change because there are a different number of molecules in each box.
D) chemical change because two types of atoms are involved.
   Answer: B

29) With increasing atomic number, the ionization energy of elements
   A) increases gradually with periodic sudden drops.
   B) decreases continuously.
   C) increases continuously.
   D) decreases gradually with periodic sudden increases.
   Answer: A

30) With increasing atomic number, the atomic size of elements
   A) decreases gradually with periodic sudden increases.
   B) increases gradually with periodic sudden drops.
   C) decreases continuously.
   D) increases continuously.
   Answer: A

31) Elements of the periodic table are listed in order of
   A) atomic number.    B) atomic mass.    C) atomic size.    D) all of the above.
   Answer: A

32) Each vertical column in the periodic table corresponds to an
   A) atomic period.    B) atomic group.
   Answer: B

33) In the periodic table, the metalloids are found
   A) horizontally below the main body.    B) diagonally just right of the center.
   C) vertically to the far left hand side.    D) vertically to the far right hand side.
   Answer: B

34) How many electrons are in the outermost shell of phosphorus (P, atomic number 15)?
   A) 8    B) 15    C) 3    D) 5
   Answer: D

35) As atoms get more massive, they become smaller in size because
   A) more mass means more protons, which act to pull electrons in closer to the nucleus.
   B) their mass becomes more concentrated.
   C) more massive atoms have a greater number of atomic shells.
   D) but they don't!
   Answer: A

36) The alkali metals (group 1) tend to form 1+ ions while the alkali-earth metals (group 2) tend to form 2+ ions because
   A) the charges of these ions corresponds to the number of valence electrons that may be lost.
   B) alkali metals are less massive.
   C) the ion an atom forms is always equal to the group number.
   D) this is a random occurrence.
   Answer: A

37) The atomic number of an atom that contains 32 protons, 30 neutrons and 31 electrons is?
   A) 30    B) 31    C) 32    D) 62    E) none of the above
38) The symbol for lead is:
A) Fe  B) K  C) Pb  D) Fe  E) Ag
Answer: C

39) The symbol for hydrogen in Chinese is?
A)  B)  C)  D) H  E) 
Answer: D

40) The outer shell of electrons in Cl can hold
A) 2 electrons  B) 8 electrons  C) 18 electrons  D) 7 electrons  E) 1 electrons
Answer: B