MULTIPLE CHOICE

1. How are carbon dioxide concentrations determined from thousands of years ago?
   a. analysis of decayed plant material
   b. analysis of ice samples
   c. analysis of the atmosphere
   d. analysis of the Earth's core

2. Which source removes carbon dioxide from the atmosphere?
   a. plants
   b. oceans
   c. phytoplankton
   d. all of the above

3. What is the greenhouse effect?
   a. solar radiation is trapped and reemitted as heat
   b. the increase in plant material
   c. UV radiation is absorbed and reemitted as heat
   d. all of these

4. What happens to most of the UV radiation in our atmosphere?
   a. absorbed by plants
   b. absorbed by greenhouse gases
   c. absorbed by ozone
   d. absorbed by nitrogen

5. How is radiation absorbed?
   a. by increasing the molecular vibrations of molecules
   b. by converting atoms to ions
   c. by breaking chemical bonds
   d. all of the above

6. Which type of radiation is the most energetic?
   a. microwaves
   b. visible
   c. ultraviolet
   d. infrared

7. What is another name for infrared radiation?
   a. gamma rays
   b. heat
   c. kilocalorie
   d. greenhouse gas
8. Which is an example of an anthropogenic contribution to carbon dioxide production?
   a. volcanoes
   b. burning of fossil fuels
   c. forest fires
   d. decaying plant and animal material

9. What does a plant convert carbon dioxide into during photosynthesis?
   a. sugar
   b. water
   c. carbon monoxide
   d. methane

10. What is the problem with increasing amounts of carbon dioxide in the atmosphere?
    a. its lack of consumption in respiration
    b. a rise in pH of ocean water
    c. too much UV radiation being absorbed
    d. global warming

11. Which is not a greenhouse gas?
    a. CO₂
    b. H₂O
    c. CO
    d. CH₄

12. Which of the following is not considered an air pollutant?
    a. water vapor
    b. ozone
    c. nitric oxide
    d. sulfur dioxide

13. Why must the ozone layer in the stratosphere be protected?
    a. ozone poisons incoming, unwanted aliens
    b. ozone absorbs some incoming ultraviolet light
    c. ozone burns up incoming meteorites
    d. ozone prevents oxygen from escaping the earth

14. Ozone-depleting substances typically contain this element
    a. oxygen
    b. sulfur
    c. nitrogen
    d. chlorine

15. What chemical bond is broken by a photon of light in a typical CFC molecule?
    a. C-H
    b. Cl-Cl
    c. H-Cl
    d. C-Cl

16. Chlorofluorocarbons, such as CCl₃F, can cause problems in the upper atmosphere by destroying
    a. nitrogen oxides
    b. oxygen
    c. ozone
d. polynuclear hydrocarbons

17. In a photochemical reaction,
   a. the chemical reaction is energized by light
   b. nitrogen dioxide must be present
   c. ozone is always formed
   d. none of the above

18. Which molecule absorbs UV-B radiation?
   a. O₂
   b. O₃
   c. CO₂
   d. NO₂

19. Which type of chemical bond requires the least amount of energy to break?
   a. single
   b. double
   c. triple
   d. quadruple

20. What does the Chapman cycle illustrate?
   a. the formation and destruction of water
   b. the formation and destruction of carbon dioxide
   c. the formation and destruction of nitrogen dioxide
   d. the formation and destruction of ozone

21. What does one Dobson unit (DU) equal?
   a. 1 ppb
   b. 1 ppm
   c. 100 ppb
   d. 100 ppm

22. Approximately how many ozone molecules can one chlorine atom derived from one CFC molecule react with?
   a. 1
   b. 100
   c. 1000
   d. 100000

23. Why are scientists worried about the ozone hole?
   a. increase in skin cancer
   b. increase in plant growth
   c. decrease in ocean temperature
   d. all of the above

24. Magnesium nitride is made up of magnesium ions and nitride ions. What is the expected formula of magnesium nitride?
   a. MgN
   b. Mg₃N₂
   c. MgN₂
   d. Mg₃N₃
25. Which is expected to form a negative ion?
   a. K
   b. Ne
   c. Na
   d. F

26. If you take three balloons, blow them up and assemble them together, the shape you are most likely to observe is
   a. linear
   b. tetrahedral
   c. pyramidal
   d. planar (triangular)

27. Which pair of atoms is most likely to be covalently bonded?
   a. Na and O
   b. K and F
   c. Ne and O
   d. C and S

28. Which substance has ionic bonds between atoms?
   a. Na₂O
   b. NCl₃
   c. H₂S
   d. CO₂

29. The shape of CH₄ and CCl₄ are best described as
   a. tetrahedral
   b. pyramidal
   c. hexagonal
   d. Octahedral

30. Which atom exists as a diatomic molecule in nature?
   a. carbon
   b. bromine
   c. sulfur
   d. phosphorous
31 Which of the following drawings properly depict a tetrahedron:

(a)  
(b)  
(c)  
(d)  

32 Which of the following is a trigonal pyramidal:

(a)  
(b)  
(c)  
(d)  

33 Pick the best option (most true):

(a) bonds are either ionic or covalent

(b) ionic bonds demonstrate equal sharing of electron pairs

(c) Covalent bonds require sharing of inner-core electrons

(d) All bonding has a degree of ionic and covalent