



Preliminary Knowledge Assessment

Directions: Below is an Attitudinal Survey and Chemical Knowledge Assessment. Complete the following questions to the best of your ability. **Do not put your name on the worksheet.**

What is your Classification?

Fresher Sophomore Junior Senior Other

Do you anticipate that this course (Chemistry of the Environment) will be required for your major?

Yes No Maybe Undecided

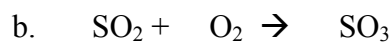
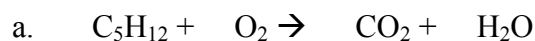
Do you anticipate that this course will be required for your minor?

Yes No Maybe Undecided

Do you anticipate that this course will be required for your professional plans?

Yes No Maybe Undecided

1. Balance the following chemical equations:



2. Using the periodic table, provide the symbol and the mass number for the element that has:

a. 9 protons and 10 neutrons

b. 26 protons and 20 neutrons

3. Write Lewis Structures for the following molecules with atoms bonded in the order written.
- H_2NNH_2
 - HCN
 - $\text{CH}_3\text{CH}_2\text{OH}$

4. Convert 300 nanometers to meters and calculate the frequency of light corresponding to this wavelength.

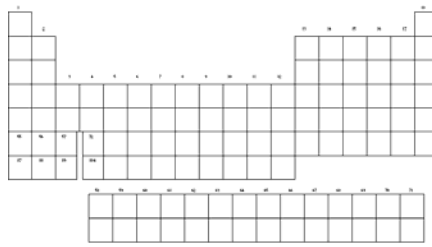
$$1 \text{ nm} = 1 \times 10^{-9}$$

$$c = 3.0 \times 10^8 \text{ meters/sec}$$

5. What is an exothermic reaction?
6. Calculate the molarity of 0.3 moles of HCl in 3.0 L of solution.
7. Name two gases found in the atmosphere which absorb infrared radiation.
8. The modern periodic table has elements arranged in:
- alphabetical order
 - order of increasing atomic number
 - order of increasing metallic content
 - order of increasing neutron content
9. "Normal" rain is:
- acidic
 - neutral
 - basic
10. What is the pH of 5×10^{-4} M solution HNO_3 ?

11. Describe the difference between a substance in its elemental form and a compound.
12. Describe the difference between a compound and a mixture.
13. What is the name of the atmospheric area **closest** to the Earth's surface?
- stratosphere
 - mesosphere
 - troposphere
14. What are the names of the following chemical formulas?
- CrI_3 _____
 - N_2O_3 _____
 - MgCl_2 _____
15. All of the following are constituents of dry air except:
- N_2
 - Ar
 - O_3
 - O_2
16. Ozone in the stratosphere is important to us because:
- it reacts with nitrogen oxides to form photochemical smog.
 - it disrupts O_2 transportation through the body.
 - it reacts with water in the atmosphere to form acid rain.
 - it protects us from harmful UV radiation from the Sun.
 - it causes lung damage if it is inhaled by humans.

17. For a compound to have no net charge:
- the number of protons must be the same as the number of neutrons.
 - the number of electrons must be the same as the number of neutrons.
 - the number of electrons must be the same as the number of protons.
 - the number of isotopes must be known.
18. Atoms of the same element that differ in the number of neutrons are called:
- neutral
 - allotropes
 - lewis structures
 - isotopes
19. CFC's released into the atmosphere by human activity may have residence times up to:
- 5 yrs
 - 25 yrs
 - 50 yrs
 - 100 yrs
 - 120 yrs
20. What type of radiation being re-emitted from the Earth is the major source of energy that leads to the "greenhouse effect"?
21. In chemistry, a mole is defined as:
- 6.63×10^{-34} atoms
 - 6.63×10^{-34} of anything
 - 6.02×10^{23} of anything
 - 3.00×10^8 of anything
 - a little gray furry animal that lives underground and eats worms
22. On the blank periodic table below, shade the area where the non metals are located.



23. A substance that dissolves in water to produce a solution that conducts electricity is referred to as a(n):
- conductor
 - semiconductor
 - non-electrolyte
 - solvent
 - electrolyte
24. Hard water refers to water containing
- Soap
 - Ca^{2+} , Mg^{2+} , and/or Fe^{3+}
 - a lot of debris and particulate matter
 - high sulfate concentration
 - an excess of industrial pollution
25. Does ultraviolet light have a higher or lower frequency than visible light?
26. To obtain 1.5 moles of iron, how many grams of iron must you weigh out?
27. What is the molecular formula for the following compounds?
- magnesium nitrate _____
 - aluminum oxide _____
28. How many electrons does Ca^{2+} have?
29. What does the First Law of Thermodynamics state?
30. Draw a structural formula of chloroform, CHCl_3 ?

31. What unit is not used to describe heat?
- Joules
 - Calories
 - pH
 - BTU
32. Why are the elements listed in the far right column of the periodic table called rare or inert gases?
- because it is hard to find them
 - because they are expensive
 - because they are unreactive
 - because they are heavy
33. The Second Law of Thermodynamics concerns the directionality of energy in the universe. What does it state?
34. What would you expect to find in an aquifer?
35. In solubility rules, what does the phrase “like dissolves like” refer to?
36. A solution with a pH of 8 is a(n):
- acid
 - base
 - neutral