Mrs. Nielsen Chemistry

Name _____ Date _____ Period _____

Unit 2 Exam Review
Electromagnetic Spectrum, Electron Configurations and Periodic Trends

Multiple Choice

_____ 1. Within the p-block, the elements at the top of the table _____ than those at the bottom.
a. have larger radii
b. are more metallic
c. have lower ionization energies
d. are less metallic

_____ 2. For each successive electron removed from an atom, the ionization energy _____.
a. increases
b. decreases
c. remains the same
d. shows no pattern

_____ 3. The most characteristic property of the noble gases is that they are _____.
a. metallic
b. radioactive
c. metalloids
d. largely unreactive

_____ 4. The number of valence electrons for alkaline earth metals is _____.
a. 1
b. 2
c. 8
d. equal to the period number

_____ 5. In a horizontal row on the periodic table, as the atomic number increases, what happens to the atomic radius?
a. It decreases.
b. It remains constant.
c. It increases.
d. It becomes immeasurable.

_____6. What do elements in the same group on the periodic table have in common?
a. atomic masses.
b. atomic numbers.
c. numbers of neutrons.
d. properties.

_____7. One mole of carbon is equivalent to _____ carbon atoms.
a. 1.66×10^{-24}
b. 6.02×10^{23}
c. 12
d. not enough information

_____8. To which group do fluorine and chlorine belong?
a. alkaline-earth metals
b. transition metals
c. halogens
d. actinides

_____ 9. Most of the volume of an atom is made up of the _____.
a. nucleus
b. nuclides
c. electron cloud
d. protons

_____ 10. What is the total number of electrons needed to fill the fourth main energy level?
a. 4
b. 8
c. 16
d. 32

_____ 11. Whenever an excited hydrogen atom falls back from an excited state to its ground state, it _____.
a. Absorbs a photon of radiation
b. Emits a photon of radiation
c. Emits radiation over a range of frequencies
d. Absorbs specific frequencies of light

_____ 12. When electrons change energy states, the amount of energy given off or absorbed is equal to _____.
a. Planck's constant x speed of light
b. Planck's constant x frequency
c. Speed of light x wavelength
d. Speed of light x frequency

_____ 13. Which of the following atoms has three valence electrons?
a. Nitrogen
b. Scandium
c. Gallium
d. Vanadium

_____ 14. Which statement best describes the density of an atom's nucleus?
a. The nucleus occupies most of the atom's volume but contains little of its mass.
b. The nucleus occupies very little of the atom's volume but contains most of its mass.
c. The nucleus occupies very little of the atom's volume and contains little of its mass.
d. The nucleus occupies most of the atom's volume and contains most of its mass.

_____ 15. Aluminum would have properties most like _____.
a. Silicon
b. Indium
c. Magnesium
d. Helium

Fill in the Blank

16. If wave A has a lower frequency than wave B, then compared with B, the wavelength of A is _____ (shorter / longer). Therefore, frequency and wavelength are _____ (directly / indirectly) proportional values.

17. The frequency of electromagnetic radiation is measured in _____.

18. The distance between corresponding points on a wave is called _____.

19. The lowest energy state of an atom is called its _____.

20. The number of waves that pass a point per second is called the _____.

21. _____ is the color of the visible spectrum with the with the lowest frequency.

22. Iron has an atomic number of _____ and an atomic mass of _____.

23. The electrons available to be lost, gained, or shared in the formation of chemical compounds are called _____.

24. The measure of the ability of an atom in a chemical compound to attract electrons is called _____.

25. The energy required to remove an electron from an atom is called its _____.

26. The electron configuration for the group 14 element in the third period is _____.

27. One-half the distance between the nuclei of identical atoms that are bonded together is the _____.

28. An atom or group of atoms that has a positive or negative charge is called a(n) _____.

Short Answer

29. Identify the period and block to which each of the following elements belong:

Strontium: period _____ block _____

Krypton: period _____ block _____

Chromium: period _____ block _____

30. Write the noble gas configuration for each of the following elements

Group 7, 4th period _____

Group 5, 3rd period _____

Group 12, 6th period _____

31. Matching:

_____ lanthanides and actinides	a. Group 2 elements
_____ transition elements	b. elements that make up the f block
_____ alkali metals	c. elements that have 1 valence electron
_____ halogens	d. elements that have 7 valence electrons

32. Matching:

_____ an electron occupies the lowest energy orbital that can receive it.

_____ orbitals of equal energy are occupied by on e electron before any orbital is occupied by a second electron.

_____ no two electrons in the same atom can have the same four quantum numbers.

_____ the single electron of hydrogen orbits the nucleus only in allowed orbits, each with a fixed energy.

_____ it is impossible to simultaneously determine both the velocity and the position of an electron.

a. Hund's rule
b. Pauli exclusion principle
c. Bohr model of the atom
d. Aufbau principle
e. Heisenberg Uncertainty Principle

33. Complete the table below:

Element	Atomic #	Ion formed	Electron Configuration of the ION
Lithium			
	8		
		S^{-2}	
	13		

Short Answer

34. What is the speed of electromagnetic radiation in a vacuum?

35. Which ion is the most stable (the most likely to form), N^{-2}, Mg^{+2}, or O^{-1}? **Why?**

36. Which has the smallest atomic radius, K^{+} or Ca^{+2}? **Why?**

37. Which has the greatest ionization energy, N, O, or F? **Why?**

38. Which rule states that atoms tend to form compounds in which each atom has eight electrons in its highest occupied energy level?

39. List four properties of metals:

40. Which of the metallic properties listed above describes the ability to be drawn, pulled, or extruded through a small opening to produce a wire?

41. How did Mendeleev's organization of the periodic table differ from the current organization?

42. Of the following neutral elements, which has the largest atomic radius: sodium, magnesium, phosphorus, or chlorine? Explain your answer in terms of trends in the periodic table.

43. How do the properties of the transition elements compare with those of the alkali and alkaline-earth metals?

44. Describe the general trends in ionization energies down a group and across a period.

45. How do the sizes of a cation and an anion compare with the size of the neutral atoms from which they are formed?

46. Identify the element with each of the following electron configurations.

$1s^2 2s^2 2p^2$ _____ $[Ar]\ 4s^1 3d^{10}$ _____

$1s^2 2s^2 2p^6 3s^2$ _____ $[Ar]\ 4s^1 3d^5$ _____

$[Ne]\ 3s^2 p^2$ _____ $[Xe]\ 6s^2 4f^{14} 5d^{10}$ _____

$[Ar]\ 4s^2 3d^6$ _____

47. What did you learn from the flame test lab and the spectroscope activities?

48. Is density a physical property or a chemical property? Justify your response.

49. List seven observations that are evidence of a chemical reaction.

Calculations

50. Find the molar mass of tetraethyl lead, $Pb(C_2H_5)_4$.

51. Determine the mass of 0.240 mol glucose, $C_6H_{12}O_6$.

52. The wavelength of light in the infrared region is 4.257×10^{-7}m. What is the frequency of this light?

53. Determine the energy of a photon whose frequency is 2.65×10^{15} Hz.

54. Determine the wavelength of light with energy of 3.79×10^{-19} J. Write your answer in nanometers.

55. What topic(s) presented in this unit do you understand the most? The least?