

1. Complete the table below.

Element name	Element symbol	Atomic number	Group number	Family name	Period number	Metal or nonmetal
fluorine						
	Ba					
				noble gas	3	

2. What is the group number of the alkaline earth metals?
3. What is the family name for Group 17?
4. State one characteristic physical property and one characteristic chemical property of the noble gas family.
5. What is electronegativity?
6. State Mendeleev's periodic law in your own words.
7. What is the difference between ionization energy and electron affinity?
8. Why does ionization energy increase from left to right in a period on the periodic table?
9. What is meant by the term "periodic trend"?
10. Elements A, B, and C are in the same chemical family. Element A bursts into pink flames when it dissolves in water. Element B sizzles slightly when it dissolves in water. Element C sizzles and sometimes burns when it dissolves in water. How would A, B, and C be arranged in the periodic table? Of the three, which would most likely be highest in the group? Which would most likely be lowest?
11. Explain how the number of electrons in an atom affects atomic radius.
12. What does a positive electron affinity mean?
13. Explain negative electron affinities in terms of attractive and repulsive forces within the atom.
14. Explain how first ionization energy is related to atomic radius.
15. Which element has the smallest atomic radius?
16. Examine the following 1st, 2nd, and 3rd ionization energies and state which element is most likely a noble gas, a group 2 metal, and a group 1 metal.

	1st (eV)	2nd (eV)	3rd (eV)
Element X	5.139	47.286	71.64
Element Y	7.646	15.035	80.143
Element Z	21.564	40.962	63.45

17. Element A has an atomic radius of 167 μm . Element B has an atomic radius of 66 μm . Are these two elements most likely in the same period or same chemical family?
18. The electronegativity of magnesium, Mg, is 1.2. Would you expect aluminum's electronegativity to be higher or lower?
19. Explain why, in general, ionization energy and electron affinity follow the same trends throughout the periodic table.

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

- _____

1. Chlorine has two naturally occurring isotopes, namely $^{37}_{17}\text{Cl}$ and $^{35}_{17}\text{Cl}$. The composition of chlorine is 25.0% $^{37}_{17}\text{Cl}$ and 75.0% $^{35}_{17}\text{Cl}$. The average atomic mass of chlorine is

a. 36.5 u

b. 35.5 u

c. 34.6 u

d. 45.5 u

e. 32.0 u
- _____

2. Silicon has three naturally occurring isotopes, as follows:
3.10% silicon-30 (atomic mass = 29.974 u); 4.67% silicon-29 (atomic mass = 28.976 u); and 92.23% silicon-28 (atomic mass = 27.977 u).
The average atomic mass of silicon is

a. 28.1 u

b. 29.2 u

c. 29.8 u

d. 30.0 u

e. 28.9 u
- _____

3. The percentage composition of chlorine, by mass, in the compound K_2PtCl_4 is

a. 47.0%

b. 34.2%

c. 18.9%

d. 15.3%

e. 11.3%
- _____

4. The percentage composition by mass of each element in sodium sulphate, Na_2SO_4 , is

- | | |
|-------------------------------|-------------------------------|
| a. 32.4% Na, 22.6% S, 45.0% O | d. 20.7% Na, 43.7% S, 35.6% O |
| b. 22.6% Na, 32.4% S, 45.0% O | e. 35.0%Na, 20.0% S, 45.0% O |
| c. 43.7% Na, 20.7% S, 35.6% O | |

ATOMIC STRUCTURE

Completion

Complete each sentence or statement.

1. A region in which there is a high probability of finding an electron is called an _____.
2. Bohr's model works perfectly for _____.
3. _____ determined that it is impossible to predict the exact location of an electron.
4. _____ orbitals are non-directional.
5. There are _____ different orientations in space for p-orbitals.
6. When an electron is in its lowest energy level, it is in the _____.
7. In his model of the atom, Bohr identified each energy level using an integer, ***n***, and called it the _____.
8. Cl^{1-} , Ar and Ca^{2+} are _____.
9. S-block elements are all _____.
10. The electron configuration for _____ is $1s^22s^22p^63s^23p^6$.

Matching

Match each of the following terms with their definitions.

- | | |
|---------------------------------------|-------------------------|
| a. Orbital | g. Nucleus |
| b. Heisenberg's Uncertainty Principle | h. s, p, d and f |
| c. Schrodinger's equation | i. Based on probability |
| d. Pauli exclusion principle | j. Photon |
| e. de Broglie | k. iso-electronic |
| f. Hund's rule | |

- | | |
|-------|--|
| _____ | 11. Developed an equation that assigns a wavelength to any mass |
| _____ | 12. A region in which there is a high probability of finding an electron |
| _____ | 13. It is not possible to determine the exact position of an electron in an atom |
| _____ | 14. Repels alpha particles |
| _____ | 15. The quantum mechanical model |

Short Answer

16. Describe and explain the **general** trend in ionization energies as you move from sodium (Na) to argon (Ar) in the periodic table.
17. Draw and write the electron configuration for calcium.
18. Draw the electron configuration for oxygen and explain how you use Hund's Rule and the Pauli Exclusion principle to do it.
19. What causes line spectra?
20. According to Bohr, why do electrons travel in specific energy levels around the nucleus?
21. What is the difference between an "orbit" as described in the Bohr-Rutherford model of the atom and an "orbital" as described in the quantum mechanical model of the atom?
22. Which element is the most reactive? Explain your reasoning.
23. Why did Bohr believe that electrons can only possess specific amounts of energy.
24. Compare and contrast "orbits" and "orbitals".
25. Explain what is meant by a "quantum" of energy.
26. Draw the electron configuration for *Scandium, Sc*.
27. What are the characteristics of substances in the s, p and d blocks