

Electrons & the Periodic Table Review

****ALL NUMERICAL ANSWERS MUST INCLUDE THE PROPER UNITS ****

SOLVE THE FOLLOWING LIGHT & ENERGY PROBLEMS:

1. Find the energy of an infrared photon whose frequency is 2.0×10^{12} Hz.
2. What is the wavelength of a red light wave whose frequency is 4.3×10^{14} Hz?
3. Calculate the frequency of an X-ray wave that has a wavelength of 9.2 nm.
4. What is the energy of a cosmic ray photon whose wavelength is 2.0 pm?
5. Find the frequency of a microwave that carries 3.4×10^{-25} J of energy.

NAME THE TERM DESCRIBED BY THE FOLLOWING DEFINITIONS:

6. A packet of light energy that carries a quantum of energy.
7. The state when all electrons of an atom are in the lowest possible energy levels.
8. When an electron jumps up to a higher energy level, the atom is in its ____.
9. The scientist who applied Einstein's particle-wave theory to electrons.
10. The theory that it is impossible to know both the position and speed of an electron simultaneously.
11. The theory that no two electrons in an atom can share the same 4 quantum numbers.
12. The theory that electrons fill the lowest energy orbitals first.
13. The theory that, within a sublevel, electrons prefer to occupy their own orbital.
14. A term describing the outermost electrons in an atom.
15. A positively charged ion is called a(n) _____. A negatively charged ion is called a(n) _____.
16. The most stable type of electron configuration.
17. The lower, left-hand section of the periodic table that includes most of the elements.
18. The upper right-hand section of the periodic table.
19. The section of the periodic table that includes only the elements in the d-block.
20. The section of the periodic table that includes both the s-block and the p-block.
21. A three-dimensional region in space where an electron is likely to exist.
22. The process by which the core electrons partially block the attraction between the nucleus and the valence electrons.

DRAW ORBITAL DIAGRAMS FOR THE FOLLOWING ELEMENTS:

23. Mg
24. Si
25. Ti

WRITE LONGHAND ELECTRON CONFIGURATIONS FOR THE FOLLOWING ELEMENTS:

26. N
27. K
28. Cr

WRITE SHORTHAND ELECTRON CONFIGURATIONS FOR THE FOLLOWING ELEMENTS:

29. Sb
30. Bi
31. Tc
32. Ge

WRITE THE ION SYMBOL AND ITS SHORTHAND ELECTRON CONFIGURATION:

33. Te
34. B
35. Ba
36. Br
37. K

WHICH ATOM HAS THE LARGER ATOMIC RADIUS?

38. C vs. Sn
39. Sr vs. In

RANK THESE ATOMS FROM SMALLEST TO LARGEST ATOMIC RADIUS.

40. Li, K, Cs, O
41. Fe, P, Ra, Ti

WHICH ATOM HAS THE LARGER 1ST IONIZATION ENERGY?

42. Fr vs. Ne
43. Na vs. Si

RANK THESE ATOMS FROM SMALLEST TO LARGEST 1ST IONIZATION ENERGY.

44. Ar, Xe, Ba, Sn
45. Mg, C, F, Sr

WHICH ATOM HAS THE HIGHER MELTING/BOILING POINT?

46. Cs vs. W
47. Fe vs. As
48. Na vs. Si

WHICH PARTICLE HAS THE LARGER RADIUS?

49. Mg vs. Mg²⁺
50. I vs. I⁻

Electrons & the Periodic Table Review – Ch. 4 & 5

ANSWER SHEET

**ALL NUMERICAL ANSWERS MUST INCLUDE THE PROPER UNITS **

1. 1.3×10^{-21} J
2. 7.0×10^{-7} m
3. 3.3×10^{16} Hz
4. 9.9×10^{-14} J
5. 5.1×10^8 Hz
6. photon
7. ground state
8. excited state
9. Louis de Broglie
10. Heisenberg Uncertainty Principle
11. Pauli Exclusion Principle
12. Aufbau Principle
13. Hund's Rule
14. valence electrons
15. cation, anion
16. full energy level (or full shell)
17. metals
18. nonmetals
19. transition metals (or transition elements)
20. main group elements
21. orbital
22. shielding
23. $\begin{array}{cccc} \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow \\ 1s & 2s & 2p & 3s & \end{array}$
24. $\begin{array}{ccccccc} \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow & \uparrow & _ \\ 1s & 2s & 2p & 3s & 3p & & & \end{array}$
25. $\begin{array}{ccccccc} \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow \\ 1s & 2s & 2p & 3s & 3p & & & & \\ \uparrow\downarrow & \uparrow & \uparrow & _ & _ & _ & _ & _ & _ \\ 4s & & 3d & & & & & & \end{array}$
26. $1s^2 2s^2 2p^3$
27. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$
28. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^5$
(Remember: Cr makes an exception to gain stability.)
29. $[\text{Kr}] 5s^2 4d^{10} 5p^3$
30. $[\text{Xe}] 6s^2 4f^{14} 5d^{10} 6p^3$
31. $[\text{Kr}] 5s^2 4d^5$
32. $[\text{Ar}] 4s^2 3d^{10} 4p^2$
33. Te^{2-} $[\text{Kr}] 5s^2 4d^{10} 5p^6$
34. B^{3+} $1s^2$
35. Ba^{2+} $[\text{Kr}] 5s^2 4d^{10} 5p^6$
36. Br^- $[\text{Ar}] 4s^2 3d^{10} 4p^6$
37. K^+ $[\text{Ne}] 3s^2 3p^6$
38. Sn
39. Sr
40. $\text{O} < \text{Li} < \text{K} < \text{Cs}$
41. $\text{P} < \text{Fe} < \text{Ti} < \text{Ra}$
42. Ne
43. Si
44. $\text{Ba} < \text{Sn} < \text{Xe} < \text{Ar}$
45. $\text{Sr} < \text{Mg} < \text{C} < \text{F}$
46. W
47. Fe
48. Si
49. Mg
50. I^-