

Key

1. What is a photon? a packet of electro magnetic energy
2. The form of electromagnetic energy that has more energy per photon than radio waves but less energy per photon than infrared is microwave.
3. When an electron in ground state absorbs energy, it goes to a(n) excited state.
4. Which color of visible light has the longest wavelength? Red
5. Which color of visible light has the shortest wavelength? Violet (purple ok)
6. What was the problem with the Bohr model of the atom? it only works for hydrogen
7. Define quantized.
only certain values are allowed
8. As the principal energy level increases, the average distance of an electron from the nucleus increases
9. The form of electromagnetic energy that has less energy per photon than yellow but more energy per photon than red is orange.
10. Which of the following is an INCORRECT designation for an atomic orbital?
 - a. 3s
 - b. 3d
 - c. 3ff does not show up until 4f!
11. Calcium has how many electrons in its highest principal energy level?
2
12. Which color of visible light has the shortest wavelength?
Violet (purple ok)
13. $1s^2 2s^2 2p^6 3s^2 3p^2$ is the correct electron configuration for which atom?
Silicon (atomic #14)

14. Which element has the fewest number of electrons in its valence shell?

a. Na

has only 1 valence electron

b. At

c. S

15. Which atom has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^1$?

Scandium (atomic # 21)

16. Which electron configuration indicates a transitional element?

a. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^4$

"d" sublevel indicates transition metal

b. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

c. $1s^2 2s^2 2p^6 3s^2 3p^4$

17. The Group 3 elements through the Group 8 elements with the exception of He form an area of the periodic table where the p sublevels are being filled.

18. Which of the following has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^3$?

Phosphorus (atomic # 15)

19. When electrons are shared unequally, chemists characterize these types of bonds as

polar covalent

20. Chemical bonds formed by the attraction of oppositely charged ions are called

Ionic Bonds

21. The electron pair in a C-O bond could be considered

a. closer to C because carbon has a lower electronegativity than oxygen

b. centrally located directly between the C and O

c. closer to O because oxygen has a higher electronegativity than carbon

Use electronegativity chart.
to figure this question.
 $O = 3.5$ $C = 2.5$

22. Which of the following has the smallest ionization energy?

a. Ca

b. Br

c. Li

I. E. decreases down a group
+ increases $L \rightarrow R$ in a period
 $Ca < Br < Li$

23. Carbon dioxide (CO_2) has polar bonds.
Covalent

24. Which of the following compounds contains an ionic bond?

a. CH_4

b. KCl

c. O_3

25. Choose the largest element from the following elements:

a. Ba

b. Cl

c. Hg

Increases down a group
decreases $L-R$ in a period
 $Cl < Hg < Ba$

26. If atom X forms a diatomic molecule with itself, the bond is

pure Covalent

27. Define Dipole moment.

partial charges created by unequal sharing of electrons.

The following questions are worth 1 point each.

28. Define speed.

how fast a wave is moving distance/time

29. Define frequency

how many peaks pass a given point in a given time period peaks/time

30. Define wavelength

distance between 2 consecutive peaks

31. What is the name of the current model of the atom?

Wave Mechanical Model

32. Who (2 people) developed this model?

Broglie Schrodinger

Use the following choices to classify each of the molecules. Place the capital letter of your choice on the line. (1 point each)

- A. ionic
- B. covalent
- C. polar covalent

33. NO C

34. NaCl A

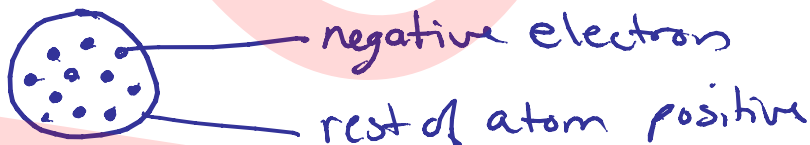
35. N₂ B

The following questions are worth 2 points each

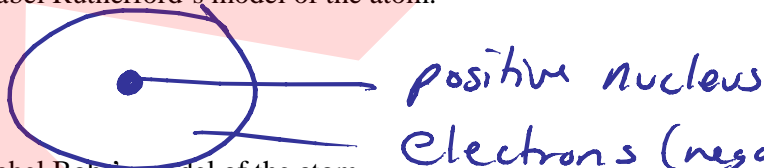
36. What causes elements from the same group (column) to have similar chemical and bonding properties?

they have the same number of valence electrons

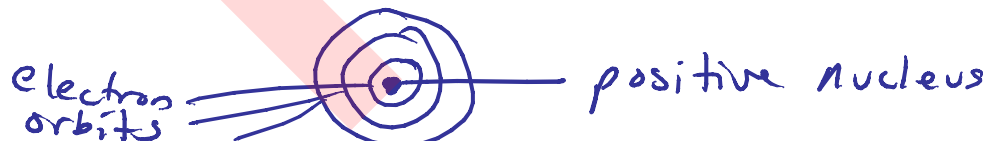
37. Draw and Label Thomson's model of the atom.



38. Draw and label Rutherford's model of the atom.



39. Draw and label Bohr's model of the atom.



40. Define "ELECTRONEGATIVITY"

the ability of an atom to attract shared electrons

41. Define "IONIZATION ENERGY"

the amount of energy needed to remove an electron

42. What is a "BOND" (define)?

the force that holds 2 or more atoms together and causes them to act as a group

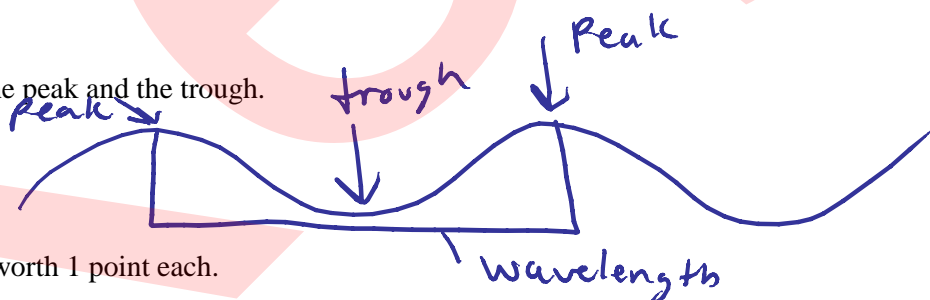
43. What is BOND ENERGY (define)?

the amount of energy needed to break a bond

44. Explain what causes the trend for atomic size down a group (column). (You need to state the if the trend is increasing or decreasing, and then explain why it is this way)

Size increases down a group because Energy levels are being added.

45. Draw a wave: label the peak and the trough.



The following questions are worth 1 point each.

46. How many electrons are shared in a double bond?

4

47. How many electrons are shared in a triple bond?

6

48. How many electrons are shared in a single bond?

2

The following questions are worth 3 points each.

49. Draw the Lewis dot diagram for the sulfur (S- atomic # 16) atom.

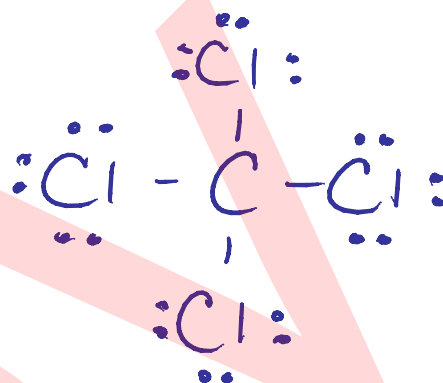


50. Draw the Lewis dot diagram for the CCl₄ molecule.

$$4 + 28 = 32$$

$$\underline{-8}$$

$$24 / 4 = 6$$



51. Draw the Lewis structure for the Br₂ molecule.

$$7 \times 2 = 14 - 2 = 12 / 2 = 6$$



52. Draw the Lewis structure for the CO molecule.

$$4 + 6 = 10$$



(not satisfied)



only 1 satisfied



both satisfied
this is your answer

53. Draw the Lewis structure for the N₂ molecule.

$$5 + 5 = 10$$



not satisfied



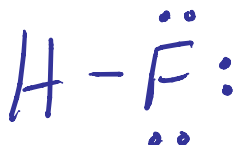
only 1 satisfied



both satisfied
this is your answer

54. Draw the Lewis structure for the HF molecule and show the dipole moment.

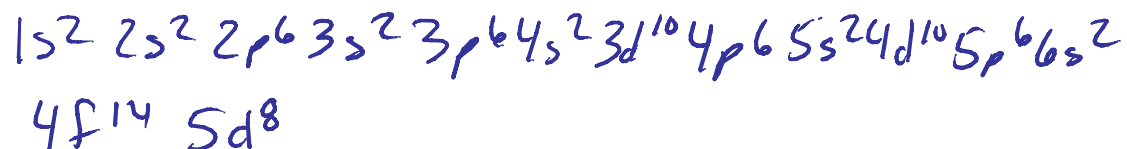
$$1 + 7 = 8$$



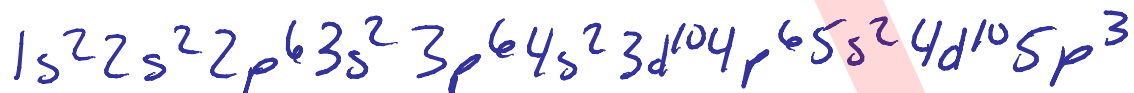
Fluorine is
more electronegative
so arrow points towards
F.

Each of the following Questions is worth 5 points

55. Write the electron configuration for platinum (Atomic # 78).



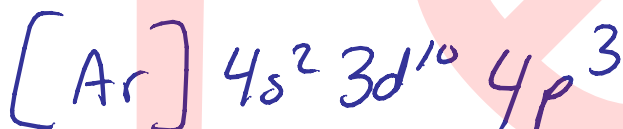
56. Write the electron configuration for Antimony (Atomic # 51).



57. Write the abbreviated electron configuration (noble gas) for polonium (Atomic # 84).



58. Write the abbreviated electron configuration (noble gas) for arsenic (Atomic # 33)



59. Draw the orbital diagram (box diagram) for sulfur (Atomic # 16).



60. Draw the orbital diagram (box diagram) for Bromine (Atomic # 35).

