

Vasquez High School -- Chemistry -- Quest #3 -- S' 2015 -- 100 points

Write TRUE if the statement is true OR write the word or words that substitute(s) for the underlined word or words that would make it true. Writing false only earns partial credit. Three points apiece.

- _____ 1) Both the Lanthanide and Actinide series fill in the f orbitals
- _____ 2) Schroedinger suggested that all objects have wave properties and even gave an equation to describe them.
- _____ 3) Democritus' term "atomos" was coined to mean something that is indivisible.
- _____ 4) The most pronounced factor in determining many trends within elemental groups and across periods is the shielding effect of electron energy levels.
- _____ 5) The 5d sub-level may contain up to fourteen electrons.
- _____ 6) In general, atomic size decreases from left to right across a period.
- _____ 7) The Rutherford gold foil experiment modified the Bohr model of the atom.
- _____ 8) Heisenberg is responsible for the Uncertainty Principle.
- _____ 9) Elements with the same valence electron arrangement show very similar chemical properties.
- _____ 10) The discovery of the electron is credited to Niels Bohr.

Short Answer / Fill-in. Be neat. Be clear. Be complete. Three points each.

11) Aristotle thought the world was composed of earth, _____, _____, and _____.

12) What is Hund's Rule? _____
_____.

13) What was so important and profound about Planck's discovery in 1900? _____

_____.

14) When we say that electrons are in their ground state, what does that mean? _____
_____.

15) Why does sodium burn yellow? (Be complete) _____

_____.

Multiple Choice. Write the letter that best answers each example. Three points each.

_____ 16) A stream of tiny packets of light energy are called

- a) radiation b) momenta c) flashes d) photons

_____ 17) The resting sublevels possible for the $n = 3$ main energy level are:

- a) 3s, 3p, 3d, 3f b) 3s, 3p, 3d c) 3s, 3p d) 3s

_____ 18) All of these are true EXCEPT which one?

- a) Cations are larger than their corresponding atoms.
b) Ionization energies decrease as you move down the periodic table.
c) Electron orbitals can be expressed as probability clouds.
d) The highest energy electron in an atom is known as the valence electron.

_____ 19) The most fundamental mystery of chemistry and physics has to do with

- a) the quantization of the electromagnetic spectrum.
b) the wave-particle duality of light.
c) the correct model of the atom.
d) where bellybutton lint comes from.

_____ 20) "No two electrons in the same atom can have the same four quantum numbers" is attributed to

- a) Schroedinger b) Aufbau c) Bohr d) Pauli

Short Essay. Write three or four sentences for each. Five points apiece. Again, be neat and complete.

21) Define ionization energy. Then explain the trends in ionization energies throughout the periodic table. Give reasons for your assertions.

22) Explain how AND why ionic sizes compare with their corresponding atomic sizes. _____

- 23) For fifteen points, sketch a NEAT diagram of the electromagnetic spectrum complete with the ten energies and the six labels in their proper places. If it's messy, erase it and do it again...

Give the proper complete electron configurations for the following elements. Three points each.

24) Bromine = _____

25) Gold = _____

26) Show with an orbital diagram and up and down arrows how the electrons are configured for iron.

27) How many joules of energy are carried by 1,000,000,000,000,000,000 (that's a quintillion) photons of green light whose wavelength is 560 nm? ($h = 6.63 \times 10^{-34}$ J/Hz)

28) There was once a rebel rock station in LA called KNAC. They broadcasted at 105.5 Mhz on the FM dial. What was the wavelength of the carrier waves they broadcasted?