

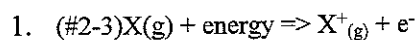
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Class: _____

Date: _____

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Honors Chemistry Review Atomic Structure (atomic structure secondary)

a

a. Ionization energy

b. Lattice energy

c. Hydration energy

d. Bond energy

e. Electron affinity

c

2.



(#2-2) Above is a model of a Lewis Dot structure of an atom. All of the following can be inferred from the dot diagram above EXCEPT:

a. X is a group 16 element

b. X has two half filled p-orbitals

c. X has at least 10 kernal (internal) electrons

d. X can accept two electrons to become an ion with charge of 2-

e. X has at least four electrons with in the "p" orbital

c

3.

(#2-2) Which of the following sets of quantum numbers (n, l, l_m, l_s) best describes the valence electron of highest energy in a ground-state gallium atom (atomic number 31)?

n = energy level

l = type of orbital ($s=0, p=1, d=2, f=3$)

$l_m = s=0, p=+1,0,-1, d=-1,-2,-3,0,+1,+2,+3$

$l_s = +1/2$ or $-1/2$

a. 4,0,0, 1/2

b. 4,0, 1,1/2

c. 4,1,1,1/2

d. 4,1,2,1/2

e. 4,2,0,1/2

4. (#2-3) Which of the elements above has the smallest ionic radius for its most commonly found ion?

a. O

b. La

c. Rb

d. Mg

e. N

← more protons

C 5. (#2-2) An impossible electronic configuration

- a. $1s^2 2s^2 2p^5 3s^2 3p^5$ d. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$
 b. $1s^2 2s^2 2p^6 3s^2 3p^6$ e. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3 4s^2$
 c. $1s^2 2s^2 2p^6 2d^{10} 3s^2 3p^6$ ☹️

d 6. (#2-2) The ground-state configuration for the atoms of a transition element

- a. $1s^2 2s^2 2p^5 3s^2 3p^5$ d. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$ ←
 b. $1s^2 2s^2 2p^6 3s^2 3p^6$ ~~1s^2 2s^2 2p^6 3s^2 3p^6 3d^3 4s^2~~
 c. $1s^2 2s^2 2p^6 2d^{10} 3s^2 3p^6$

e 7. (#2-2) The ground-state configuration for the atoms that have 2 valence electrons.

- a. $1s^2 2s^2 2p^5 3s^2 3p^5$ d. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$
 b. $1s^2 2s^2 2p^6 3s^2 3p^6$ e. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2$
 c. $1s^2 2s^2 2p^6 2d^{10} 3s^2 3p^6$

b 8. (#2-2) The ground-state configuration of a negative ion of a halogen

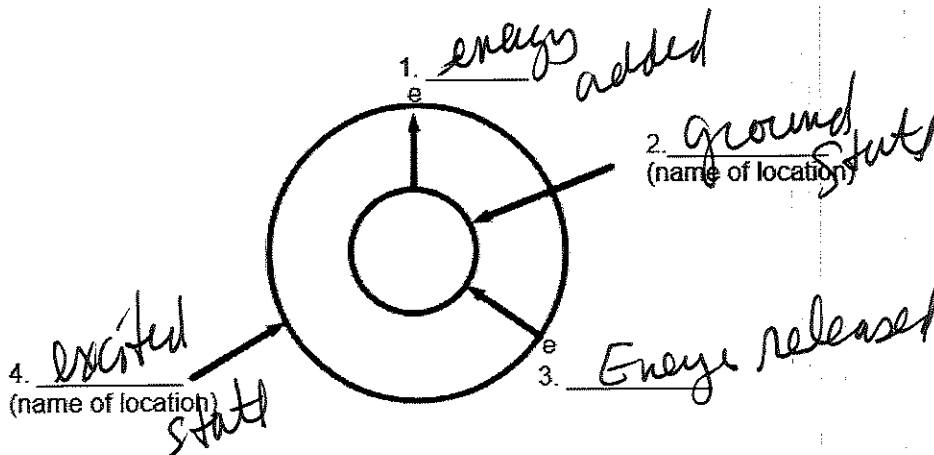
- a. $1s^2 2s^2 2p^5 3s^2 3p^5$ d. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$
 b. $1s^2 2s^2 2p^6 3s^2 3p^6$ ←
 c. $1s^2 2s^2 2p^6 2d^{10} 3s^2 3p^6$ ←
 e. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3 4s^2$

b 9. (#2-2) The ground-state configuration of a common ion of an alkaline earth element

- a. $1s^2 2s^2 2p^5 3s^2 3p^5$ d. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$
 b. $1s^2 2s^2 2p^6 3s^2 3p^6$ ←
 c. $1s^2 2s^2 2p^6 2d^{10} 3s^2 3p^6$ ←
 e. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3 4s^2$

A a 10. (#2-3) O^{2-} , F^{-1} , and Ne all have the same number of electrons, Which is bigger and why?

- a. O^{2-} , due to less number of protons, less coulombic attraction.
 b. F^{-1} , due to more neutrons, these take up more space due to Hund's rule.
 c. Ne, due to the fact it is farthest to the right on the periodic table
 d. Ne, due to less number of protons, less coulombic attraction



d

11. (#2-4)

Match the number that correctly describe what is happening at each location.

- | | 1. | 2. | 3. | 4. |
|-----------|---------------|----------------|----------------|---------------|
| a. | Lower level | energy added | light produced | ground state |
| b. | energy added | light produced | excited state | ground state |
| c. | excited state | ground state | energy added | ground state |
| <u>d.</u> | energy added | ground state | light produced | excited state |

b

12. (#2-2) How many total orbitals are there with a principal quantum, $n = 4$

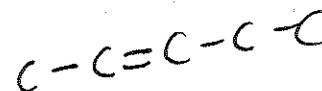
- | | | | |
|-----------|---|----|----|
| a. | 1 | c. | 9 |
| <u>b.</u> | 4 | d. | 16 |

$4s^2 4p 4d 4f$

a

13. (#1-1) Which of these would be an acceptable formula for 2-pentene.

- | | | | |
|-----------|-------------|----|----------------|
| <u>a.</u> | C_5H_{10} | c. | C_5H_8 |
| b. | C_5H_{12} | d. | $C_{10}H_{16}$ |



d

14. (#1) Of the options below, 1 is not an isomer of the others. Indicate which is not an isomer.

- | | | | |
|----|----------------------|-----------|-----------------|
| a. | pentane | c. | 2-methyl butane |
| b. | 2,2 dimethyl propane | <u>d.</u> | 2-pentene |

Matching

- | | | | |
|----|---------------------|----|---------------|
| a. | isotope | i. | alkali metals |
| b. | anion | j. | principal |
| c. | cation | k. | proton |
| d. | chemical | l. | noble gases |
| e. | physical | m. | spin |
| f. | mass number | n. | magnetic |
| g. | average atomic mass | o. | Hunds |
| h. | alkaline earth | p. | Isomer |

____ 15. (#2-1) An A is two atoms which have the same number of protons and different number of neutrons.

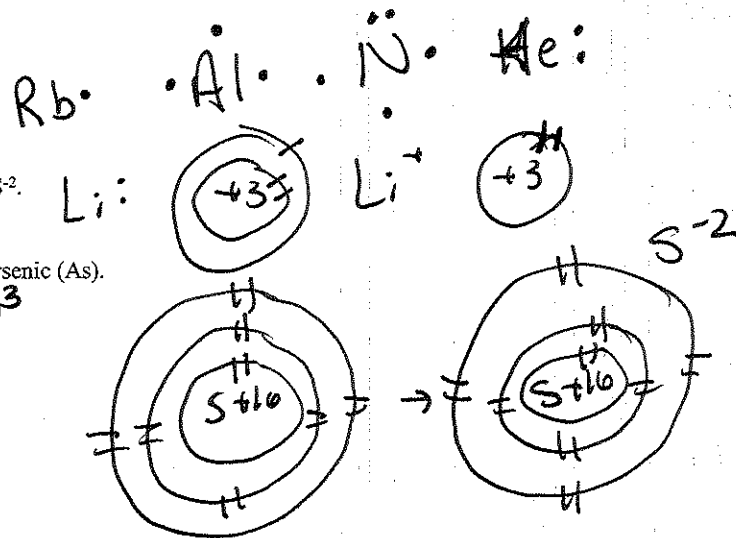
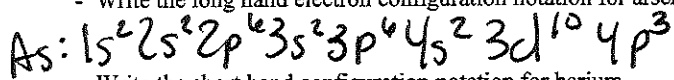
____ 16. (#2-3) The first family on the periodic table is called the i.

____ 17. (#2-2) The j quantum number represents the energy levels of an atom.

18. (#2-2) Two electrons in the same suborbital have different m spin
19. (#2-1) A proton is a subatomic particle with a positive charge.
20. (#2-3) The halogens are a family of elements that are very unreactive.
21. (#2-1) The Z is the sum of the protons and the neutrons. mass #
22. (#2-1) An atom who has gained an electron in order to fill its outer orbital is an anion
23. (#1) Gas evolution (new substance) is an indicator of a(an) chemical change.
24. (#2-1) A positively charge particle is called a(an) cation.
25. (#1) An atom that has the same type and quantity of atoms but is connected differently

Short Answer

26. Modeling atoms (#2-2)
- Show the Lewis Dot Structure for Rb, Al, N, and He.
 - Draw Bohr Diagrams for the following: Li, Li⁺, S, and S²⁻
 - Write the long hand electron configuration notation for arsenic (As).
 - Write the short hand configuration notation for barium.
 - Write the long hand electron configuration for oxygen.
 - Draw an orbital diagram for oxygen.



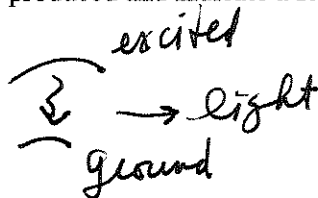
27.

Sy	Atomic #	P ⁺	¹ ₀ n	Mass #	e ⁻	Charge
Bi	83	83	120	203	83	none
²⁵⁴ ₉₉ Es ²⁺	99	99	155	254	97	+2

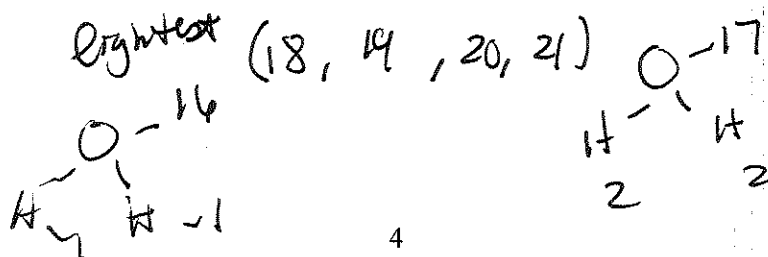
Atomic structure (#2-1)

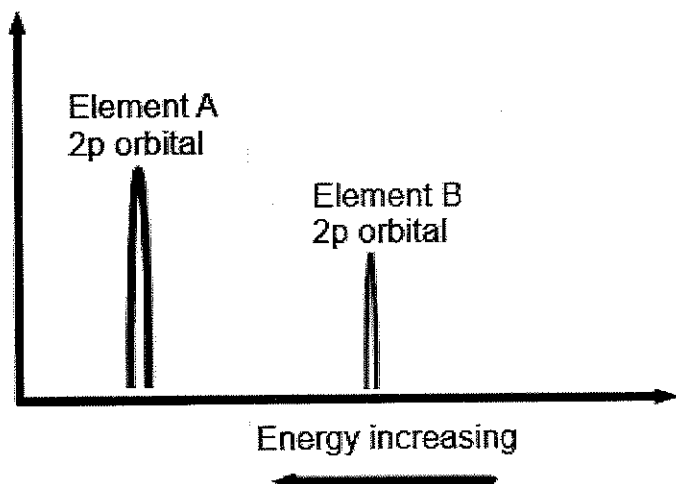
28. Laboratory structure of the atom #2-4

In lab we burned several different metals. As a result, several different colors were produced. Explain, in great detail, how these colors were produced and indicate a few areas in your everyday life that you see this effect occurring.



29. (#2-1) The most abundant isotopes of hydrogen and oxygen are H-1, H-2, O-16, O-17, respectively. Using these isotopes only, what is the number of different possible values for the molecular mass of water and list them?





30. (#2-3) Both of the peaks represent electrons removed from the same energy level but from different atoms. Which of the following assumptions are true or false? Give a reason why you chose your answer.
- () Element "A" has more electrons removed from the 2p orbital.
we do not know
 - () Element "B" has a larger nucleus than A.
A has larger nucleus
 - () Electrons from "A" are in the same energy level and orbital but they are closer.
31. (#1)(#1) Hydrocarbons are used to make oils and fats used in foods. A saturated fat has only single bonds and a maximum number of hydrogens. Where as an unsaturated fat contains double bonds and therefore loses some of the hydrogen. Scientists add hydrogne back, with the help of a catalyst, on to the hydrocarbon to convert an unsaturated fat back into a saturated fat.

Draw a 4 carbon hydrocarbon as both a saturated and unsaturated hydrocarbon. Please include the formula for both as well.

32. (#1) (#1) Propane is a common fuel to be used in home heating. If oxygen is restricted the propane will burn via incomplete combustion. Write out the balanced incomplete combustion of propane.

