Name: ____________________ Class: __________________ Date: _________ ID: A

Honors Chemistry Review Atomic Structure

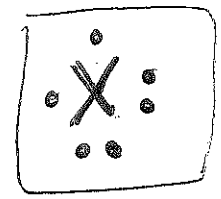
Multiple Choice

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

a 1. (#2-3)X(g) + energy => $X^{+}_{(g)}$ + e^{-}

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 structrure 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

d 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

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

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

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

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

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

a. $1s^2\ 2s^2 2p^5\ 3s^2 3p^5$ excited
b. $1s^2\ 2s^2 2p^6\ 3s^2 3p^6$ noe d
c. $1s^2\ 2s^2 2p^6 2d^{10}\ 3s^2 3p^6$ not poss
d. $1s^2\ 2s^2 2p^6\ 3s^2 3p^6 3d^5$ missed $4s^2$
(e.) $1s^2\ 2s^2 2p^6\ 3s^2 3p^6 3d^{10}\ 4s^2$ ← 2 valence electrons (switch)

b 8. (#2-2)The ground-state configuration of a negative ion of a halogen (Cl⁻¹)

a. $1s^2\ 2s^2 2p^5\ 3s^2 3p^5$
(b.) $1s^2\ 2s^2 2p^6\ 3s^2 3p^6$ ← noble gas configuration
c. $1s^2\ 2s^2 2p^6 2d^{10}\ 3s^2 3p^6$
d. $1s^2\ 2s^2 2p^6\ 3s^2 3p^6 3d^5$
e. $1s^2\ 2s^2 2p^6\ 3s^2 3p^6 3d^3\ 4s^2$

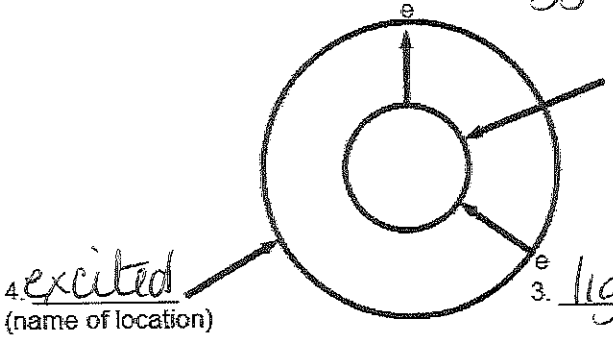
b 9. (#2-2)The ground-state configuration of a common ion of an alkaline earth element

a. $1s^2\ 2s^2 2p^5\ 3s^2 3p^5$
(b.) $1s^2\ 2s^2 2p^6\ 3s^2 3p^6$ ← noble gas configuration (K^{+1})
c. $1s^2\ 2s^2 2p^6 2d^{10}\ 3s^2 3p^6$
d. $1s^2\ 2s^2 2p^6\ 3s^2 3p^6 3d^5$
e. $1s^2\ 2s^2 2p^6\ 3s^2 3p^6 3d^3\ 4s^2$

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

O^{-2} F^{-1} Ne
2 2 2
8p+ 9p+ 10p+
largest smallest



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
(d.)	energy added	ground state	light produced	excited state

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

a. 1
b. 4
c. 9
d. 16

4s² 4p⁶ 4d¹⁰ 4f¹⁴

2

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Matching

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

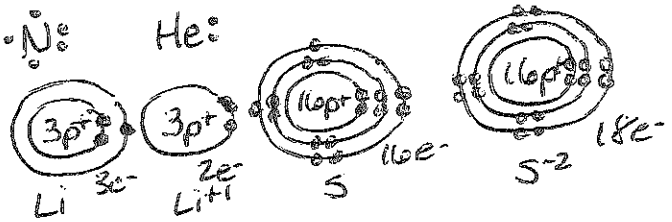
a 13. (#2-1) An isotope is two atoms which have the same number of protons and different number of neutrons.
i 14. (#2-3) The first family on the periodic table is called the alkali metals
j 15. (#2-2) The principal quantum number represents the energy levels of an atom.
m 16. (#2-2) Two electrons in the same suborbital have different spin.
k 17. (#2-1) A proton is a subatomic particle with a positive charge.
l 18. (#2-3) The noble gases are a family of elements that are very unreactive.
f 19. (#2-1) The mass # is the sum of the protons and the neutrons.
b 20. (#2-1) An atom who has gained an electron in order to fill its outer orbital is an anion
d 21. (#1) Gas evolution (new substance) is an indicator of a(an) chemical change.
c 22. (#2-1) A positively charge particle is called a(an) cation

Short Answer

23. Modeling atoms (#2-2)
- Show the Lewis Dot Structure for Rb, Al, N, and He.

Rb· ·Al· ·N: He:

- Draw Bohr Diagrams for the following: Li, Li^{+1}, S, and S^{-2}.



- Write the long hand electron configuration notation for arsenic (As).

As: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^3$

- Write the short hand configuration notation for barium. Ba: $[Xe]6s^2$
- Write the long hand electron configuration for oxygen. O: $1s^2 2s^2 2p^4$
- Draw an oribital diagram for oxygen.

O: $1s^2 2s^2 2p^4$ (Hunds rule)

24.

Sy	Atomic #	P^+	^1_0n	Mass #	e^-	Charge
$^{203}_{83}Bi$	83	83	120	203	83	none
$^{254}_{99}Es^{2+}$	99	99	155	254	97	+2

Atomic structure (#2-1) same $p^+ + n^0$

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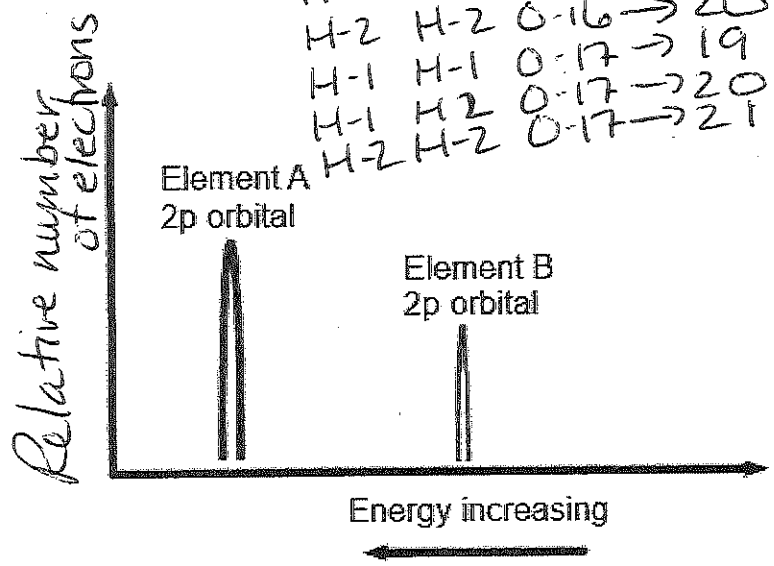
25. Laboratory structure of the atom #2-4
In lab we burned several different metals. As a result, several different colors were produced. Explain, in great detail, how these colors were produced and indicate a few areas in your everyday life that you see th effect occurring.

As electrons in the ground state are given energy (heat) the electrons jump to an excited state. As the electron falls back to the ground state a photon of light with a specific wavelength is released.

26. (#2-1) The most abundant isotopes of hydrogen and oxygen are H-1, H-2, O-16, O-17, respectively. Usin these isotopes only, what is the number of different possible values for the molecular mass of water and li them? H_2O

H	H	O	total mass
H-1	H-1	O-16	→ 18
H-1	H-2	O-16	→ 19
H-2	H-2	O-16	→ 20
H-1	H-1	O-17	→ 19
H-1	H-2	O-17	→ 20
H-2	H-2	O-17	→ 21

4 possible values
18, 19, 20, or 21



27. (#2-3)
Both of the peaks represent electrons removed from the same energy level but from different atom Which of the following assumptions are true or false? Give a reason why you chose your answer.

a. (T)F) Element "A" has more electrons removed from the 2p orbital..
A has a higher peak

b. (T(F)) Element "B" has a larger nucleus then A..
A has more attraction/energy - A must have larger nucleus

c. (T)F) Electrons from "A" are in the same energy level and orbital but they are closer.
A has more energy so must have greater charge. More attraction of e⁻ to the nucleus holds the electrons closer.