

Pre-AP Chemistry, Grade 10  
Test 2 – Practice

I. Multiple Choice

1. A Cl atom has how many protons?

- a) 35
- b) 37
- c) 18
- d) 17
- e) 1,000,000

2. The number of protons equals the number of \_\_\_\_\_ in a neutral atom.

- a) Neutrons
- b) Isotopes
- c) Electrons
- d) Molecules
- e) Coulombs of charge

3. Sr emits red light of wavelength 750 nm. The energy of a photon of this light is

- a)  $\frac{(6.626 \times 10^{-34}) \times (3 \times 10^8)}{(750)}$
- b)  $\frac{(750 \times 10^{-9})}{(6.626 \times 10^{-34}) \times (3 \times 10^8)}$
- c)  $\frac{(6.626 \times 10^{-34}) \times (750 \times 10^{-9})}{(3 \times 10^8)}$
- d)  $\frac{(6.626 \times 10^{-34}) \times (3 \times 10^8)}{(750 \times 10^{-9})}$
- e)  $\frac{(750 \times 10^{-9}) \times (3 \times 10^8)}{(6.626 \times 10^{-34})}$

4. The quantum number  $m_l$  tells you about the \_\_\_\_\_ of an orbital.

- a) electron spin
- b) effective nuclear charge
- c) orientation
- d) size
- e) shape

5. An electron in an atom of Be can occupy which of the following orbitals?

- a) 3d
- b) 2s
- c) 2p
- d) None of the above
- e) All of the above

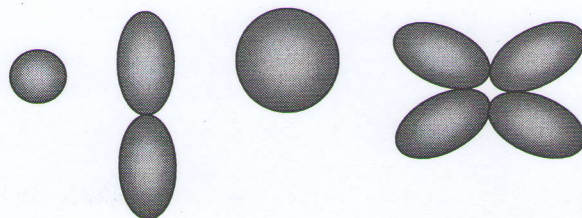
6. Which group below lists orbitals in order of increasing energy?

- a) 1s, 2s, 3s, 2p, 3p, 4p
- b) 3s, 4s, 4p, 3d, 4d, 5s
- c) 5s, 5p, 5d, 6s, 6p, 6d
- d) 2s, 2p, 3d, 4p, 5s, 7d
- e) 1s, 2p, 2d, 3f, 4d, 5s

7. In the Bohr model, energy is \_\_\_\_\_ when an electron jumps from  $n = 3$  to  $n = 2$

- a) created
- b) emitted
- c) destroyed
- d) absorbed
- e) mummified

8. The orbitals below are most likely



- a) 2p, 2s, 3p, 4f
- b) 1s, 2p, 2s, 3d
- c) 1s, 2p, 2s, 2d
- d) 2s, 2p, 1s, 3d
- e) 2p, 3d, 3p, 3s

9. Which of the following are possible quantum numbers for an electron in 4d orbital?

- a)  $n=4; l=2; m_l=+3; m_s=-1/2$
- b)  $n=2; l=4; m_l=+2; m_s=+1/2$
- c)  $n=4; l=3; m_l=+2; m_s=-1/2$
- d)  $n=4; l=2; m_l=+2; m_s=+1/2$
- e)  $n=2; l=2; m_l=+2; m_s=+1/2$

10. The uncertainty in momentum is \_\_\_\_\_ the uncertainty in position

- a) equal to
- b) directly proportional to
- c) not related to
- d) greater than
- e) inversely proportional to

Match the terms below to the descriptions in questions 11 – 15:

- a) Golden Rule (Energy Ordering)
- b) Schrodinger Equation
- c)  $10^{-10}$  m
- d) Orbital
- e) Pauli Exclusion

B 11. Used to solve for electron wavefunctions

E 12. Electrons in the same orbital have opposite spins.

D 13. Described by a set of  $n, l,$  and  $m_l$

A 14. Why ground-state He has no electrons in 2s.

C 15. Uncertainty in electron position / wavelength of electron / radius of an atom

Use the following electron configurations for questions 16 – 20:

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

16. the electron configuration of Kr

D

17. this electron configuration is not possible

A

18. an excited state of an atom with 30 electrons

E

19. the electron configuration of  $Sr^{2+}$

D

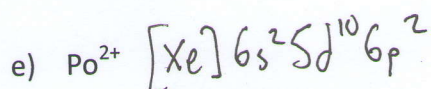
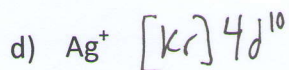
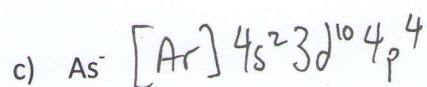
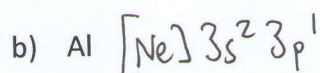
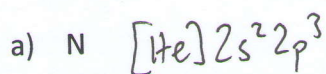
20. the sum of all  $m_s$  values can be greater than 1 or less than -1

B

\*\*\* Turn to the next page for Free Response questions \*\*\*

II. Free Response – **Read All Parts First!!!**

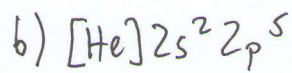
1. Write the electron configurations for the following atoms or ions. Use noble gas abbreviations whenever possible.



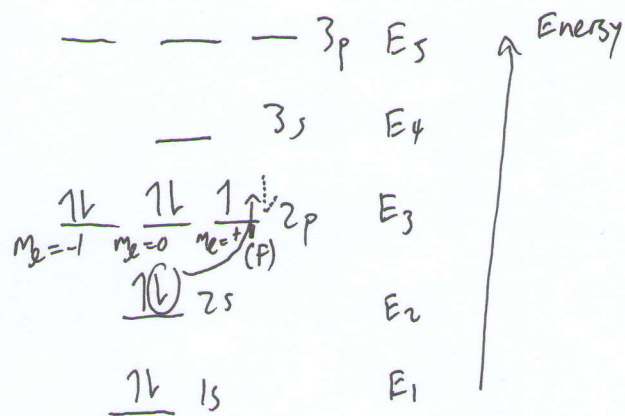
2. Consider a neutral fluorine atom.

- How many electrons are in one neutral atom of fluorine?
- Write the electron configuration of fluorine.
- Fill in the appropriate orbital names in the boxes and place the appropriate number of electrons in the correct orbitals on the energy-level diagram on your answer sheet.
- In which orbitals are the valence electrons?
- Draw a picture of the valence orbitals from part (d) on the nucleus on your answer sheet.
- On the energy-level diagram AND orbital diagram, show an electron jumping from the lowest-energy valence orbital to the highest-energy valence orbital.
- For the electron you moved in part (f), give the quantum numbers,  $n$ ,  $l$ ,  $m_l$ , and  $m_s$  for the electron AFTER the electron jumped (in the excited state).
- Using the energies on the diagram, calculate the wavelength of light that must be absorbed by the electron in part (f).

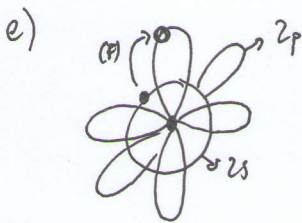
2. a) 9



c)



d) 2s, 2p



g)  $n=2, l=1, m_l=+1, m_s=-1/2$

h) Accidentally deleted the original answer sheet. Using energies above, wavelength of light absorbed equals

$$\lambda = \frac{hc}{\Delta E} = \frac{hc}{E_3 - E_2} = \frac{(6.626 \times 10^{-34})(3 \times 10^8)}{(E_3 - E_2)}$$