Name: _____

CHEM 151 Practice Exam 3

FOR MULTIPLE CHOICE QUESTIONS: CIRCLE THE BEST ANSWER (a-e)

FOR QUESTIONS INVOLVING CALCULATIONS, BE SURE TO SHOW YOUR WORK!
INCLUDE UNITS. NO CREDIT IS GIVEN IF WORK IS NOT SHOWN!

1. (4 points)
The energy of a photon is directly proportional to its:

a) frequency b) wavelength c) amplitude d) intensity e) none of the above

2. (4 points)
Group VIIA elements have an electron configuration of:

a) ns^7 b) np^7 c) ns^2np^5 d) ns^1np^6 e) ns^3np^4

3. (4 points)
In a single atom, how many electrons can have following quantum numbers: n=3, l=2, $m_s = +1/2$

a) 10 b) 5 c) 3 d) 6 e) 9

4. (4 points)
The characteristic of an orbital that is determined by the value of the angular momentum quantum numbers (l) is

a) shape b) distance from the nucleus c) spin
d) orientation in space e) main energy level

5. (4 points)
Which element below has the largest first ionization energy?

a) Rb b) Fr c) K d) Na e) Mg

6. (4 points)
Aluminum is a:

a) transition metal b) alkaline earth metal c) metal
d) nonmetal e) halogen

7. (4 points)
An anion is

a) a positively charged ion. b) usually a metal ion like Na^+ or Fe^{3+}
c) a negatively charged ion. d) formed by the sharing of an electron pair.
e) two of the above

8. (4 points)
The ion(s) that have the electron configuration, $1s^22s^22p^63s^23p^6$, is(are)

a) F^{-1} b) Ca^{+2} c) S^{+2} d) Cl^{+1} e) two of the above

9. (4 points)
Which of the following elements is assigned the highest electronegativity?

a) Na b) Cs c) Si d) Te e) Cl

10. (4 points)
Which of the following contains both ionic and covalent bonds?

a) ClF b) SO_2 c) NaCl d) SO_3 e) NaCN

11. (4 points)
Predict the molecular geometry of H_2CO using VSEPR.

a) linear b) pyramidal c) trigonal planar
d) V shaped e) tetrahedral

12. (4 points)
The bond angles in SCl_2 are a little less than:

a) 90° b) 109° c) 120° d) 180° e) two of the above

13. (4 points)
A bond which is formed by the overlap of atomic orbitals in a region outside of the internuclear axis is called a(n)

a) pi bond. b) ionic bond. c) polar bond. d) sigma bond. e) nonpolar bond.

14. (4 points)
The bond angle(s) characteristic of sp^2 hybridization is(are)

a) 90° b) 109° c) 120° d) 180° e) two of the above

15. (4 points)
The hybrid orbitals employed by phosphorus in the PF_3 molecule are:

a) sp b) sp^2 c) sp^3 d) sp^3d e) sp^3d^2

16. (8 points)
Draw Lewis Dot Structures of all possible resonance forms of CO_3^{2-}.

17. (8 points)
Use bond energies to estimate the $\triangle H$ for the following

$F_2 + 2HBr \rightarrow 2HF + Br_2$

18. (8 points)
Calculate the energy of a photon of light having a wavelength of 5.45×10^{-3} m.

19. (8 points)
Draw a Lewis Dot Structure for

a) NO

b) OF_2

20. (8 points)
Compare and contrast electron location and energy as described by the Bohr model and the quantum mechanical model. Be sure to include a distinction between an orbit and an orbital.

Answers: 1. **A** **2.C** **3. B** **4.A** **5. E** **6. C** **7. C** **8. B** **9. E** **10. E** **11. C**
12. B **13. A** **14. C** **15. C** **16.** **17. -441 kJ** **18. 3.65×10^{-23} J** **19.** **20.**