

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) $ns^2 np^5$ d) $ns^1 np^6$ e) $ns^3 np^4$

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, $1s^2 2s^2 2p^6 3s^2 3p^6$, 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) SO₂ c) NaCl d) SO₃ e) NaCN

11. (4 points)

Predict the molecular geometry of H₂CO using VSEPR.

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

12. (4 points)

The bond angles in SCl₂ 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 sp² 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 PF₃ molecule are:

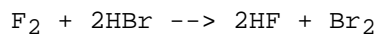
- a) sp b) sp² c) sp³ d) sp³d e) sp³d²

16. (8 points)

Draw Lewis Dot Structures of all possible resonance forms of CO₃²⁻.

17. (8 points)

Use bond energies to estimate the ΔH for the following

**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.