# CHM 1001 General Chemistry

## Assignment 1

- 20 multiple-choice questions + 5 short answer questions.
- There is only one correct answer for each multiple-choice question.
- Please write your answers in the Assignment Answers Template, which is uploaded with the assignment.
- Upload your answer into Blackboard before the deadline, you can write directly in the template, or by hand and scan it into an electronic version.
- No late submission is allowed.

Deadline: 23:59 pm, September 18th (UTC+8)

Part 1: Multiple-choice questions

1) The wavelength of light emitted from a traffic light having a frequency of $5.75 \times 10^{14}$ Hz is _____.

A) 702 nm
B) 641 nm
C) 674 nm
D) 522 nm
E) 583 nm

2) Of the following, _____ radiation has the shortest wavelength.
A) X-ray
B) radio
C) microwave
D) ultraviolet
E) infrared

3) Of the following transitions in the Bohr hydrogen atom, the _____ transition results in the emission of the lowest-energy photon.
A) n = 1 → n = 6
B) n = 6 → n = 1
C) n = 6 → n = 3
D) n = 3 → n = 6
E) n = 1 → n = 4

4) According to the Heisenberg Uncertainty Principle, it is impossible to know precisely both the position and the _____ of an electron.
A) mass
B) color
C) momentum
D) shape
E) charge

5) A mole of red photons of wavelength 725 nm has _____ kJ of energy.

A) $2.74 \times 10^{-19}$

B) $4.56 \times 10^{-46}$

C) $6.05 \times 10^{-3}$

D) 165
E) 227

6) A mole of yellow photons of wavelength 527 nm has _____ kJ of energy.
A) 165
B) 227
C) $4.56 \times 10^{-46}$
D) $6.05 \times 10^{-3}$
E) $2.74 \times 10^{-19}$

7) All of the orbitals in a given electron shell have the same value of the _____ quantum number.
A) principal
B) angular momentum
C) magnetic
D) spin
E) psi

8) Which of the subshells below do not exist due to the constraints upon the angular momentum quantum number?
A) 2d
B) 2s
C) 2p
D) all of the above
E) none of the above

9) Which one of the following is <u>not</u> a valid value for the magnetic quantum number of an electron in a 5d subshell?
A) 2
B) 3
C) 0
D) 1
E) -1

10) Which one of the following is an incorrect orbital notation?
A) 2s
B) $3p_y$
C) 3f
D) $4d_{xy}$
E) 4s

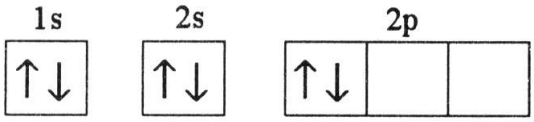
11) An electron cannot have the quantum numbers n = ____, l = ____, $m_l$ = ____.

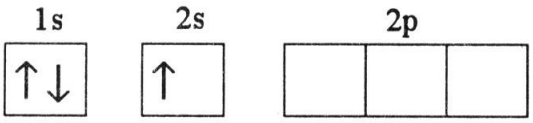
A) 2, 0, 0
B) 2, 1, -1
C) 3, 1, -1
D) 1, 1, 1
E) 3, 2, 1

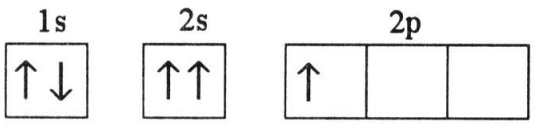
12) At maximum, an f-subshell can hold _____ electrons, a d-subshell can hold _____ electrons, and a p-subshell can hold _____ electrons.
A) 14, 10, 6
B) 2, 8, 18
C) 14, 8, 2
D) 2, 12, 21
E) 2, 6, 10

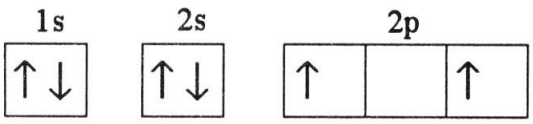
13) If an electron has a principal quantum number (n) of 3 and an angular momentum quantum number (l) of 2, the subshell designation is _____.
A) 3p
B) 3d
C) 4s
D) 4p
E) 4d

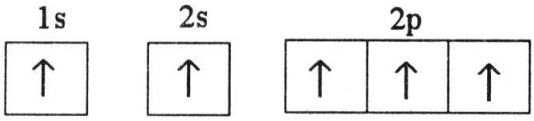
14) Which electron configuration represents a violation of the Pauli exclusion principle?

A) 

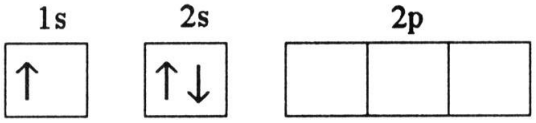

B) 

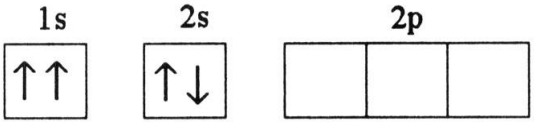

C) 

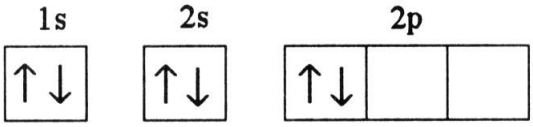

D) 

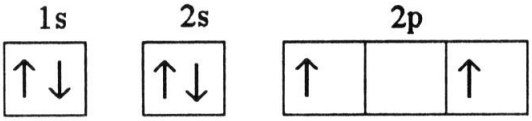
E) 

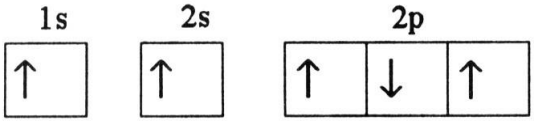

15) Which electron configuration denotes an atom in its ground state?

A) 


B) 


C) 


D) 


E) 


16) The ground state electron configuration of Ga is _____.

A) $1s^2 2s^2 3s^2 3p^6 4s^2 3d^{10} 4p^1$

B) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4d^{10} 4p^1$

C) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^1$

D) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4d^1$

E) $[Ar] 4s^2 3d^{11}$

17) The ground state electron configuration of Fe is _____.

A) $1s^2 2s^2 3s^2 3p^6 3d^6$

B) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$

C) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

D) $1a^2 2s^2 2p^6 3s^2 3p^6 4s^2 4d^6$

E) $1s^2 2s^2 3s^2 3p^{10}$

18) The ground state electron configuration for Zn is _____.

A) $[Kr]4s^2 3d^{10}$

B) $[Ar]4s^2 3d^{10}$

C) $[Ar]4s^1 3d^{10}$

D) $[Ar]3s^2 3d^{10}$

E) $[Kr]3s^2 3d^{10}$

19) The ground-state electron configuration of _____ is $[Ar]4s^1 3d^5$.

A) V
B) Mn
C) Fe
D) Cr
E) K

20) The elements in the _____ period of the periodic table have a core-electron configuration that is the same as the electron configuration of neon.
A) first
B) second
C) third
D) fourth
E) fifth

Part 2: Short answer questions

1. When was “electron” discovered? Who discovered it? How was electron discovered?

2. The laser in a standard laser printer emits light with a wavelength of 780.0 nm. What is the energy of a photon of this light?

3. What is the difference between a photon and an electron?

4. A particular orbital has n=4 and l =2. What must this orbital be?

5. Why 2d orbital does not exist?