Chemistry Practice Test
Periodic Trends and Orbitals

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Which of the following is a quantized property of an electron?
A) nuclear charge B) charge to mass ratio
C) number D) energy

2) What is the term for the shorthand description of the arrangement of electrons by sublevels according to increasing energy?
A) electron configuration
B) atomic notation
C) atomic number
D) continuous spectrum
E) none of the above

3) Which feature of Bohr's atomic model is no longer accepted as true by today's scientists?
A) Electrons have only certain, allowed energy values.
B) Most of an atom's mass is located within the nucleus.
C) Electrons orbit the nucleus in fixed circular paths.
D) Each principal quantum level can hold a maximum of $2n^2$ electrons.

4) What is the maximum number of electrons that the *d* subshell can hold?
A) 6 B) 10 C) 32 D) 5

5) Which of the following is a representation for a *p* orbital?
A)  B)  C)  D) 

6) According to the Pauli exclusion principle, any orbital can hold at most _____ electrons.
A) 8 B) 10 C) 6 D) 18 E) 2

7) Which statement is NOT true about "p" orbitals?
A) These orbitals are shaped like dumbbells.
B) A subshell contains three "p" orbitals.
C) A 3p orbital has a higher energy than a 2p orbital.
D) All three of these statements are true.
E) none of the above

8) "When filling orbitals of equal energy, electrons fill them singly first with parallel spins." This is known as:
A) Hund's rule. B) Bohr's model.
C) Pauli exclusion principle.
D) Ground state. E) none of the above

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

10) Which of the following subshell notations for electron occupancy is an impossibility?
A) $2p^1$ B) $4p^5$ C) $5s^3$ D) $4f^{11}$

11) After the 5s subshell of an atom is filled with electrons, the next electron added will enter the _____.
A) 5f subshell B) 5p subshell
C) 4d subshell D) 4p subshell

12) Which of the following has chemical properties most similar to sodium?
A) Mg B) He C) Fe D) K E) B

13) Given the chemical formulas Na_2O, MgO, and Al_2O_3, predict the formula for radioactive francium oxide, Fr?O?.
A) Fr_2O_3 B) FrO C) Fr_3O_2
D) Fr_2O E) FrO_2

14) Indicate the missing words in the following statement: The Aufbau principle states that _____ normally occupy the lowest energy subshell available.
A) neutrons B) protons C) electrons D) nucleus

15) Which energy sublevel is being filled by the elements Rb to Sr?
A) 5*d* B) 5*s* C) 5*f* D) 4*d* E) 5*p*

16) The correct electron configuration for manganese is:
A) $1s^2\ 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$
B) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^1$
C) $1s^2 2s^2 2p^6 3s^2 3p^6$
D) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^6$

17) What is the core notation for the electron configuration of a potassium atom?
A) [Ar] B) [Ar] $4s^1$ C) [Ar] $4d^1$
D) [Kr] E) [Ar] $4p^1$

18) The element with the electron configuration below is:
$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^1$
A) Si B) La C) Sc D) Y

19) Which element has the electron configuration $[Kr]5s^2 4d^{10} 5p^2$?
A) Pb B) Ge C) Sb D) Sn

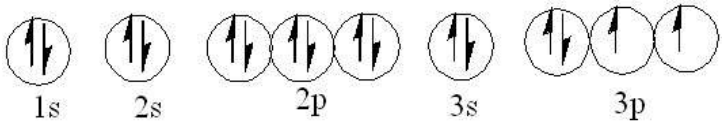
20) What is the core notation for the electron configuration of an iodine atom?
A) [Kr] $5s^2\ 4p^5$ B) [Kr] $5s^2\ 4d^{10}\ 5d^6$
C) [Xe] D) [Kr]
E) [Kr] $5s^2\ 4d^{10}\ 5p^5$

21) The number of unpaired electrons present in a magnesium atom is _____.
A) 1 B) 3 C) 2 D) 0

22) How many unpaired electrons are there in a phosphorous atom?
A) 1 B) 4 C) 3 D) 2

23) Which of the following pairings is *incorrect*?
A) Be – *s* area of periodic table B) Xe – *p* area of periodic table
C) Au – *d* area of periodic table D) Pr – *d* area of periodic table

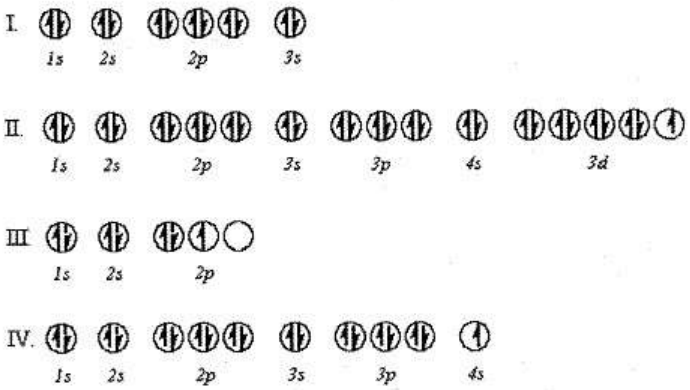
24) Which element is represented by the electronic orbital diagram given?



A) selenium B) sulfur C) chlorine D) phosphorus

25) Which one of the following elements would be in the same group of the periodic table as the element whose configuration is $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$?
A) $_{18}Ar$ B) $_{15}P$ C) $_{3}Li$ D) $_{34}Se$

26) Which orbital diagram is *incorrect* according to Hund's Rule?



A) Diagram I B) Diagram II
C) Diagram IV D) Diagram III

27) Which energy sublevel is being filled by the elements Ce to Lu?
A) 4*f* B) 6*f* C) 6*d* D) 5*d* E) 5*f*

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.
28) Blue visible light has a lower energy than red visible light.

29) In Bohr's theory, electrons can jump from one energy level to another or from one orbit to another.

30) The observed line spectra of electrically excited gas samples tend to support the notion that electron energies are quantized.

Solution
1) D 2) A 3) C 4) B 5) C 6) E 7) D 8) A 9) B 10) C 11) C 12) D 13) D 14) C
15) B 16) A 17) B 18) D 19) D 20) E 21) D 22) C 23) D 24) B 25) C 26) D 27) A
28) FALSE 29) TRUE 30) TRUE