

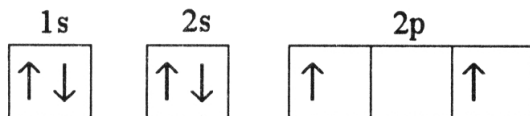
Name _____

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

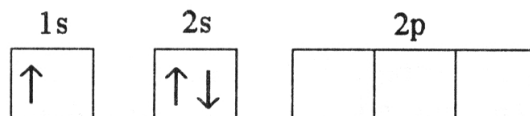
1) Which electron configuration represents a violation of the Pauli exclusion principle?

1) _____

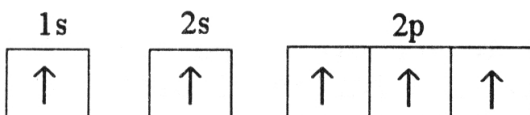
A)



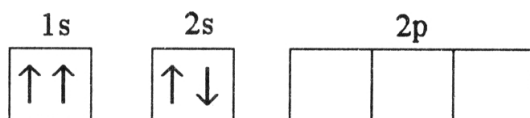
B)



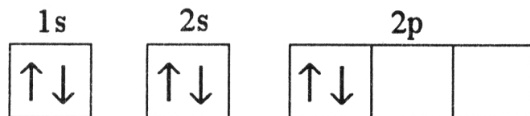
C)



D)

Correct Answer

E)

2) Which of the following is a valid set of four quantum numbers? (n, l, m_l, m_s)

2) _____

A) 2, 1, +2, +1/2

B) 2, 2, 1, -1/2

C) 1, 1, 0, -1/2

D) 2, 1, 0, +1/2

E) 1, 0, 1, +1/2

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

3) _____

A) 1s²2s²2p⁶3s²3p⁶3d¹⁰4s²4p¹B) [Ar]4s²3d¹¹C) 1s²2s²2p⁶3s²3p⁶4s²4d¹⁰4p¹D) 1s²2s²3s²3p⁶3d¹⁰4s²4p¹E) 1s²2s²2p⁶3s²3p⁶3d¹⁰4s²4d¹

4) Which one of the following configurations depicts an excited oxygen atom?

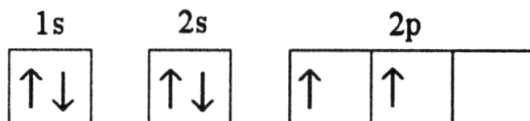
4) _____

- A) $1s^2 2s^2 2p^2 3s^2$
- B) $1s^2 2s^2 2p^4$
- C) $[\text{He}] 2s^2 2p^4$
- D) $1s^2 2s^2 2p^2$
- E) $1s^2 2s^2 2p^1$

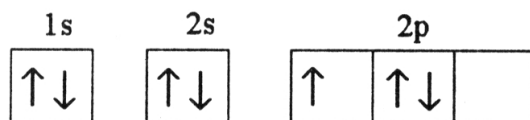
5) Which electron configuration represents a violation of Hund's rule for an atom in its ground state?

5) _____

A)

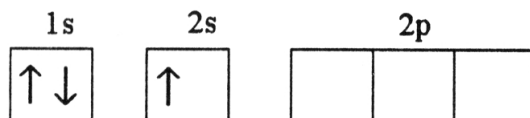


B)

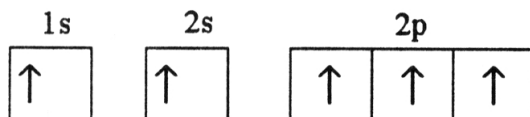


DCorrect answer

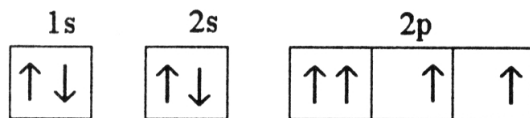
C)



D)



E)



6) Which of the following elements has a ground-state electron configuration different from the predicted one?

6) _____

- A) Xe
- B) Ti
- C) Ca
- D) Cl
- E) Cu

7) How many different principal quantum numbers can be found in the ground state electron configuration of nickel?

7) _____

- A) 2
- B) 3
- C) 4
- D) 5
- E) 6

8) Of the following, which gives the correct order for atomic radius for Mg, Na, P, Si and Ar?

8) _____

- A) $\text{Ar} > \text{Si} > \text{P} > \text{Na} > \text{Mg}$
- B) $\text{Mg} > \text{Na} > \text{P} > \text{Si} > \text{Ar}$
- C) $\text{Si} > \text{P} > \text{Ar} > \text{Na} > \text{Mg}$
- D) $\text{Na} > \text{Mg} > \text{Si} > \text{P} > \text{Ar}$
- E) $\text{Ar} > \text{P} > \text{Si} > \text{Mg} > \text{Na}$

9) The atomic radius of main-group elements generally increases down a group because _____. 9) _____
 A) effective nuclear charge decreases down a group
 B) effective nuclear charge increases down a group
 C) the principal quantum number of the valence orbitals increases
 D) effective nuclear charge zigzags down a group
 E) both effective nuclear charge increases down a group and the principal quantum number of the valence orbitals increases

10) Of the following atoms, which has the largest first ionization energy? 10) _____
 A) C B) P C) I D) Br E) O

11) Which of the following correctly represents the second ionization of aluminum? 11) _____
 A) $\text{Al}^+(\text{g}) \rightarrow \text{Al}^{2+}(\text{g}) + \text{e}^-$
 B) $\text{Al}^+(\text{g}) + \text{e}^- \rightarrow \text{Al}(\text{g})$
 C) $\text{Al}^-(\text{g}) + \text{e}^- \rightarrow \text{Al}^{2-}(\text{g})$
 D) $\text{Al}^+(\text{g}) + \text{e}^- \rightarrow \text{Al}^{2+}(\text{g})$
 E) $\text{Al}(\text{g}) \rightarrow \text{Al}^+(\text{g}) + \text{e}^-$

12) Of the following elements, _____ has the most negative electron affinity. 12) _____
 A) Cl B) S C) Se D) Br E) I

Consider the following electron configurations to answer the questions that follow:

- (i) $1s^2 2s^2 2p^6 3s^1$
- (ii) $1s^2 2s^2 2p^6 3s^2$
- (iii) $1s^2 2s^2 2p^6 3s^2 3p^1$
- (iv) $1s^2 2s^2 2p^6 3s^2 3p^4$
- (v) $1s^2 2s^2 2p^6 3s^2 3p^5$

13) The electron configuration belonging to the atom with the highest second ionization energy is 13) _____
 _____.
 A) (i) B) (ii) C) (iii) D) (iv) E) (v)

14) Of the following oxides, _____ is the most acidic. 14) _____
 A) Na_2O B) CaO C) Li_2O D) Al_2O_3 E) CO_2

15) This element is more reactive than lithium and magnesium but less reactive than potassium. This element is _____. 15) _____
 A) Be B) Na C) Rb D) Ca E) Fr

16) Which of the following generalizations cannot be made with regard to reactions of alkali metals? 16) _____
 (The symbol M represents any one of the alkali metals.)
 A) $2\text{M}(\text{s}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{MCl}(\text{s})$
 B) $2\text{M}(\text{s}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{MOH}(\text{aq}) + \text{H}_2(\text{g})$
 C) $\text{M}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{MO}_2(\text{s})$
 D) $2\text{M}(\text{s}) + \text{H}_2(\text{g}) \rightarrow 2\text{MH}(\text{s})$
 E) $2\text{M}(\text{s}) + \text{S}(\text{s}) \rightarrow \text{M}_2\text{S}(\text{s})$

- 17) Of the following statements, _____ is not true for oxygen. 17) _____
- A) Oxygen is a colorless gas at room temperature.
 - B) The most stable allotrope of oxygen is O₂.
 - C) Dry air is about 79% oxygen.
 - D) The chemical formula of ozone is O₃.
 - E) Oxygen forms peroxide and superoxide anions.
- 18) In nature, the noble gases exist as 18) _____
- A) solids in rocks and in minerals
 - B) monatomic gaseous atoms
 - C) alkali metal salts
 - D) the sulfides
 - E) the gaseous fluorides

Consider the following electron configurations to answer the questions that follow:

- (i) 1s² 2s² 2p⁶ 3s¹
 - (ii) 1s² 2s² 2p⁶ 3s²
 - (iii) 1s² 2s² 2p⁶ 3s² 3p¹
 - (iv) 1s² 2s² 2p⁶ 3s² 3p⁴
 - (v) 1s² 2s² 2p⁶ 3s² 3p⁵
- 19) The electron configuration of the atom that is expected to have a positive electron affinity is 19) _____
- _____.
- A) (i)
 - B) (ii)
 - C) (iii)
 - D) (iv)
 - E) (v)
- 20) Lattice energy is _____. 20) _____
- A) the energy required to produce one mole of an ionic compound from its constituent elements in their standard states
 - B) the energy required to convert a mole of ionic solid into its constituent ions in the gas phase
 - C) the sum of ionization energies of the components in an ionic solid
 - D) the energy given off when gaseous ions combine to form one mole of an ionic solid
 - E) the sum of electron affinities of the components in an ionic solid
- 21) For a given arrangement of ions, the lattice energy increases as ionic radius _____ and as ionic charge _____. 21) _____
- A) decreases, increases
 - B) increases, increases
 - C) increases, decreases
 - D) decreases, decreases
 - E) This cannot be predicted.
- 22) The electron configuration of the S²⁻ ion is _____. 22) _____
- A) [Ar]3s²3p²
 - B) [Ne]3s²3p²
 - C) [Ne]3s²3p⁶
 - D) [Kr]3s²2p⁻⁶
 - E) [Ar]3s²3p⁶

23) What is the electron configuration for the Co^{2+} ion?

23) _____

- A) $[\text{Ar}]4s^13d^6$
- B) $[\text{Ne}]3s^23p^{10}$
- C) $[\text{Ar}]3d^7$
- D) $[\text{Ar}]4s^23d^9$
- E) $[\text{Ar}]4s^03d^5$

24) Which one of the following orbitals can hold two electrons?

24) _____

- A) $4d_{xy}$
- B) $3s$
- C) $2p_x$
- D) all of the above
- E) none of the above

25) Which one of the following is an incorrect orbital notation?

25) _____

- A) $3p_y$
- B) $4s$
- C) $4d_{xy}$
- D) $2s$
- E) $\underline{3f}$