

AP Chem Chapter 7: Periodic Properties of the Elements. Worksheet #2

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- Electrons in the 1s subshell are much closer to the nucleus in Ar than in He due to the larger _____ in Ar.
Ⓐ nuclear charge
Ⓑ paramagnetism
Ⓒ diamagnetism
Ⓓ Hund's rule
Ⓔ azimuthal quantum number
- In which orbital does an electron in a phosphorus atom experience the greatest effective nuclear charge?
Ⓐ 1s
Ⓑ 2s
Ⓒ 2p
Ⓓ 3s
Ⓔ 3p
- Atomic radius generally increases as we move _____.
Ⓐ down a group and from right to left across a period
Ⓑ up a group and from left to right across a period
Ⓒ down a group and from left to right across a period
Ⓓ up a group and from right to left across a period
Ⓔ down a group; the period position has no effect
- The effective nuclear charge of an atom is primarily affected by _____.
Ⓐ inner electrons
Ⓑ outer electrons
Ⓒ nuclear charge
Ⓓ electron distribution
Ⓔ orbital radial probability
- Which one of the following atoms has the largest radius?
Ⓐ Sr
Ⓑ Ca
Ⓒ K
Ⓓ Rb
Ⓔ Y
- In which of the following atoms is the 2s orbital closest to the nucleus?
Ⓐ S
Ⓑ Cl
Ⓒ P
Ⓓ Si
Ⓔ The 2s orbitals are the same distance from the nucleus in all of these atoms.
- _____ is isoelectronic with argon and _____ is isoelectronic with neon.
Ⓐ Cl^- , F^-
Ⓑ Cl^- , Cl^+
Ⓒ F^+ , F^-
Ⓓ Ne^- , Kr^+
Ⓔ Ne^- , Ar^+
- Which of the following is an isoelectronic series?
Ⓐ B^{5-} , Si^{4-} , As^{3-} , Te^{2-}
Ⓑ F^- , Cl^- , Br^- , I^-
Ⓒ S, Cl, Ar, K
Ⓓ Si^{2-} , P^{2-} , S^{2-} , Cl^{2-}
Ⓔ O^{2-} , F^- , Ne, Na^+
- Of the choices below, which gives the order for first ionization energies?
Ⓐ $\text{Cl} > \text{S} > \text{Al} > \text{Ar} > \text{Si}$
Ⓑ $\text{Ar} > \text{Cl} > \text{S} > \text{Si} > \text{Al}$
Ⓒ $\text{Al} > \text{Si} > \text{S} > \text{Cl} > \text{Ar}$
Ⓓ $\text{Cl} > \text{S} > \text{Al} > \text{Si} > \text{Ar}$
Ⓔ $\text{S} > \text{Si} > \text{Cl} > \text{Al} > \text{Ar}$

- 10) Of the following atoms, which has the largest first ionization energy?
 (A) Br
 (B) O
 (C) C
 (D) P
 (E) I
- 11) Which of the following correctly represents the second ionization of aluminum?
 (A) $\text{Al}^+(\text{g}) + \text{e}^- \rightarrow \text{Al}(\text{g})$
 (B) $\text{Al}(\text{g}) \rightarrow \text{Al}^+(\text{g}) + \text{e}^-$
 (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) $\text{Al}^+(\text{g}) \rightarrow \text{Al}^{2+}(\text{g}) + \text{e}^-$
- 12) Which ion below has the largest radius?
 (A) Cl^-
 (B) K^+
 (C) Br^-
 (D) F^-
 (E) Na^+
- 13) Of the following elements, _____ has the most negative electron affinity.
 (A) Na
 (B) Li
 (C) Be
 (D) N
 (E) F
- 14) Chlorine is much more apt to exist as an anion than is sodium. This is because _____.
 (A) chlorine is bigger than sodium
 (B) chlorine has a greater ionization energy than sodium does
 (C) chlorine has a greater electron affinity than sodium does
 (D) chlorine is a gas and sodium is a solid
 (E) chlorine is more metallic than sodium
- 15) Which equation correctly represents the electron affinity of calcium?
 (A) $\text{Ca}(\text{g}) + \text{e}^- \rightarrow \text{Ca}^-(\text{g})$
 (B) $\text{Ca}(\text{g}) \rightarrow \text{Ca}^+(\text{g}) + \text{e}^-$
 (C) $\text{Ca}(\text{g}) \rightarrow \text{Ca}^-(\text{g}) + \text{e}^-$
 (D) $\text{Ca}^-(\text{g}) \rightarrow \text{Ca}(\text{g}) + \text{e}^-$
 (E) $\text{Ca}^+(\text{g}) + \text{e}^- \rightarrow \text{Ca}(\text{g})$

- 16) 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) $1s^2 2s^2 2p^6 3s^2 3p^5$

The electron configuration belonging to the atom with the highest second ionization energy is _____.

- (A) (i)
 (B) (ii)
 (C) (iii)
 (D) (iv)
 (E) (v)

- 17) 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) $1s^2 2s^2 2p^6 3s^2 3p^5$

The electron configuration that belongs to the atom with the lowest second ionization energy is _____.

- (A) (i)
 (B) (ii)
 (C) (iii)
 (D) (iv)
 (E) (v)

- 18) Of the elements below, _____ is the most metallic.

- (A) sodium
 (B) barium
 (C) magnesium
 (D) calcium
 (E) cesium

- 19) In the generation of most anions, the energy change (kJ/mol) that _____ an electron is _____.
- Ⓐ removes, positive
 - Ⓑ adds, positive
 - Ⓒ removes, negative
 - Ⓓ adds, negative
 - Ⓔ None of the above is correct.
- 20) Which one of the following is a metalloid?
- Ⓐ Ge
 - Ⓑ S
 - Ⓒ Br
 - Ⓓ Pb
 - Ⓔ C
- 21) The list that correctly indicates the order of metallic character is _____.
- Ⓐ $B > N > C$
 - Ⓑ $F > Cl > S$
 - Ⓒ $Si > P > S$
 - Ⓓ $P > S > Se$
 - Ⓔ $Na > K > Rb$
- 22) Of the elements below, _____ has the highest melting point.
- Ⓐ Ca
 - Ⓑ K
 - Ⓒ Fe
 - Ⓓ Na
 - Ⓔ Ba
- 23) Of the following metals, _____ exhibits multiple oxidation states.
- Ⓐ Al
 - Ⓑ Cs
 - Ⓒ V
 - Ⓓ Ca
 - Ⓔ Na
- 24) Of the following oxides, _____ is the most acidic.
- Ⓐ CaO
 - Ⓑ CO_2
 - Ⓒ Al_2O_3
 - Ⓓ Li_2O
 - Ⓔ Na_2O
- 25) The acidity of carbonated water is due to the _____.
- Ⓐ presence of sulfur
 - Ⓑ reaction of CO_2 and H_2O
 - Ⓒ addition of acid
 - Ⓓ nonmetal oxides
 - Ⓔ none of the above
- 26) The element in the periodic table that looks like a metal, is a poor thermal conductor, and acts as an electrical semiconductor is _____.
- Ⓐ Sn
 - Ⓑ B
 - Ⓒ As
 - Ⓓ Si
 - Ⓔ Ge
- 27) Transition metals within a period differ mainly in the number of _____ electrons.
- Ⓐ s
 - Ⓑ p
 - Ⓒ d
 - Ⓓ f
 - Ⓔ all of the above
- 28) This element is more reactive than lithium and magnesium but less reactive than potassium. This element is _____.
- Ⓐ Na
 - Ⓑ Rb
 - Ⓒ Ca
 - Ⓓ Be
 - Ⓔ Fr

- 29) Consider the general valence electron configuration of ns^2np^5 and the following statements:
- (i) Elements with this electron configuration are expected to form -1 anions.
 - (ii) Elements with this electron configuration are expected to have large positive electron affinities.
 - (iii) Elements with this electron configuration are nonmetals.
 - (iv) Elements with this electron configuration form acidic oxides.
- Which statements are true?
- (A) (i) and (ii)
 - (B) (i), (ii), and (iii)
 - (C) (ii) and (iii)
 - (D) (i), (iii,) and (iv)
 - (E) All statements are true.
- 30) All of the following are ionic compounds except _____.
- (A) K_2O
 - (B) Na_2SO_4
 - (C) SiO_2
 - (D) Li_3N
 - (E) $NaCl$
- 31) Which one of the following compounds produces a basic solution when dissolved in water?
- (A) SO_2
 - (B) Na_2O
 - (C) CO_2
 - (D) OF_2
 - (E) O_2
- 32) All of the halogens _____.
- (A) exist under ambient conditions as diatomic gases
 - (B) tend to form positive ions of several different charges
 - (C) tend to form negative ions of several different charges
 - (D) exhibit metallic character
 - (E) form salts with alkali metals with the formula MX
- 33) The noble gases were, until relatively recently, thought to be entirely unreactive. Experiments in the early 1960s showed that Xe could, in fact, form compounds with fluorine. The formation of compounds consisting of Xe is made possible by _____.
- (A) the availability of xenon atoms
 - (B) xenon's noble gas electron configuration
 - (C) the stability of xenon atoms
 - (D) xenon's relatively low ionization energy
 - (E) xenon's relatively low electron affinity
- 34) Ozone is a (an) _____ of oxygen.
- (A) isotope
 - (B) allotrope
 - (C) precursor
 - (D) peroxide
 - (E) free radical