

Periodic Trends Multiple Choice Review

Name _____

Atomic Size

- 1) Elements Z and X are compared. Element Z is larger than Element X. Based on this you could say:
 - A) Element Z is further to the left side of the periodic table
 - B) Element X is closer to the top of the periodic table
 - C) Element Z and X are probably in the same group
 - D) A and/or B
 - E) B and/or C
- 2) Atomic radius generally increases as we move _____.
 - A) down a group and from right to left across a period
 - B) up a group and from left to right across a period
 - C) down a group and from left to right across a period
 - D) up a group and from right to left across a period
 - E) down a group; the period position has no effect
- 3) The atomic radius of main-group elements generally increases down a group because _____.
 - A) effective nuclear charge increases down a group
 - B) effective nuclear charge decreases down a group
 - C) effective nuclear charge zigzags down a group
 - D) the principal quantum number of the valence orbitals increases
 - E) both effective nuclear charge increases down a group and the principal quantum number of the valence orbitals increases
- 4) Which one of the following atoms has the largest radius?
 - A) O
 - B) F
 - C) S
 - D) Cl
 - E) Ne
- 5) Which one of the following atoms has the largest radius?
 - A) Sr
 - B) Ca
 - C) K
 - D) Rb
 - E) Na
- 6) Which one of the following has the smallest radius?
 - A) Na
 - B) Cl
 - C) P
 - D) Br
 - E) K

- 7) Which one of the following atoms has the largest radius?
A) I
B) Co
C) Ba
D) Sr
E) Ca
- 8) Which one of the following elements has the largest atomic radius?
A) Se
B) As
C) S
D) Sb
E) Te
- 9) Which one of the following elements has the largest atomic radius?
A) O
B) F
C) Al
D) P
E) B
- 10) In which of the following atoms is the 2s orbital closest to the nucleus?
A) S
B) Cl
C) P
D) Si
E) They are the same distance in all of these atoms.
- 11) Which of the following correctly lists the five atoms in order of increasing size (smallest to largest)?
A) $F < K < Ge < Br < Rb$
B) $F < Ge < Br < K < Rb$
C) $F < K < Br < Ge < Rb$
D) $F < Br < Ge < K < Rb$
E) $F < Br < Ge < Rb < K$
- 12) In which of the following atoms is the 3s orbital closest to the nucleus?
A) Br
B) Cl
C) At
D) I
E) They are the same distance in all of these atoms.

- 13) Which of the following correctly lists the five atoms in order of increasing size (smallest to largest)?
- A) $O < F < S < Mg < Ba$
 - B) $F < O < S < Mg < Ba$
 - C) $F < O < S < Ba < Mg$
 - D) $O < F < S < Ba < Mg$
 - E) $F < S < O < Mg < Ba$

Ions and Ionic Size

- 14) Which ion below has the largest radius?

- A) Cl^-
- B) K^+
- C) Br^-
- D) F^-
- E) Na^+

- 15) The ion with the smallest diameter is _____.

- A) Br^-
- B) Cl^-
- C) I^-
- D) F^-
- E) O^{2-}

- 16) The most common sulfur ion has a charge of _____.

- A) 2-
- B) 1-
- C) 4+
- D) 6+
- E) Sulfur does not form ions.

- 17) Chlorine is much more apt to exist as a negative ion 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 electronegativity than sodium does
- D) chlorine is a gas and sodium is a solid
- E) chlorine is more metallic than sodium

- 18) Sodium is much more apt to exist as a positive ion than is chlorine. This is because _____.

- A) chlorine is a gas and sodium is a solid
- B) chlorine has a greater electron affinity than sodium does
- C) chlorine is bigger than sodium
- D) chlorine has a greater ionization energy than sodium does
- E) chlorine is more metallic than sodium

19) Of the following species, _____ has the largest radius.

- A) Rb^+
- B) Sr^{2+}
- C) Br^-
- D) Kr
- E) Ar

20) Which of the following is an isoelectronic series? [*]

- A) B^{5-} , Sr^{4+} , As^{3-} , Te^{2-}
- B) F^- , Cl^- , Br^- , I^-
- C) S, Cl, Ar, K
- D) Si^{2-} , P^{2-} , S^{2-} , Cl^{2-}
- E) O^{2-} , F^- , Ne, Na^+

21) Which isoelectronic series is correctly arranged in order of increasing radius?

- A) $\text{K}^+ < \text{Ca}^{2+} < \text{Ar} < \text{Cl}^-$
- B) $\text{Cl}^- < \text{Ar} < \text{K}^+ < \text{Ca}^{2+}$
- C) $\text{Ca}^{2+} < \text{Ar} < \text{K}^+ < \text{Cl}^-$
- D) $\text{Ca}^{2+} < \text{K}^+ < \text{Ar} < \text{Cl}^-$
- E) $\text{Ca}^{2+} < \text{K}^+ < \text{Cl}^- < \text{Ar}$

22) _____ is isoelectronic with argon and _____ is isoelectronic with neon.

- A) Cl^- , F^-
- B) Cl^- , Cl^+
- C) F^+ , F^-
- D) Ne^- , Kr^+
- E) Ne^- , Ar^+

Electronegativity

23) The ability of an atom in a molecule to attract electrons is best quantified by the _____.

- A) paramagnetism
- B) diamagnetism
- C) electronegativity
- D) first ionization potential
- E) electron change-to-mass ratio

24) Electronegativity _____ from left to right within a period and _____ from top to bottom within a group.

- A) decreases, increases
- B) increases, increases
- C) increases, decreases
- D) stays the same, increases
- E) increases, stays the same

25) Of the atoms below, _____ is the most electronegative.

- A) Br
- B) O
- C) Cl
- D) N
- E) F

26) Of the atoms below, _____ is the most electronegative.

- A) Si
- B) Cl
- C) Rb
- D) Ca
- E) S

27) Of the atoms below, _____ is the least electronegative.

- A) Rb
- B) F
- C) Si
- D) Cl
- E) Ca

28) Which of the elements below has the largest electronegativity?

- A) Si
- B) Mg
- C) P
- D) S
- E) Na

29) In general, as you go across a period in the periodic table from left to right:

- (1) the atomic radius _____;
- (2) the electronegativity _____; and
- (3) the first ionization energy _____.

- A) decreases, decreases, increases
- B) increases, increases, decreases
- C) increases, increases, increases
- D) decreases, increases, increases
- E) decreases, increases, decreases

Ionization Energy

30) The first ionization energies of the elements _____ as you go from left to right across a period of the periodic table, and _____ as you go from the bottom to the top of a group in the table.

- A) increase, increase
- B) increase, decrease
- C) decrease, increase
- D) decrease, decrease
- E) are completely unpredictable

31) Of the choices below, which gives the order for first ionization energies?

- A) $\text{Cl} > \text{S} > \text{Al} > \text{Ar} > \text{Si}$
- B) $\text{Ar} > \text{Cl} > \text{S} > \text{Si} > \text{Al}$
- C) $\text{Al} > \text{Si} > \text{S} > \text{Cl} > \text{Ar}$
- D) $\text{Cl} > \text{S} > \text{Al} > \text{Si} > \text{Ar}$
- E) $\text{S} > \text{Si} > \text{Cl} > \text{Al} > \text{Ar}$

32) Of the following atoms, which has the largest first ionization energy?

- A) Br
- B) O
- C) C
- D) P
- E) I

33) Of the following elements, which has the largest first ionization energy?

- A) Na
- B) Al
- C) Se
- D) Cl
- E) Br

34) Of the following elements, which has the largest first ionization energy?

- A) K
- B) Rb
- C) Sr
- D) Ca
- E) Ba

35) Of the following elements, which has the largest first ionization energy?

- A) Se
- B) As
- C) S
- D) Sb
- E) Ge

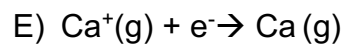
36) Of the following elements, which has the largest first ionization energy?

- A) B
- B) N
- C) P
- D) Si
- E) C

37) Of the elements below, _____ has the largest first ionization energy.

- A) Li
- B) K
- C) Na
- D) H

- E) Rb
- 38) _____ have the lowest first ionization energies of the groups listed.
- A) Alkali metals
 - B) Transition metals
 - C) Halogens
 - D) Alkaline Earth metals
 - E) Noble gases
- 39) Which equation correctly represents the first ionization of aluminum? [*]
- A) $\text{Al}^- (\text{g}) \rightarrow \text{Al}(\text{g}) + \text{e}^-$
 - B) $\text{Al} (\text{g}) \rightarrow \text{Al}^-(\text{g}) + \text{e}^-$
 - C) $\text{Al} (\text{g}) + \text{e}^- \rightarrow \text{Al}^-(\text{g})$
 - D) $\text{Al} (\text{g}) \rightarrow \text{Al}^+(\text{g}) + \text{e}^-$
 - E) $\text{Al}^+ (\text{g}) + \text{e}^- \rightarrow \text{Al}(\text{g})$
- 40) 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) $\text{Al}^+ (\text{g}) \rightarrow \text{Al}^{2+}(\text{g}) + \text{e}^-$
 - D) $\text{Al}^+ (\text{g}) + \text{e}^- \rightarrow \text{Al}^{2+}(\text{g})$
 - E) $\text{Al}^+ (\text{g}) \rightarrow \text{Al}^{2+}(\text{g}) + \text{e}^-$
- 41) Which equation correctly represents the first ionization of phosphorus?
- A) $\text{P}(\text{g}) + \text{e}^- \rightarrow \text{P}^-(\text{g})$
 - B) $\text{P}(\text{g}) \rightarrow \text{P}^-(\text{g}) + \text{e}^-$
 - C) $\text{P}(\text{g}) \rightarrow \text{P}^+(\text{g}) + \text{e}^-$
 - D) $\text{P}^-(\text{g}) \rightarrow \text{P}(\text{g}) + \text{e}^-$
 - E) $\text{P}^+(\text{g}) + \text{e}^- \rightarrow \text{P}(\text{g})$
- 42) Which of the following correctly represents the second ionization of phosphorus?
- A) $\text{P}^+(\text{g}) + \text{e}^- \rightarrow \text{P}^{2+} (\text{g})$
 - B) $\text{P}(\text{g}) \rightarrow \text{P}^+ (\text{g}) + \text{e}^-$
 - C) $\text{P}^-(\text{g}) + \text{e}^- \rightarrow \text{P}^{2-} (\text{g})$
 - D) $\text{P}^+(\text{g}) \rightarrow \text{P}^{2+} (\text{g}) + \text{e}^-$
 - E) $\text{P}^+(\text{g}) + \text{e}^- \rightarrow \text{P} (\text{g})$
- 43) Which equation correctly represents the first ionization of Barium? [*]
- A) $\text{Ba}(\text{g}) \rightarrow \text{Ba}^+ (\text{g}) + \text{e}^-$
 - B) $\text{Ba}(\text{g}) \rightarrow \text{Ba}^- (\text{g}) + \text{e}^-$
 - C) $\text{Ba}(\text{g}) + \text{e}^- \rightarrow \text{Ba}^- (\text{g})$
 - D) $\text{Ba}^-(\text{g}) \rightarrow \text{Ba} (\text{g}) + \text{e}^-$
 - E) $\text{Ba}^+(\text{g}) + \text{e}^- \rightarrow \text{Ba} (\text{g})$
- 44) Which of the following correctly represents the second ionization of calcium? [*]
- A) $\text{Ca}(\text{g}) \rightarrow \text{Ca}^+ (\text{g}) + \text{e}^-$
 - B) $\text{Ca}^+(\text{g}) \rightarrow \text{Ca}^{2+} (\text{g}) + \text{e}^-$
 - C) $\text{Ca}^-(\text{g}) + \text{e}^- \rightarrow \text{Ca}^{2-} (\text{g})$
 - D) $\text{Ca}^+(\text{g}) + \text{e}^- \rightarrow \text{Ca}^{2+} (\text{g})$



Metallic Character (✖)

45) Of the elements below, _____ is the most metallic.

- A) Na
- B) Mg
- C) Al
- D) K
- E) Ar

46) The list that correctly indicates the order of metallic character is _____.

- A) $\text{B} > \text{N} > \text{C}$
- B) $\text{F} > \text{Cl} > \text{S}$
- C) $\text{Si} > \text{P} > \text{S}$
- D) $\text{P} > \text{S} > \text{Se}$
- E) $\text{Na} > \text{K} > \text{Rb}$

47) Between which two elements is the difference in metallic character the greatest?

- A) Rb and O
- B) O and I
- C) Rb and I
- D) Li and O
- E) Li and Rb

ANSWERS:

- | | |
|------|------|
| 1) D | 25)E |
| 2) A | 26)B |
| 3) D | 27)A |
| 4) C | 28)D |
| 5) D | 29)D |
| 6) B | 30)A |
| 7) C | 31)B |
| 8) D | 32)B |
| 9) C | 33)D |
| 10)B | 34)D |
| 11)D | 35)C |
| 12)C | 36)B |
| 13)B | 37)D |
| 14)C | 38)A |
| 15)D | 39)D |
| 16)A | 40)C |
| 17)C | 41)C |
| 18)D | 42)D |
| 19)C | 43)A |
| 20)E | 44)B |
| 21)D | 45)D |
| 22)A | 46)C |
| 23)C | 47)A |
| 24)C | |