

Periodicity Practice Test

Version A

2. Which of the following statements are reasons that explain why transition metals are often good metal catalysts?
- they have multiple oxidation states so they can lose or gain electrons easily
 - They can form complex ions with ligands that can donate lone pairs of electrons
- I only
 - II only
 - both I and II
 - neither I nor II
3. All of the following statements about the nitrogen family of elements are true EXCEPT:
- the atomic radii increase with increasing atomic number.
 - the boiling points increase with increasing atomic number.
 - the electronic configuration of the valence shell of the atom is $ns^2 np^3$ where n is the quantum number.
 - It contains both metals and nonmetals
 - All of the above are true.
4. Which of the following elements is not likely to form either negative or positive ions because its highest energy level already has a stable octet?
- K
 - Zn
 - He
 - Xe
 - Sc
5. Which of the following elements has atoms that show the greatest attraction or affinity for electrons?
- Li
 - S
 - Cl
 - O

Use the following answers for questions 6–9 Match the correct element with the correct description.

- Fluorine (F # 9)
 - Chlorine (Cl # 17)
 - Bromine (Br # 35)
 - Iodine (I # 53)
 - Astatine (At #85)
6. All isotopes of this element are radioactive.
7. A compound of this element is found in bleach.
8. Atoms of this element have the smallest radius
9. This element is the most reactive in the halogen group. It can displace the others from compounds
10. The colors of the compounds of the d block elements are due to electron transitions
- between different d orbitals
 - between d and s orbitals
 - among the attached ligands
 - from the metal to the attached ligands
 - None of the above
11. Which of the following reactions will NOT occur?
- $F_2 + 2 NaBr \rightarrow 2 NaF + Br_2$
 - $Cl_2 + 2 KI \rightarrow 2 KCl + I_2$
 - $Br_2 + 2 NaF \rightarrow 2 NaBr + F_2$



12. Which of these ions is colorless?

- A. $[Cr(H_2O)_6]^{3+}$
- B. $[Fe(CN)_6]^{4-}$
- C. $[Cu(NH_3)_4]^{2+}$
- D. $[Zn(H_2O)_4]^{2+}$

13. Which of these oxides would you expect to have the highest melting point?

- A. Al_2O_3
- B. SO_2
- C. Cl_2O
- D. SO_3

14. Which of these chlorides would you expect to be the least acidic?

- A. $NaCl$
- B. $MgCl_2$
- C. $AlCl_3$
- D. PCl_3

15. The greatest similarity in chemical properties is expected for elements with the atomic numbers

- A. 3 and 4
- B. 6 and 12
- C. 17 and 25
- D. 19 and 37

16. Arrange the following neutral gaseous atoms in order of decreasing atomic radius.

- A. $Cl > F > S > Mg$
- B. $Cl > S > F > Mg$
- C. $Mg > S > Cl > F$
- D. $F > Cl > S > Mg$

17. Which of the following elements most readily gives up an electron?

- A. F
- B. Cl
- C. K
- D. Li

18. In the modern periodic table elements are arranged in order of increasing

- A. atomic number.
- B. atomic mass.
- C. number of valence electrons.
- D. electronegativity.

19. Barium is an element in group 2 of the periodic table with atomic number 56. Which of the following statements about strontium is NOT correct?

- A. Its first ionization energy is lower than that of calcium .
- B. It has two electrons in the outermost energy level.
- C. Its atomic radius is smaller than magnesium.
- D. It forms a chloride with the formula $BaCl_2$.

20. A molecule or ion that donates a lone pair of electrons while attaching to transition metal ion to form a complex ion is called

- A. a chelating agent
- B. a ligand
- C. a polyatomic ion
- D. none of the above is correct

Answers

- 1 C
- 2 C
- 3 E
- 4 D
- 5 C
- 6 E
- 7 B
- 8 A
- 9 A
- 10 A
- 11 C
- 12 D
- 13 A
- 14 A
- 15 D
- 16 C
- 17 C
- 18 A
- 19 C
- 20 B

Version B

Using a periodic table characterize the following elements according to the group to which they belong

- A. Alkali Metal
 - B. Alkaline earth Metals
 - C. Halogen
 - D. Noble Gases
 - E. Transition Metals
1. Iodine (I # 53)
 2. Rubidium (Rb # 37)
 3. Astatine (At # 85)
 4. Xenon (Xe # 54)
 5. Vanadium (V# 23)
 6. The first comprehensive periodic table was developed by
 - A. J.W. Dobereiner
 - B. Dmitri Mendeleev
 - C. Vladimir Putin
 - D. J.A.R. Newlands
 - E. Lothar Meyer
 7. Which of the following elements is not likely to form either negative or positive ions because its highest energy level already has a stable octet?
 - A. K
 - B. Zn
 - C. He
 - D. Xe
 - E. Ra
 8. A solution of KSCN will give a dark red color when added to a solution containing
 - A. NaCl
 - B. NaI
 - C. FeSO₄
 - D. FeCl₃
 - E. NaBr
 9. Which of the following elements in the third period has the highest ionization energy
 - A. Na
 - B. Mg
 - C. Al

- D. P
- E. Si

10. The greatest electrical conductivity at room temperature would be observed in
- A. Al
 - B. C
 - C. P
 - D. Si
 - E. S
11. The most reactive group in the Periodic Table is
- A. the transition metals
 - B. the alkaline Earth Metals
 - C. the Noble Gases
 - D. the Alkali Metals
12. The property that decreases from top to bottom in the halogen family is
- A. density
 - B. ionization energy
 - C. mass
 - D. boiling point
13. The greatest similarity in chemical properties is expected for elements with the atomic numbers
- A. 9 and 10
 - B. 9 and 18
 - C. 9 and 17
 - D. 16 and 17
14. Barium is an element in group 2 of the periodic table with atomic number 56. Which of the following statements about barium is NOT correct
- A. Its first ionization energy is lower than that of calcium .
 - B. It has two electrons in the outermost energy level
 - C. Its atomic radius is smaller than calcium
 - D. It forms a chloride with the formula B BaCl_2
15. Which of the following reactions will NOT occur?
- A. $\text{Br}_2 + 2 \text{NaCl} \rightarrow 2 \text{NaBr} + \text{Cl}_2$
 - B. $\text{Cl}_2 + 2 \text{NaBr} \rightarrow 2 \text{NaCl} + \text{Br}_2$
 - C. $\text{Br}_2 + 2 \text{NaI} \rightarrow 2 \text{NaBr} + \text{I}_2$
 - D. $\text{Cl}_2 + 2 \text{KI} \rightarrow 2 \text{KCl} + \text{I}_2$
16. Which of the following series is arranged in order of **increasing** value?
- A. The radii of: H^- ion, H atom, H^+ ion
 - B. The first ionization energies of oxygen, fluorine, neon.
 - C. The electronegativities of : chlorine, bromine, iodine
 - D. The boiling points of: iodine, bromine, and chlorine.
17. Which of the following has the largest ionic radius?
- A. Al^{3+}
 - B. Mg^{2+}
 - C. P^{3-}
 - D. F^-

The following list contains oxides of elements in the third period. Use these answers for questions 19–21

- A. SO_2
- B. P_4O_{10}
- C. Al_2O_3
- D. MgO
- E. Na_2O

18. Which of these oxides has the **highest melting point**?
19. Which of the above is most likely to be a **gas** at room temperature?.
20. Which of the above would form water solutions that are **highly acidic** ?
21. Which of the following statements are reasons that explain why transition metals are often good metal catalysts?
- they have multiple oxidation states so they can lose or gain electrons easily
 - They can form complex ions with ligands that can donate lone pairs of electrons
- A. I only
 B. II only
 C. both I and II
 D. neither I nor II
22. Which of these ions is most likely colorless?
- A. $[\text{Ni}(\text{NH}_3)_4]^{2+}$
 B. $[\text{Cd}(\text{H}_2\text{O})_4]^{2+}$
 C. $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$
 D. $[\text{Fe}(\text{CN})_6]^{3-}$
23. An ion or polar molecule that attaches to a simple ion to form a complex ion is called a(n)?
- A. catalyst
 B. ligand
 C. coordinate
 D. none of the above
24. The formula for the chloride of a certain element E has the form ECl_3 . The element is most likely to be
- A. lithium
 B. calcium
 C. silicon
 D. boron

Answer key

- C
- A
- C
- D
- E
- B
- D
- D
- D
- A
- D
- B
- C
- C
- A
- B
- C
- D
- A
- A
- B
- B
- B
- D