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1. The metalloids that are included in Group 15 are antimony (Sb) and

- A) N    B) P    C) As    D) Bi

2. All elements on the modern Periodic Table are arranged in order of increasing

- A) atomic mass  
B) molar mass  
C) number of neutrons per atom  
D) number of protons per atom

3. Which of the following Period 3 elements has the *least* metallic character?

- A) Na    B) Mg    C) Al    D) Si

4. Five cubes of iron are tested in a laboratory. The tests and the results are shown in the table below.

**Iron Tests and the Results**

Test	Procedure	Result
1	A cube of Fe is hit with a hammer.	The cube is flattened.
2	A cube of Fe is placed in 3 M HCl(aq).	Bubbles of gas form.
3	A cube of Fe is heated to 1811 K.	The cube melts.
4	A cube of Fe is left in damp air.	The cube rusts.
5	A cube of Fe is placed in water.	The cube sinks.

Which tests demonstrate chemical properties?

- A) 1, 3, and 4    B) 1, 3, and 5    C) 2 and 4    D) 2 and 5

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5. Which elements have the most similar chemical properties?

- A) Si, As, and Te    B) N<sub>2</sub>, O<sub>2</sub>, and F<sub>2</sub>  
C) Mg, Sr, and Ba    D) Ca, Cs, and Cu

6. Which elements are malleable and good conductors of electricity?

- A) iodine and silver    B) iodine and xenon  
C) tin and silver    D) tin and xenon

7. Which characteristics describe most nonmetals in the solid phase?

- A) They are malleable and have metallic luster.  
B) They are malleable and lack metallic luster.  
C) They are brittle and have metallic luster.  
D) They are brittle and lack metallic luster.

8. Which element is a liquid at STP and has low electrical conductivity?

- A) silver    B) mercury  
C) barium    D) bromine

9. Which element exists as monatomic molecules at STP?

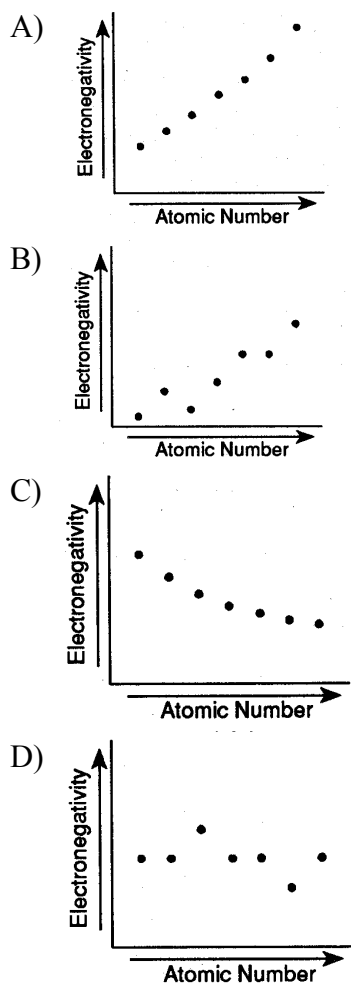
- A) hydrogen    B) nitrogen  
C) argon    D) chlorine

10. At STP, which substance is a noble gas?

- A) ammonia    B) chlorine  
C) neon    D) nitrogen
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11. Which list of elements contains a metal, a metalloid, and a nonmetal?
- A) Ag, Si, I<sub>2</sub>                      B) Ge, As, Ne  
C) K, Cu, Br<sub>2</sub>                      D) S, Cl<sub>2</sub>, Ar
12. Which element is a metalloid?
- A) Al    B) Ar    C) As    D) Au
13. Which element has both metallic and nonmetallic properties?
- A) Rb    B) Rn    C) Si    D) Sr
14. Which sequence of elements is arranged in order of decreasing atomic radii?
- A) Al, Si, P                      B) Li, Na, K  
C) Cl, Br, I                      D) N, C, B
15. Which of the following elements has the smallest atomic radius?
- A) nickel                      B) cobalt  
C) calcium                      D) potassium
16. As the elements of Group 16 are considered from top to bottom on the Periodic Table, the covalent radii
- A) increase and the ionization energies decrease  
B) increase and the ionization energies increase  
C) decrease and the ionization energies increase  
D) decrease and the ionization energies decrease
17. As the atoms of the elements from atomic number 3 to atomic number 9 are considered in sequence from left to right on the Periodic Table, the atomic radius of each successive atom is
- A) smaller, and the nuclear charge is less  
B) smaller, and the nuclear charge is greater  
C) larger, and the nuclear charge is less  
D) larger, and the nuclear charge is greater
18. Which statement describes the general trends in electronegativity and first ionization energy as the elements in Period 3 are considered in order from Na to Cl?
- A) Electronegativity increases, and first ionization energy decreases.  
B) Electronegativity decreases, and first ionization energy increases.  
C) Electronegativity and first ionization energy both increase.  
D) Electronegativity and first ionization energy both decrease.
19. Which property *decreases* when the elements in Group 17 are considered in order of increasing atomic number?
- A) atomic mass                      B) atomic radius  
C) melting point                      D) electronegativity
20. Which atom has the strongest attraction for electrons?
- A) Cl    B) F    C) Br    D) I
21. Element *M* has an electronegativity of less than 1.2 and reacts with bromine to form the compound *MBr*<sub>2</sub>. Element *M* could be
- A) Al    B) Na    C) Ca    D) K

22. Which diagram correctly shows the relationship between electronegativity and atomic number for the elements of Period 3?



23. Which element in Group 18 of the Periodic Table has the highest first ionization energy?

- A) Kr B) Ar C) Ne D) He

24. Which atom requires the *least* energy to form a positive ion?

- A) Ge B) Ca C) Ga D) K

25. Which element has six valence electrons in each of its atoms in the ground state?

- A) Se B) As C) Kr D) Ga

26. The elements in Group 2 have similar chemical properties because each atom of these elements has the same

- A) atomic number  
 B) mass number  
 C) number of electron shells  
 D) number of valence electrons

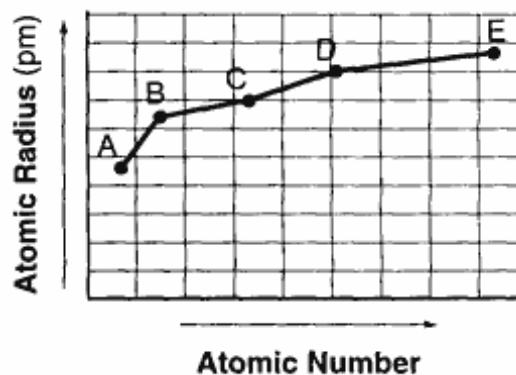
27. Which element has an atom in the ground state with a total of three valence electrons?

- A) aluminum B) lithium  
 C) phosphorus D) scandium

28. When the elements in Group 1 are considered in order from top to bottom, each successive element at standard pressure has

- A) a higher melting point and a higher boiling point  
 B) a higher melting point and a lower boiling point  
 C) a lower melting point and a higher boiling point  
 D) a lower melting point and a lower boiling point

29. The graph below represents the relationship between atomic radii, in picometers, and increasing atomic number for elements in Group 15.



Which element is most metallic

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

30. Given the electron configuration of an atom in the ground state:  $2 - 8 - 6$

This element is found in the Periodic Table in

- A) Period 4 and Group 16  
 B) Period 4 and Group 14  
 C) Period 3 and Group 16  
 D) Period 3 and Group 14