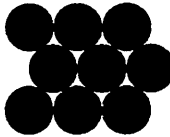



- Which substance can *not* be decomposed by ordinary chemical means?
 - methane
 - mercury
 - ethanol
 - ammonia
- Which two characteristics are associated with metals?
 - low first ionization energy and low electronegativity
 - low first ionization energy and high electronegativity
 - high first ionization energy and low electronegativity
 - high first ionization energy and high electronegativity
- At STP, which element is brittle and *not* a conductor of electricity?
 - S
 - K
 - Na
 - Ar
- At STP, an element that is a brittle solid and a poor conductor of heat and electricity could have an atomic number of
 - 12
 - 13
 - 16
 - 17
- Which element is a noble gas?
 - krypton
 - chlorine
 - antimony
 - manganese
- Which element exists as monatomic molecules at STP?
 - hydrogen
 - nitrogen
 - argon
 - chlorine
- The element in Group 14, Period 3 on the Periodic Table is classified as a
 - metal
 - noble gas
 - metalloid
 - nonmetal
- At standard pressure, which element has a melting point higher than standard temperature?
 - F₂
 - Br₂
 - Fe
 - Hg
- Which of these elements has the *lowest* melting point?
 - Li
 - Na
 - K
 - Rb
- Given the particle diagram:



Key
 atom

At 101.3 kPa and 298 K, which element could this diagram represent?

 - Rn
 - Xe
 - Ag
 - Kr
- Which substance can be decomposed by chemical means?
 - tungsten
 - antimony
 - krypton
 - methane
- The elements on the Periodic Table are arranged in order of increasing
 - boiling point
 - electronegativity
 - atomic number
 - atomic mass
- Explain, in terms of electron configuration, why selenium and sulfur have similar chemical properties.

14. Which list consists of elements that have the most similar chemical properties?
1) Mg, Al, and Si 3) K, Al, and Ni
2) Mg, Ca, and Ba 4) K, Ca, and Ga
15. The carbon atoms in graphite and the carbon atoms in diamond have different
1) atomic numbers
2) atomic masses
3) electronegativities
4) structural arrangements
16. Which statement explains why ozone gas, O₃, and oxygen gas, O₂, have different properties?
1) They are formed from different elements.
2) They have different molecular structures.
3) They have different oxidation numbers.
4) They have different electronegativities.
17. A 10.0-gram sample of which element has the *smallest* volume at STP?
1) aluminum 3) titanium
2) magnesium 4) zinc
18. When an atom loses one or more electrons, this atom becomes a
1) positive ion with a radius smaller than the radius of this atom
2) positive ion with a radius larger than the radius of this atom
3) negative ion with a radius smaller than the radius of this atom
4) negative ion with a radius larger than the radius of this atom
19. What is the total number of electrons in a Mg²⁺ ion?
1) 10 3) 14
2) 12 4) 24
20. Which Lewis electron-dot diagram is correct for a S²⁻ ion?
1) $\left[\cdot \ddot{\text{S}} \cdot \right]^{2-}$ 3) $\left[\cdot \ddot{\text{S}} \cdot \right]^{2-}$
2) $\left[\ddot{\text{S}} \right]^{2-}$ 4) $\left[\cdot \ddot{\text{S}} \cdot \right]^{2-}$
21. Which Lewis electron-dot structure is drawn correctly for the atom it represents?
1) $\cdot \ddot{\text{N}}$ 3) $\cdot \ddot{\text{O}}$
2) $\cdot \ddot{\text{F}}$ 4) $\cdot \ddot{\text{Ne}}$
22. Which compound forms a green aqueous solution?
1) RbCl 3) NiCl₂
2) CaCl₂ 4) ZnCl₂
23. Which list of elements from Group 2 on the Periodic Table is arranged in order of increasing atomic radius?
1) Be, Mg, Ca 3) Ba, Ra, Sr
2) Ca, Mg, Be 4) Sr, Ra, Ba
24. An ion of which element has a larger radius than an atom of the same element?
1) aluminum 3) magnesium
2) chlorine 4) sodium

25. Which trends are observed as each of the elements within Group 15 on the Periodic Table is considered in order from top to bottom?
- 1) Their metallic properties decrease and their atomic radii decrease.
 - 2) Their metallic properties decrease and their atomic radii increase.
 - 3) Their metallic properties increase and their atomic radii decrease.
 - 4) Their metallic properties increase and their atomic radii increase.
26. How does the size of a barium ion compare to the size of a barium atom?
- 1) The ion is smaller because it has fewer electrons.
 - 2) The ion is smaller because it has more electrons.
 - 3) The ion is larger because it has fewer electrons.
 - 4) The ion is larger because it has more electrons.
27. Atoms of which element have the greatest tendency to gain electrons?
- 1) bromine
 - 2) chlorine
 - 3) fluorine
 - 4) iodine
28. The strongest forces of attraction occur between molecules of
- 1) HCl
 - 2) HF
 - 3) HBr
 - 4) HI
29. Which Group of the Periodic Table contains atoms with a stable outer electron configuration?
- 1) 1
 - 2) 8
 - 3) 16
 - 4) 18
30. As the elements of Group 1 on the Periodic Table are considered in order of increasing atomic radius, the ionization energy of each successive element generally
- 1) decreases
 - 2) increases
 - 3) remains the same
31. The amount of energy required to remove the outermost electron from a gaseous atom in the ground state is known as
- 1) first ionization energy
 - 2) activation energy
 - 3) conductivity
 - 4) electronegativity
32. Elements *Q*, *X*, and *Z* are in the same group on the Periodic Table and are listed in order of increasing atomic number. The melting point of element *Q* is -219°C and the melting point of element *Z* is -7°C . Which temperature is closest to the melting point of element *X*?
- 1) -7°C
 - 2) -101°C
 - 3) -219°C
 - 4) -226°C
33. Which Group 15 element exists as a diatomic molecule at STP?
- 1) phosphorus
 - 2) nitrogen
 - 3) bismuth
 - 4) arsenic
34. Which element exists as a diatomic molecule at STP?
- 1) bromine
 - 2) argon
 - 3) sulfur
 - 4) rubidium
35. Which of the following ions has the *smallest* radius?
- 1) F^{-}
 - 2) Cl^{-}
 - 3) K^{+}
 - 4) Ca^{2+}

36. As the elements in Period 2 of the Periodic Table are considered in succession from left to right, there is a decrease in atomic radius with increasing atomic number. This may best be explained by the fact that the
- 1) number of protons increases, and the number of shells of electrons remains the same
 - 2) number of protons increases, and the number of shells of electrons increases
 - 3) number of protons decreases, and the number of shells of electrons remains the same
 - 4) number of protons decreases, and the number of shells of electrons increases
37. Based on Reference Table S, atoms of which of these elements have the strongest attraction for the electrons in a chemical bond?
- 1) Al
 - 2) Si
 - 3) P
 - 4) S
38. From which of these atoms in the ground state can a valence electron be removed using the *least* amount of energy?
- 1) nitrogen
 - 2) carbon
 - 3) oxygen
 - 4) chlorine
39. Which Period 4 element has the most metallic properties?
- 1) As
 - 2) Br
 - 3) Ge
 - 4) Sc
40. What is the total number of different elements present in NH_4NO_3 ?
- 1) 7
 - 2) 9
 - 3) 3
 - 4) 4
41. Element X reacts with iron to form two different compounds with the formulas $\text{Fe}X$ and Fe_2X_3 . To which group on the Periodic Table does element X belong?
- 1) Group 8
 - 2) Group 2
 - 3) Group 13
 - 4) Group 16
- Base your answers to questions 42 through 45 on the information below.
- A metal, M , was obtained from a compound in a rock sample. Experiments have determined that the element is a member of Group 2 on the Periodic Table of the Elements.
42. Using the symbol M for the element, write the chemical formula for the compound that forms when element M reacts with iodine.
43. What is the phase of element M at STP?
44. Explain, in terms of electrons, why element M is a good conductor of electricity.
45. Explain why the radius of a positive ion of element M is *smaller* than the radius of an atom of element M .
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