

Periodic Table Quiz

List as many of the main properties of each of the following groups as you can (2 points each):

1) alkali metals:

2) alkaline earth metals:

3) halogens:

4) noble gases:

5) transition metals:

6) metals:

7) metalloids:

8) nonmetals:

9) hydrogen:

For each of the following, give the periodic trend for each of the following as well as a reason for this trend. (5 points each)

Example: Atomic number

Correct answer: It increases as you move across the periodic table and also increases as you move down the periodic table. This is because every element has one more proton than the one before it.

10) electronegativity:

11) atomic radius:

12) ionization energy:

13) What does the word "diatomic" mean? What elements on the periodic table do we associate with the word "diatomic"? (5 points)

Periodic Table Quiz - Solutions

List as many of the main properties of each of the following groups as you can (2 points each):

- 1) **alkali metals:** Form ions with a charge of +1, soft, reactive with water and oxygen, form basic solutions, low density, low electronegativity, low melting and boiling points. *(0.5 points each for a maximum of 2 points)*
- 2) **alkaline earth metals:** Form ions with a charge of +2, soft (but less so than the alkali metals), low density (but less so than alkali metals), reactive with water and oxygen (but less so than alkali metals), low electronegativity, low melting and boiling points (but less so than alkali metals). *(0.5 points each for a maximum of 2 points)*
- 3) **halogens:** High reactivity (particularly with metals to form compounds with the general formula MX_n and hydrogen to form HX), high electronegativity, diatomic, strong oxidizers, form ions with a -1 charge. *(0.5 points each for a maximum of 2 points, though for lower level classes you may wish to give 1 point each for a maximum of two points)*
- 4) **noble gases:** Extremely unreactive. *(2 points)*
- 5) **transition metals:** Hard, less reactive than other metals, have more than one possible positive charge, dense, high melting and boiling points. *(0.5 points each for a maximum of 2 points)*
- 6) **metals:** malleable, ductile, lustrous, thermal and electrical conductors, form basic oxides, high density, generally solid, form cations. *(0.5 points each for a maximum of 2 points)*
- 7) **metalloids:** electrical semiconductors, have properties between those of the metals and nonmetals. *(1 point each, though you may want to give 0.5 points each if they specify what properties of metals and nonmetals they have)*
- 8) **nonmetals:** nonlustrous (many are colored), may be solids, liquids, or gases, poor conductors of heat and electricity, form anions, solid nonmetals are brittle, form acidic oxides. *(0.5 points each for a maximum of 2 points)*
- 9) **hydrogen:** Can form ions with a +1 (hydronium) or -1 (hydride) charge, diatomic, gas, reacts with the halogens to form HX , extremely flammable. *(0.5 points each for a maximum of 2 points)*

For each of the following, give the periodic trend for each of the following as well as a reason for this trend. (5 points each)

- 10) electronegativity:
- **Increases as you move across the periodic table because the energy of each electron in the sublevel is the same even though the amount of positive charge in the nucleus increases. This causes a higher effective nuclear charge ($Z_{\text{effective}}$) that attracts electrons.**
 - **Decreases as you move down the periodic table because of the shielding effect (inner electrons cause a decrease in the effective nuclear charge, causing it to attract electrons less well).**
- 11) atomic radius:
- **Decreases as you move across the periodic table because the energy of each electron in the sublevel is the same even though the amount of positive charge in the nucleus increases. This causes a higher effective nuclear charge ($Z_{\text{effective}}$) that causes these electrons to be bound more tightly to the nucleus.**
 - **Increases as you move down the periodic table because each sublevel has more energy than the one before it.**
- 12) ionization energy:
- **Increases as you move across the periodic table because increased nuclear charge causes the electrons to be held more tightly. As a result, it takes more energy to pull them off to ionize the atom.**
 - **Decreases as you move down the periodic table because the shielding effect causes outer electrons to be bound less tightly.**
- 13) What does the word "diatomic" mean? What elements on the periodic table do we associate with the word "diatomic"? (5 points)
"Diatomic" means that elements form molecules consisting of two atoms of that element bound together. The diatomic elements on the periodic table are hydrogen, nitrogen, oxygen, fluorine, chlorine, bromine, and iodine. (2.5 points for defining "diatomic", 2.5 points for correctly naming the seven diatomic elements).

Suggested Grading Scale

38 = A+
34.5 – 37 = A
32.5 – 34 = B+
30.5 – 32 = B
28.5 – 30 = C+
27 – 28 = C
25 – 26 = D+
23 – 24 = D
< 23 = F