THE PERIODIC LAW PUZZLE

The present organization of the elements is a product of the first periodic table published by Dmitri Mendeleev in 1869. Today, the periodic law states that the properties of the elements are periodic functions of their atomic numbers. Each of the elements has its own set of characteristic properties. These range from solid to gas, lustrous to dull, low to high melting points, various colors, and so on. The elements are arranged into groups or families and periods or series based on these properties. This arrangement reflects the periodic or repeating nature of the properties of the elements.

In this exercise, you will use your knowledge of periodic properties and a list of clues to arrange the main group (representative) elements into a periodic table. Use the clues below to arrange the letters A - Z into their appropriate positions in the grid of the periodic table provided. (Please note that the letters A - Z in no way correspond to the real symbols for these elements.)

The following elements belong together in groups (not necessarily in this order):

BFT DGLZ JNV CMS QXY AEO IPH UKWR

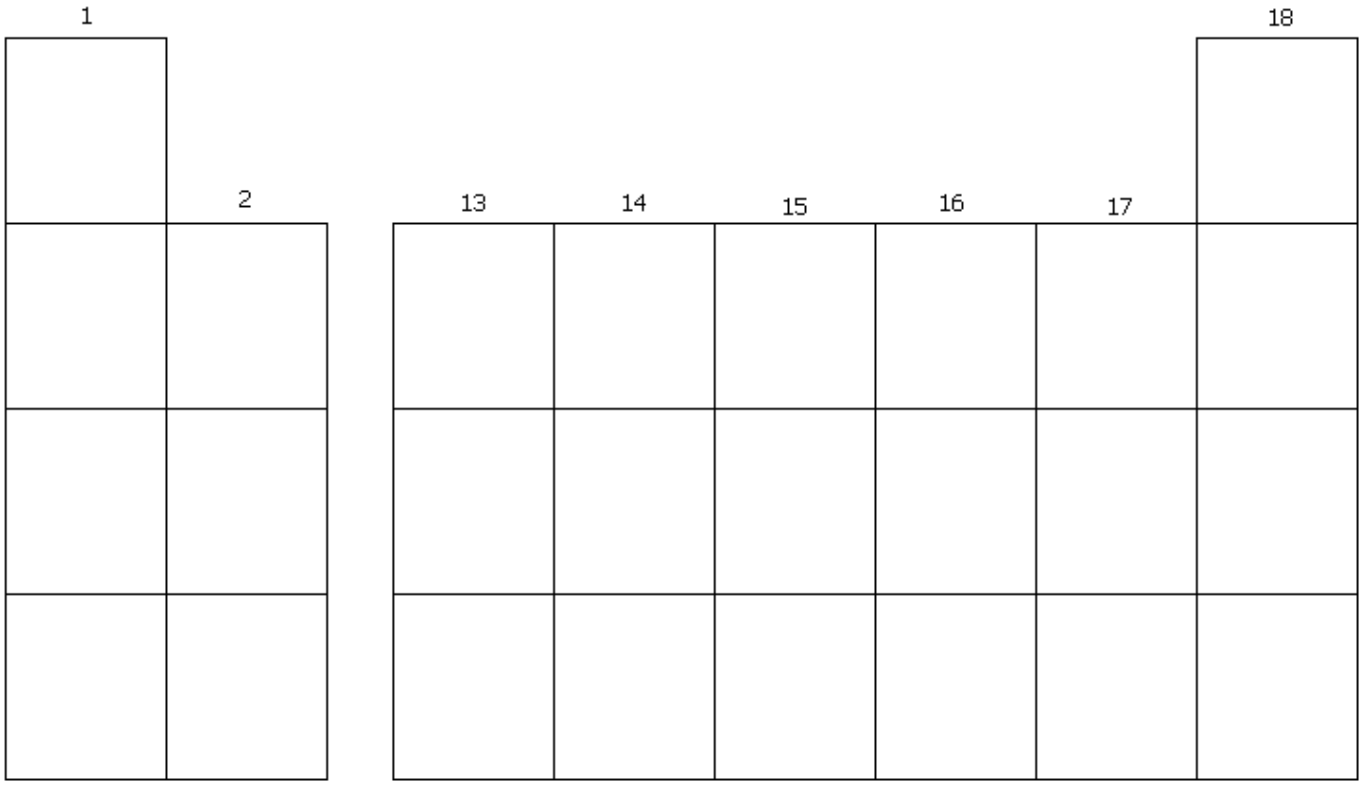
Use the following clues to determine which group each set of elements belongs to:

1.) G is a noble gas.
2.) U is an alkali metal.
3.) E has 5 electrons in its outermost energy level.
4.) N has 2 valence electrons.
5.) T has an outer electron configuration of $4s^2\ 4p^1$.
6.) Q is a halogen.
7.) C has a valence electron configuration of $2s^2\ 2p^4$.

Use these clues to determine where each element is placed within each group.

8.) W is a gas at room temperature.
9.) F has the smallest atomic mass in its group.
10.) P has the lowest ionization energy in its family.
11.) Atoms of Z have a total of 2 electrons.
12.) Atoms of D contain 10 protons.
13.) The electrons of atom G are distributed over three energy levels.
14.) H is the least metallic element in its group.
15.) The atomic mass of V is less than that of J, but more than that of N.
16.) J has a lower ionization energy than V, but a higher ionization energy than K.
17.) The atomic number of R is one greater than that of Z.
18.) Y is a liquid at room temperature.
19.) The atomic radius of M is greater than that of S.
20.) A is more metallic than either O or E.
21.) Atoms of K are larger than those of U.
22.) T is more metallic than B.
23.) X has an atomic number that is one less than that of G.
24.) E is a gas at room temperature.

Names:



PERIODIC TABLE CROSSWORD PUZZLE CLUES

ACROSS

1. has 4 valence electrons and the largest mass in its group
2. its electron configuration ends with $3p^4$
3. exception to electron configuration rule because of the stability of a filled 3d sublevel
4. 1 mole of this element has a mass of 39.10 grams
5. noble gas (with 8 valence electrons) with the lowest atomic number
6. only gas in Group 15
7. exception to electron configuration rule because of the stability of a half-filled 3d sublevel
8. heaviest non-radioactive noble gas
9. has 76 protons
10. alkali metal that has its valence electron in the 5^{th} energy level
11. halogen whose ion has the same electron configuration as argon
12. named after a very famous scientist and has an atomic number of 99
13. lightest metalloid in Group 14
14. 6.022×10^{23} atoms of this element have a mass of 24.3 grams
15. non-radioactive halogen with highest atomic number
16. only noble gas without 8 valence electrons
17. Lanthanide Series named after this element
18. noble gas with its valence electrons in the 4^{th} energy level
19. known to be a poison; will gain 3 electrons to become stable
20. "coinage metal" with 2^{nd} largest atomic radius
21. 5th period, Group 4
22. used in jewelry; 6th period, Group 10
23. lightest solid metal
24. has the highest atomic number of all elements that do not have any occupied "f" orbitals
25. basis for organic chemistry; only true nonmetal in Group 14
26. radioactive element in Group 18
27. used in light bulb filaments; end of its electron configuration should be $5d^4$
28. radioactive element that has 94 electrons when it is a neutral atom
29. 2^{nd} lowest ionization energy in Group 15
30. largest atomic radius in Group 1; non-radioactive
31. its symbol is Mo
32. location of this metal would lead us to believe that it is a metalloid

DOWN

1. its last electron is the first electron occupying the 4p sublevel
2. only gas in Group 1
3. has 63 protons; named after a continent
4. most electronegative element
5. lowest ionization energy of all alkaline earth elements
6. its symbol is Nd
7. Actinide Series element that is named after the scientist who arranged Periodic Table by atomic mass
8. 10 moles of this element would have a mass of 876.2 grams
9. its electron configuration ends with $3d^{10}$
10. only liquid metal
11. transition element with only 1 completely filled 3d orbital
12. makes up 21% of Earth's atmosphere; vital for human life
13. solid Group 15 element with the highest electron affinity
14. mass of 2 atoms of this element is 117.9 amu
15. most common Actinide Series element
16. Group 16 element whose ion has the same electron configuration as krypton
17. has 2 electrons in its 4s orbital and 1 electron in each 3d orbital
18. has 77 protons
19. Group 15 element with the lowest electronegativity
20. only liquid nonmetal
21. alkaline earth metal needed for strong bones and teeth
22. Group 17 element with the lowest electron affinity
23. 18 grams of this element contains the same number of atoms as 24 grams of carbon
24. same name as an American coin
25. heaviest noble gas that does not have any electrons in ANY "d" orbital
26. lightest metalloid
27. 2^{nd} largest atomic radius in Group 14
28. heaviest "coinage metal"
29. 0.5 moles of this element have a mass of 56.2 grams
30. Group 1 element that is a part of common table salt