|  |  |  |
| --- | --- | --- |
| **Li**Atomic Weight 6.94Physical State solidDensity 0.534 g/cm3Conductivity goodMelting Point 180°CColor silverIonization Energy 520 Electronegativity 0.98 | **Cl**Atomic Weight 35.45Physical State gasDensity 0.00321 g/cm3Conductivity very poorMelting Point -101°CColor greenish yellowIonization Energy 1251 Electronegativity 3.16 | **Se**Atomic Weight 78.96Physical State solidDensity 4.81 g/cm3Conductivity semiMelting Point 221 °CColor gray/red/blackIonization Energy 941 Electronegativity 2.55 |
| **N**Atomic Weight 14.01Physical State gasDensity 0.00125 g/cm3Conductivity poorMelting Point -210°CColor colorlessIonization Energy 1402 Electronegativity 3.04 | **He**Atomic Weight 4.00Physical State gasDensity 0.00018 g/cm3Conductivity very poorMelting Point -272°CColor colorlessIonization Energy 2372 Electronegativity 0 | **Na**Atomic Weight 22.99Physical State solidDensity 0.971 g/cm3Conductivity goodMelting Point 98°CColor silverIonization Energy 496 Electronegativity 0.93 |
| **C**Atomic Weight 12.01Physical State solidDensity 2.10 g/cm3Conductivity goodMelting Point 3550°CColor blackIonization Energy 1087 Electronegativity 2.55 | **Ca**Atomic Weight 40.08Physical State solidDensity 1.57 g/cm3Conductivity goodMelting Point 845°CColor silvery whiteIonization Energy 590 Electronegativity 1.00 | **Be**Atomic Weight 9.01Physical State solidDensity 1.85 g/cm3Conductivity excellentMelting Point 1287°CColor grayIonization Energy 900 Electronegativity 1.57 |
| **Ne**Atomic Weight 20.18Physical State gasDensity 0.00090 g/cm3Conductivity very poorMelting Point -249°CColor colorlessIonization Energy 2081 Electronegativity 0 | **Br**Atomic Weight 79.90Physical State gasDensity 3.12 g/cm3Conductivity very poorMelting Point -7.2°CColor reddish brownIonization Energy 1140 Electronegativity 2.96 | **Sn**Atomic Weight 118.71Physical State solidDensity 7.31 g/cm3Conductivity goodMelting Point 232°CColor silverIonization Energy 709 Electronegativity 1.96 |
| **In**Atomic Weight 114.82Physical State solidDensity 7.31 g/cm3Conductivity mediumMelting Point 157°CColor silvery whiteIonization Energy 558 Electronegativity 1.78 | **Ba**Atomic Weight 137.33Physical State solidDensity 3.6 g/cm3Conductivity goodMelting Point 710°CColor silvery whiteIonization Energy 503 Electronegativity 0.89 | **K**Atomic Weight 39.10Physical State solidDensity 0.86 g/cm3Conductivity goodMelting Point 63°CColor silverIonization Energy 419 Electronegativity 0.82 |
| **Ar**Atomic Weight 39.95Physical State gasDensity 0.00178 g/cm3Conductivity very poorMelting Point -189.2°CColor colorlessIonization Energy 1521 Electronegativity 0 | **Ga**Atomic Weight 69.72Physical State solidDensity 5.904 g/cm3Conductivity mediumMelting Point 30°CColor silveryIonization Energy 579 Electronegativity 1.81 | **Cs**Atomic Weight 132.91Physical State solidDensity 1.87 g/cm3Conductivity goodMelting Point 29°CColor silvery whiteIonization Energy 376 Electronegativity 0.79 |
| **O**Atomic Weight 16.00Physical State gasDensity 0.0013 g/cm3Conductivity poorMelting Point -219°CColor colorlessIonization Energy 1314 Electronegativity 3.44 | **P**Atomic Weight 30.97Physical State solidDensity 1.823 g/cm3Conductivity poorMelting Point 44.2 °CColor whiteIonization Energy 1012 Electronegativity 2.19 | **As**Atomic Weight 74.92Physical State solidDensity 5.776 g/cm3Conductivity poorMelting Point 817 °CColor grayIonization Energy 947 Electronegativity 2.18 |
| **Xe**Atomic Weight 131.29Physical State gasDensity 0.00585 g/cm3Conductivity very poorMelting Point -119.9°CColor colorlessIonization Energy 1170 Electronegativity 0 | **B**Atomic Weight 10.81Physical State solidDensity 2.34 g/cm3Conductivity poor at r.t.Melting Point 2076°CColor brownIonization Energy 801 Electronegativity 2.04 | **I**Atomic Weight 126.90Physical State solidDensity 4.93 g/cm3Conductivity very poorMelting Point 113.5°CColor blue-blackIonization Energy 1008 Electronegativity 2.66 |
| **Si**Atomic Weight 28.09Physical State solidDensity 2.33 g/cm3Conductivity intermediateMelting Point 1410°CColor grayIonization Energy 787 Electronegativity 1.90 | **Unknown #2**Atomic Weight ?Physical State gasDensity 0.00170 g/cm3Conductivity very poorMelting Point -219.6°CColor pale yellowIonization Energy 1681 Electronegativity 3.98 | **Unknown #3**Atomic Weight ?Physical State solidDensity 1.53 g/cm3Conductivity goodMelting Point 39°CColor silvery whiteIonization Energy 403 Electronegativity 0.82 |
| **Unknown #4**Atomic Weight ?Physical State gasDensity 0.00374 g/cm3Conductivity very poorMelting Point -156.6°CColor colorlessIonization Energy 1351 Electronegativity 0 | **Unknown #5**Atomic Weight ?Physical State solidDensity 1.96 g/cm3Conductivity poorMelting Point 115 °CColor yellowIonization Energy 1000 Electronegativity 2.58 | **Sr**Atomic Weight 87.62Physical State solidDensity 2.54 g/cm3Conductivity goodMelting Point 769°CColor silvery whiteIonization Energy 550 Electronegativity 0.95 |
| **Unknown #7**Atomic Weight ?Physical State solidDensity 5.32 g/cm3Conductivity fair to poorMelting Point 937°CColor grayIonization Energy 762 Electronegativity 2.01 | **Al**Atomic Weight 26.98Physical State solidDensity 2.7 g/cm3Conductivity mediumMelting Point 303°CColor silvery whiteIonization Energy 578 Electronegativity 1.61 | **Unknown #1**Atomic Weight ?Physical State solidDensity 1.74 g/cm3Conductivity goodMelting Point 651°CColor silvery whiteIonization Energy 738 Electronegativity 1.31 |
| **Unknown #6**Atomic Weight ?Physical State solidDensity 6.69 g/cm3Conductivity poorMelting Point 631 °CColor bluish-whiteIonization Energy 834 Electronegativity 2.05 | **Te**Atomic Weight 127.60Physical State solidDensity 6.24 g/cm3Conductivity variesMelting Point 450°CColor silvery grayIonization Energy 869 Electronegativity 2.10 | **H**Atomic Weight 1.01Physical State gasDensity 0.00009 g/cm3Conductivity very poorMelting Point -259°CColor colorlessIonization Energy 1312 Electronegativity 2.10 |

Names \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_

**The Mendeleev Lab of 1869**

**Problem:**

Use your knowledge of the periodic table to determine the identity of each of the seven unknown elements in this activity.

* The unknown elements are from the A groups on the periodic table. Each group contains at least one unknown.
* None of the known elements serve as one of the seven unknown elements.
* No radioactive elements are used during this experiment. The relevant radioactive elements include Fr, Ra, At, and Rn.
* You may not use your textbook or other reference materials. You have been provided with enough information to determine each of the unknown elements.

**Procedure:**

1. Separate the unknowns and set aside.

2. Inspect the properties of the known elements.

3. Arrange the cards of the known elements in a crude representation of the periodic table.

4. Once the known elements are in place, answer the questions first before trying to identify the missing elements. This will help you figure out where the missing elements go.

5. Inspect the properties of the unknowns to see where their properties would best "fit" the trends of the elements of each group.

6. In your data table, assign the proper element name to each of the unknowns. Record the symbol for each of the "unknowns" in your data table.

1. What general trend in atomic weight do you see as you move from left to right?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. What general trend in atomic weight do you see as you move from top to bottom?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. What general trend in size of the atom do you see as you move from left to right?

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4. What general trend in size of the atom do you see as you move from top to bottom?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. What general trend in ionization energy do you see as you move from left to right?

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6. What general trend in ionization energy do you see as you move from top to bottom?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. What general trend in electronegativity do you see as you move from left to right?

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8. What general trend in electronegativity do you see as you move from top to bottom?

|  |  |  |  |
| --- | --- | --- | --- |
| **Unknown**  | **Element Identity** | **Approximate Atomic Weight** | **Evidence?** |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |
| 6 |  |  |  |
| 7 |  |  |  |