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| --- | --- | --- |
| **Li**  Atomic Weight 6.94  Physical State solid  Density 0.534 g/cm3  Conductivity good  Melting Point 180°C  Color silver  Ionization Energy 520 Electronegativity 0.98 | **Cl**  Atomic Weight 35.45  Physical State gas  Density 0.00321 g/cm3  Conductivity very poor  Melting Point -101°C  Color greenish yellow  Ionization Energy 1251 Electronegativity 3.16 | **Se**  Atomic Weight 78.96  Physical State solid  Density 4.81 g/cm3  Conductivity semi  Melting Point 221 °C  Color gray/red/black  Ionization Energy 941 Electronegativity 2.55 |
| **N**  Atomic Weight 14.01  Physical State gas  Density 0.00125 g/cm3  Conductivity poor  Melting Point -210°C  Color colorless  Ionization Energy 1402 Electronegativity 3.04 | **He**  Atomic Weight 4.00  Physical State gas  Density 0.00018 g/cm3  Conductivity very poor  Melting Point -272°C  Color colorless  Ionization Energy 2372 Electronegativity 0 | **Na**  Atomic Weight 22.99  Physical State solid  Density 0.971 g/cm3  Conductivity good  Melting Point 98°C  Color silver  Ionization Energy 496 Electronegativity 0.93 |
| **C**  Atomic Weight 12.01  Physical State solid  Density 2.10 g/cm3  Conductivity good  Melting Point 3550°C  Color black  Ionization Energy 1087 Electronegativity 2.55 | **Ca**  Atomic Weight 40.08  Physical State solid  Density 1.57 g/cm3  Conductivity good  Melting Point 845°C  Color silvery white  Ionization Energy 590 Electronegativity 1.00 | **Be**  Atomic Weight 9.01  Physical State solid  Density 1.85 g/cm3  Conductivity excellent  Melting Point 1287°C  Color gray  Ionization Energy 900 Electronegativity 1.57 |
| **Ne**  Atomic Weight 20.18  Physical State gas  Density 0.00090 g/cm3  Conductivity very poor  Melting Point -249°C  Color colorless  Ionization Energy 2081 Electronegativity 0 | **Br**  Atomic Weight 79.90  Physical State gas  Density 3.12 g/cm3  Conductivity very poor  Melting Point -7.2°C  Color reddish brown  Ionization Energy 1140 Electronegativity 2.96 | **Sn**  Atomic Weight 118.71  Physical State solid  Density 7.31 g/cm3  Conductivity good  Melting Point 232°C  Color silver  Ionization Energy 709 Electronegativity 1.96 |
| **In**  Atomic Weight 114.82  Physical State solid  Density 7.31 g/cm3  Conductivity medium  Melting Point 157°C  Color silvery white  Ionization Energy 558 Electronegativity 1.78 | **Ba**  Atomic Weight 137.33  Physical State solid  Density 3.6 g/cm3  Conductivity good  Melting Point 710°C  Color silvery white  Ionization Energy 503 Electronegativity 0.89 | **K**  Atomic Weight 39.10  Physical State solid  Density 0.86 g/cm3  Conductivity good  Melting Point 63°C  Color silver  Ionization Energy 419 Electronegativity 0.82 |
| **Ar**  Atomic Weight 39.95  Physical State gas  Density 0.00178 g/cm3  Conductivity very poor  Melting Point -189.2°C  Color colorless  Ionization Energy 1521 Electronegativity 0 | **Ga**  Atomic Weight 69.72  Physical State solid  Density 5.904 g/cm3  Conductivity medium  Melting Point 30°C  Color silvery  Ionization Energy 579 Electronegativity 1.81 | **Cs**  Atomic Weight 132.91  Physical State solid  Density 1.87 g/cm3  Conductivity good  Melting Point 29°C  Color silvery white  Ionization Energy 376 Electronegativity 0.79 |
| **O**  Atomic Weight 16.00  Physical State gas  Density 0.0013 g/cm3  Conductivity poor  Melting Point -219°C  Color colorless  Ionization Energy 1314 Electronegativity 3.44 | **P**  Atomic Weight 30.97  Physical State solid  Density 1.823 g/cm3  Conductivity poor  Melting Point 44.2 °C  Color white  Ionization Energy 1012 Electronegativity 2.19 | **As**  Atomic Weight 74.92  Physical State solid  Density 5.776 g/cm3  Conductivity poor  Melting Point 817 °C  Color gray  Ionization Energy 947 Electronegativity 2.18 |
| **Xe**  Atomic Weight 131.29  Physical State gas  Density 0.00585 g/cm3  Conductivity very poor  Melting Point -119.9°C  Color colorless  Ionization Energy 1170 Electronegativity 0 | **B**  Atomic Weight 10.81  Physical State solid  Density 2.34 g/cm3  Conductivity poor at r.t.  Melting Point 2076°C  Color brown  Ionization Energy 801 Electronegativity 2.04 | **I**  Atomic Weight 126.90  Physical State solid  Density 4.93 g/cm3  Conductivity very poor  Melting Point 113.5°C  Color blue-black  Ionization Energy 1008 Electronegativity 2.66 |
| **Si**  Atomic Weight 28.09  Physical State solid  Density 2.33 g/cm3  Conductivity intermediate  Melting Point 1410°C  Color gray  Ionization Energy 787 Electronegativity 1.90 | **Unknown #2**  Atomic Weight ?  Physical State gas  Density 0.00170 g/cm3  Conductivity very poor  Melting Point -219.6°C  Color pale yellow  Ionization Energy 1681 Electronegativity 3.98 | **Unknown #3**  Atomic Weight ?  Physical State solid  Density 1.53 g/cm3  Conductivity good  Melting Point 39°C  Color silvery white  Ionization Energy 403 Electronegativity 0.82 |
| **Unknown #4**  Atomic Weight ?  Physical State gas  Density 0.00374 g/cm3  Conductivity very poor  Melting Point -156.6°C  Color colorless  Ionization Energy 1351 Electronegativity 0 | **Unknown #5**  Atomic Weight ?  Physical State solid  Density 1.96 g/cm3  Conductivity poor  Melting Point 115 °C  Color yellow  Ionization Energy 1000 Electronegativity 2.58 | **Sr**  Atomic Weight 87.62  Physical State solid  Density 2.54 g/cm3  Conductivity good  Melting Point 769°C  Color silvery white  Ionization Energy 550 Electronegativity 0.95 |
| **Unknown #7**  Atomic Weight ?  Physical State solid  Density 5.32 g/cm3  Conductivity fair to poor  Melting Point 937°C  Color gray  Ionization Energy 762 Electronegativity 2.01 | **Al**  Atomic Weight 26.98  Physical State solid  Density 2.7 g/cm3  Conductivity medium  Melting Point 303°C  Color silvery white  Ionization Energy 578 Electronegativity 1.61 | **Unknown #1**  Atomic Weight ?  Physical State solid  Density 1.74 g/cm3  Conductivity good  Melting Point 651°C  Color silvery white  Ionization Energy 738 Electronegativity 1.31 |
| **Unknown #6**  Atomic Weight ?  Physical State solid  Density 6.69 g/cm3  Conductivity poor  Melting Point 631 °C  Color bluish-white  Ionization Energy 834 Electronegativity 2.05 | **Te**  Atomic Weight 127.60  Physical State solid  Density 6.24 g/cm3  Conductivity varies  Melting Point 450°C  Color silvery gray  Ionization Energy 869 Electronegativity 2.10 | **H**  Atomic Weight 1.01  Physical State gas  Density 0.00009 g/cm3  Conductivity very poor  Melting Point -259°C  Color colorless  Ionization 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?

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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?

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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?

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