

The Mendeleev Lab of 1869

Problem:

Use your knowledge of the periodic table to identify each of the nine unknown elements in this activity. The unknown elements are from the following groups in the periodic table. Each group listed below contains at least one unknown.

1 2 11 13 14 17 18

None of the 21 elements named on the cards serve as one of the nine unknown elements. No radioactive elements are used during this experiment. 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. Inspect the properties of the known elements.
2. Arrange the cards of the known elements in a crude representation of the periodic table.
3. Once the known elements are in place, inspect the properties of the unknowns to see where their properties would best “fit” the trends of the elements of each group.
4. 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.

Data Table:

Be sure to construct your data table with enough space for all your unknown elements.

Conclusion:

Summarize your group’s reasoning for choosing each unknown. Explain in a few sentences exactly how you predicted the identity of the unknowns.

<p style="text-align: center;">Li</p> <p>Physical State solid Density 0.534 g/cm³ Hardness soft, claylike Conductivity good Solubility (H₂O) reacts with water Melting Point 180°C Color silver</p>	<p style="text-align: center;">Cl₂</p> <p>Physical State gas Density 0.00321 g/cm³ Hardness none Conductivity very poor Solubility (H₂O) slight Melting Point -101°C Color greenish yellow</p>
<p style="text-align: center;">Ag</p> <p>Physical State solid Density 10.50 g/cm³ Hardness somewhat soft Conductivity excellent Solubility (H₂O) none Melting Point 961°C Color silver</p>	<p style="text-align: center;">He</p> <p>Physical State gas Density 0.00018 g/cm³ Hardness none Conductivity very poor Solubility (H₂O) none Melting Point -272°C Color colorless</p>
<p style="text-align: center;">Cu</p> <p>Physical State solid Density 8.96 g/cm³ Hardness somewhat soft Conductivity excellent Solubility (H₂O) none Melting Point 1803°C Color silver</p>	<p style="text-align: center;">Na</p> <p>Physical State solid Density 0.971 g/cm³ Hardness soft, claylike Conductivity good Solubility (H₂O) reacts rapidly Melting Point 98°C Color silver</p>
<p style="text-align: center;">C</p> <p>Physical State solid Density 2.10 g/cm³ Hardness soft, yet brittle Conductivity good Solubility (H₂O) negligibile Melting Point 3550°C Color black</p>	<p style="text-align: center;">Ca</p> <p>Physical State solid Density 1.57 g/cm³ Hardness medium Conductivity good Solubility (H₂O) reacts Melting Point 845°C Color silvery white</p>
<p style="text-align: center;">Unknown #8</p> <p>Physical State solid Density 1.74 g/cm³ Hardness medium Conductivity good Solubility (H₂O) reacts slowly Melting Point 651°C Color silvery white</p>	<p style="text-align: center;">Unknown #9</p> <p>Physical State solid Density 11.85 g/cm³ Hardness very soft Conductivity medium Solubility (H₂O) none Melting Point 303°C Color silvery white</p>
<p style="text-align: center;">Be</p> <p>Physical State solid Density 1.85 g/cm³ Hardness brittle Conductivity excellent Solubility (H₂O) none Melting Point 1287°C Color gray</p>	<p style="text-align: center;">Sn</p> <p>Physical State solid Density 7.31 g/cm³ Hardness somewhat soft Conductivity good Solubility (H₂O) none Melting Point 232°C Color silver</p>

<p style="text-align: center;">Ne</p> <p>Physical State gas Density 0.00090 g/cm³ Hardness none Conductivity very poor Solubility (H₂O) none Melting Point -249°C Color colorless</p>	<p style="text-align: center;">Br₂</p> <p>Physical State gas Density 3.12 g/cm³ Hardness none Conductivity very poor Solubility (H₂O) negligible Melting Point -7.2°C Color reddish brown</p>
<p style="text-align: center;">K</p> <p>Physical State solid Density 0.86 g/cm³ Hardness soft, claylike Conductivity good Solubility (H₂O) reacts strongly Melting Point 961°C Color silver</p>	<p style="text-align: center;">Ba</p> <p>Physical State solid Density 3.6 g/cm³ Hardness soft Conductivity good Solubility (H₂O) reacts strongly Melting Point 710°C Color silvery white</p>
<p style="text-align: center;">Xe</p> <p>Physical State gas Density 0.00585 g/cm³ Hardness none Conductivity very poor Solubility (H₂O) none Melting Point -119.9°C Color colorless</p>	<p style="text-align: center;">In</p> <p>Physical State solid Density 7.31 g/cm³ Hardness very soft Conductivity medium Solubility (H₂O) none Melting Point 157°C Color silvery white</p>
<p style="text-align: center;">I₂</p> <p>Physical State solid Density 4.93 g/cm³ Hardness soft Conductivity very poor Solubility (H₂O) negligible Melting Point 113.5°C Color bluish-black</p>	<p style="text-align: center;">Pb</p> <p>Physical State solid Density 11.35 g/cm³ Hardness somewhat soft Conductivity poor Solubility (H₂O) none Melting Point 327.5°C Color gray</p>
<p style="text-align: center;">Ar</p> <p>Physical State gas Density 0.00178 g/cm³ Hardness none Conductivity very poor Solubility (H₂O) none Melting Point -189°C Color colorless</p>	<p style="text-align: center;">Ga</p> <p>Physical State solid Density 5.904 g/cm³ Hardness soft Conductivity medium Solubility (H₂O) none Melting Point 30°C Color gray</p>
<p style="text-align: center;">Cs</p> <p>Physical State solid Density 1.87 g/cm³ Hardness soft Conductivity good Solubility (H₂O) reacts violently Melting Point 29°C Color silvery white</p>	<p style="text-align: center;">Unknown #1</p> <p>Physical State solid Density 2.33 g/cm³ Hardness brittle Conductivity intermediate Solubility (H₂O) none Melting Point 1410°C Color gray</p>

Unknown #2	Physical State gas Density 0.00170 g/cm ³ Hardness none Conductivity very poor Solubility (H ₂ O) slight Melting Point -2-9.6°C Color pale yellow	Unknown #3	Physical State solid Density 1.53 g/cm ³ Hardness soft Conductivity good Solubility (H ₂ O) reacts violently Melting Point 39°C Color silvery white
Unknown #4	Physical State gas Density 0.00374 g/cm ³ Hardness none Conductivity very poor Solubility (H ₂ O) none Melting Point -156.6°C Color colorless	Unknown #5	Physical State solid Density 19.3 g/cm ³ Hardness soft Conductivity excellent Solubility (H ₂ O) none Melting Point 1064°C Color gold
Unknown #6	Physical State solid Density 2.54 g/cm ³ Hardness somewhat soft Conductivity good Solubility (H ₂ O) reacts rapidly Melting Point 769°C Color silvery white	Unknown #7	Physical State solid Density 5.32 g/cm ³ Hardness fairly brittle Conductivity fair to poor Solubility (H ₂ O) none Melting Point 937°C Color gray