

Predicting Properties

Some element properties can be estimated by averaging the properties of the elements that are just above and below it on the periodic table. This is partly how Mendeleev predicted the existence of some elements that were not discovered until after his time.

Use your periodic table and the information given in each problem to help you predict the properties of certain elements.

0. How is an average calculated?
1. The density of silicon (Si) is 2.3 g/cm^3 and the density of tin (Sn) is 7.3 g/cm^3 . Predict the density of Germanium (Ge).
2. This is how Mendeleev predicted the density of Ge, which did not exist during his time. The actual density of Ge is 5.3 g/cm^3 . Is this close to your prediction?
3. Do you expect sodium's (Na) melting point to be higher or lower than rubidium's? Explain your reasoning.
4. The element krypton (Kr) was also not known during Mendeleev's time. Argon has a boiling point of $-186 \text{ }^\circ\text{C}$ and xenon (Xe) has a boiling point of $-112 \text{ }^\circ\text{C}$. Predict krypton's boiling point.
5. Estimate the melting point of rubidium (Rb). The melting point of potassium (K) is $337 \text{ }^\circ\text{K}$ and cesium (Ce) is $302 \text{ }^\circ\text{K}$.
6. Mendeleev knew that SiCl_4 existed. Based on this information, predict the chemical formula for the compound formed with germanium and chlorine.

Use the following known compounds and their formulas to predict the compounds that could be formed from the given elements: NaI, MgCl_2 , CaO, Al_2O_3 , CCl_2

7. C and F
8. K and Cl
9. Sr and O
10. Al and S
11. Ca and B