Element Clues

Use periodic table patterns to predict properties and reactions.

P.7.5C.4 "Predict the properties and interactions of elements using the periodic table (metals, non-metals, reactivity, and conductors)."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the location clues that help you predict conductivity, circle the words that show which way reactivity changes, and number the two electron-transfer steps.

Choosing Materials for an Alarm

1. A school maker club is choosing materials for a tiny alarm. The periodic table gives clues before anyone tests a sample. Most metals are on its left and in its center, while most nonmetals are on the right. Metals usually carry electric current well; solid nonmetals usually do not. For example, zinc is a metal that can carry current, but solid phosphorus is a nonmetal and a poor conductor. Aluminum lies on the left side of the table, and sulfur lies on the right.

2. Location can also hint at how strongly an element reacts. In group 1, the column at the far left, metal reactivity generally increases as you move down. Lithium sits above sodium, so sodium reacts more readily than lithium. Potassium sits below sodium in this same column. In group 17, near the right edge, nonmetal reactivity generally increases as you move up. Fluorine sits above chlorine and reacts more readily than chlorine. Bromine sits below chlorine in group 17. These trends help scientists predict reactions without testing every pair.

3. Some reactions join a metal and a nonmetal. The metal can give up electrons, and the nonmetal can gain them. Their charged particles then attract and form an ionic compound. For instance, calcium, a metal on the left, can react with fluorine, a nonmetal on the right, to form calcium fluoride. Magnesium is on the left side of the periodic table, and oxygen is on the right. A clue about whether two elements might combine is useful, but location alone cannot tell how fast a reaction will occur.

2 ANSWER WITH EVIDENCE

Use the passage

1. The alarm needs a solid conductor. Would aluminum or sulfur be the better choice? Explain using their positions on the periodic table.

2. Which is likely more reactive, sodium or potassium? Explain using their group positions.

3. Which is likely more reactive, chlorine or bromine? Explain using their group positions.

4. If magnesium reacts with oxygen, what kind of compound would you predict, and which element would give up electrons?

3 YOUR TURN

Your own words

A mystery element X is in group 1 below potassium, and mystery element Y is in group 17 above chlorine. Write four sentences predicting which would be a better electrical conductor, how each would compare in reactivity with potassium or chlorine, and what kind of compound X and Y could form if they react.

ANSWER KEY

Element Clues

GRADE 7 · P.7.5C.4

PART 1 · READ AND MARK

Underline the location clues that help you predict conductivity, circle the words that show which way reactivity changes, and number the two electron-transfer steps. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	The alarm needs a solid conductor. Would aluminum or sulfur be the better choice? Explain using their positions on the periodic table.	**Aluminum is the better choice. It is on the left, where most metals are, and metals usually conduct electricity well. Sulfur is on the right, where most nonmetals are.**
2	Which is likely more reactive, sodium or potassium? Explain using their group positions.	**Potassium is likely more reactive because it is below sodium in group 1, where metal reactivity increases downward.**
3	Which is likely more reactive, chlorine or bromine? Explain using their group positions.	**Chlorine is likely more reactive because it is above bromine in group 17, where nonmetal reactivity increases upward.**
4	If magnesium reacts with oxygen, what kind of compound would you predict, and which element would give up electrons?	**They would form an ionic compound. Magnesium, the metal, would give up electrons.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

X would be the better electrical conductor because it is a group 1 metal, while Y is a group 17 nonmetal. X is likely more reactive than potassium because group 1 metal reactivity increases down the column. Y is likely more reactive than chlorine because group 17 nonmetal reactivity increases up the column. If X and Y react, X could give up an electron to Y, forming an ionic compound.

Accept predictions that correctly apply the group trends and the metal versus nonmetal pattern. Students need not identify the mystery elements by name.