

CHAPTER

13 THE PERIODIC TABLE*Chapter 13 Test***USING VOCABULARY**

To complete the following sentences, choose the correct term from each pair of terms listed, and write the term in the blank.

1. A horizontal row of elements in the periodic table is called a _____ . (period or group)
2. The elements in Group 1 are the _____ metals, which react violently with water. (alkali or alkaline-earth)
3. A vertical column of elements in the periodic table is called a _____ . (period or group)
4. Neon and argon are known as _____ . (halogens or noble gases)
5. Elements in the same _____ often have similar chemical and physical properties. (period or group)

UNDERSTANDING CONCEPTS**Multiple Choice**

Circle the correct answer.

6. Most of the elements in the periodic table are
 - a. metals.
 - b. metalloids.
 - c. poor conductors of electricity.
 - d. nonmetals.
7. Moseley rearranged the elements in Mendeleev's periodic table in terms of
 - a. chemical symbols.
 - b. atomic mass.
 - c. density.
 - d. atomic number.
8. Alkaline-earth metals _____ than alkali metals.
 - a. are more reactive
 - b. have greater density
 - c. have lower atomic numbers
 - d. are more explosive
9. The element _____ is a metalloid.
 - a. silicon, Si
 - b. carbon, C
 - c. lead, Pb
 - d. phosphorus, P
10. Most metals
 - a. are easily shattered.
 - b. are bad conductors of electric current.
 - c. are made of atoms with many electrons in their outer energy level.
 - d. are made of atoms with few electrons in their outer energy level.



Chapter 13 Test, continued

11. The elements in Groups 3–12
- a. have unstable atoms.
 - b. are good insulators.
 - c. have the same physical and chemical properties.
 - d. are solids at room temperature, except for mercury.
12. _____ is a gas at room temperature, and its atoms have six electrons in their outer level.
- a. Nitrogen
 - b. Bromine
 - c. Oxygen
 - d. Sulfur

Short Answer

13. State the periodic law, which is the basis for the periodic table.

14. Explain why helium is a safer choice than hydrogen, H_2 , for filling large balloons or blimps.

15. What is unique about hydrogen's structure and properties?

CRITICAL THINKING AND PROBLEM SOLVING

16. Suppose a new element is added directly under radon, Rn, in the periodic table. Describe the characteristics that you would expect this new element to have.

INTERPRETING GRAPHICS

The following chart shows some of the characteristics and properties of “Element X.” Examine the chart and answer the question that follows.

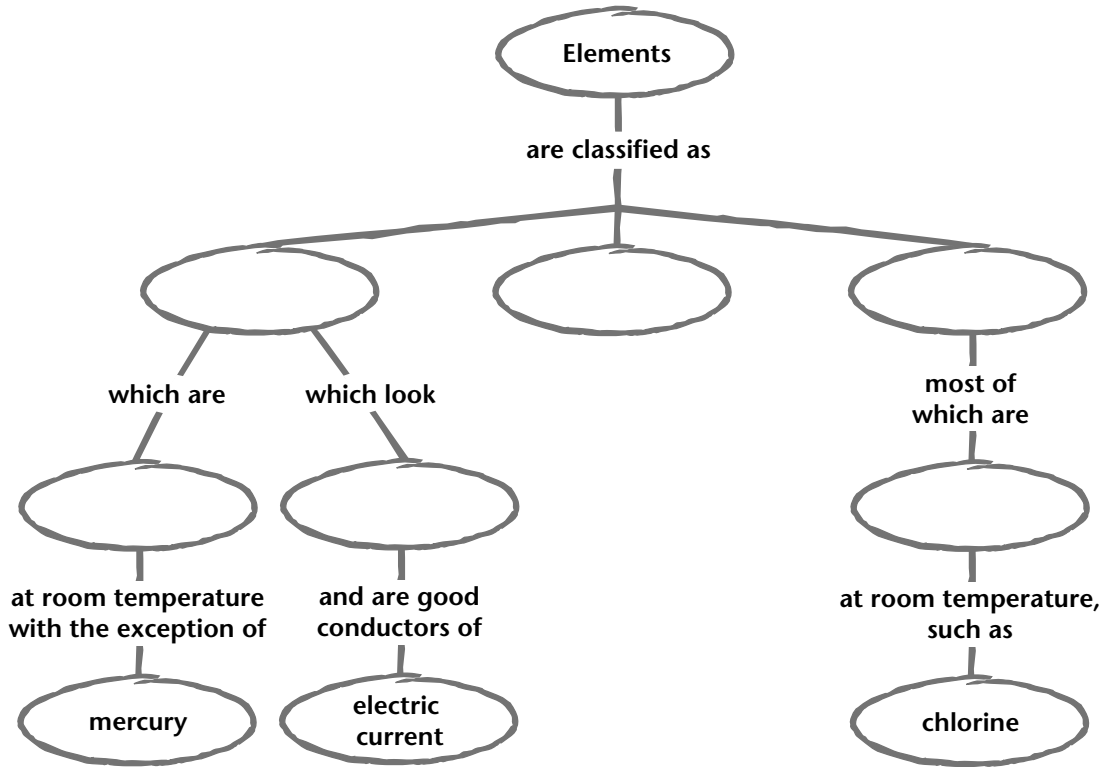
Properties of Element X

Characteristics and properties	Element X
State at room temperature	solid
Hardness	harder than gold; softer than copper
Malleability	can be hammered into sheets 0.000025 cm thick
Ductility	can be drawn into wires finer than a human hair
Ability to conduct electric current	excellent conductor
Melting point	960°C
Reactions	does not react with water; resists corrosion; reacts with sulfur or air that contains sulfur

17. Based on the information in the chart and in the periodic table, what is Element X? Explain your reasoning.

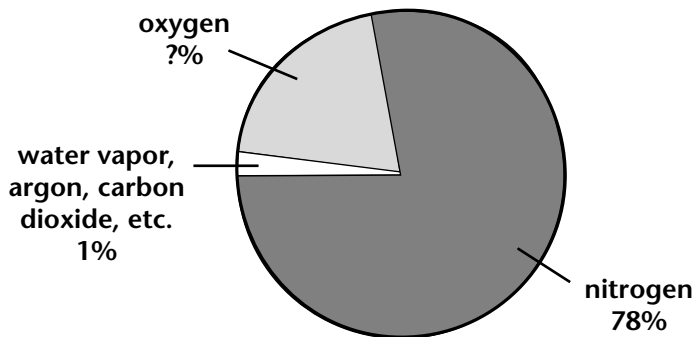
CONCEPT MAPPING

18. Use the following terms to complete the concept map below: nonmetals, metals, solids, gases, shiny, metalloids.



MATH IN SCIENCE

19. Many people think the words *air* and *oxygen* mean almost the same thing. Use the pie graph below to explain why this is not correct. Show your work.



CHAPTER

13 THE PERIODIC TABLE*Chapter 13 Test***USING VOCABULARY** *(Recommended 3 pts. each)*

To complete the following sentences, choose the correct term from each pair of terms listed, and write the term in the blank.

- A horizontal row of elements in the periodic table is called a _____ **period** _____. (period or group)
- The elements in Group 1 are the _____ **alkali** _____ metals, which react violently with water. (alkali or alkaline-earth)
- A vertical column of elements in the periodic table is called a _____ **group** _____. (period or group)
- Neon and argon are known as _____ **noble gases** _____. (halogens or noble gases)
- Elements in the same _____ **group** _____ often have similar chemical and physical properties. (period or group)

UNDERSTANDING CONCEPTS**Multiple Choice** *(Recommended 4 pts. each)*

Circle the correct answer.

- Most of the elements in the periodic table are

<input checked="" type="radio"/> a. metals.	c. poor conductors of electricity.
<input type="radio"/> b. metalloids.	<input type="radio"/> d. nonmetals.
- Moseley rearranged the elements in Mendeleev's periodic table in terms of

<input type="radio"/> a. chemical symbols.	c. density.
<input type="radio"/> b. atomic mass.	<input checked="" type="radio"/> d. atomic number.
- Alkaline-earth metals _____ than alkali metals.

<input type="radio"/> a. are more reactive	c. have lower atomic numbers
<input checked="" type="radio"/> b. have greater density	<input type="radio"/> d. are more explosive
- The element _____ is a metalloid.

<input checked="" type="radio"/> a. silicon, Si	c. lead, Pb
<input type="radio"/> b. carbon, C	<input type="radio"/> d. phosphorus, P
- Most metals

<input type="radio"/> a. are easily shattered.
<input type="radio"/> b. are bad conductors of electric current.
<input type="radio"/> c. are made of atoms with many electrons in their outer energy level.
<input checked="" type="radio"/> d. are made of atoms with few electrons in their outer energy level.



Chapter 13 Test, continued

11. The elements in Groups 3–12
- a. have unstable atoms.
 - b. are good insulators.
 - c. have the same physical and chemical properties.
 - d.** are solids at room temperature, except for mercury.
12. _____ is a gas at room temperature, and its atoms have six electrons in their outer level.
- a. Nitrogen
 - b. Bromine
 - c.** Oxygen
 - d. Sulfur

Short Answer (*Recommended 7 pts. each*)

13. State the periodic law, which is the basis for the periodic table.

The periodic law states that chemical and physical properties of elements are periodic, repeating functions of the elements' atomic numbers. This is why elements in vertical groups of the periodic table share similar properties.

14. Explain why helium is a safer choice than hydrogen, H₂, for filling large balloons or blimps.

Helium is a safer choice because it is a stable, nonreactive gas with atoms that have a full set of electrons in their outer energy level. Hydrogen is very reactive and combustible because its atoms have an incomplete outer energy level.

15. What is unique about hydrogen's structure and properties?

Atoms of hydrogen have only one electron in their outer energy level and no neutrons in their nucleus. Hydrogen is located in Group 1 above the alkali metals, but it has physical properties like those of the nonmetals.

Chapter 13 Test, continued

CRITICAL THINKING AND PROBLEM SOLVING *(Recommended 9 pts.)*

16. Suppose a new element is added directly under radon, Rn, in the periodic table. Describe the characteristics that you would expect this new element to have.

The new element would be in Group 18 of the periodic table and would have an atomic number of 118. The element would be a colorless, odorless, nonreactive gas at room temperature.

INTERPRETING GRAPHICS *(Recommended 9 pts.)*

The following chart shows some of the characteristics and properties of “Element X.” Examine the chart and answer the question that follows.

Properties of Element X

Characteristics and properties	Element X
State at room temperature	solid
Hardness	harder than gold; softer than copper
Malleability	can be hammered into sheets 0.000025 cm thick
Ductility	can be drawn into wires finer than a human hair
Ability to conduct electric current	excellent conductor
Melting point	960°C
Reactions	does not react with water; resists corrosion; reacts with sulfur or air that contains sulfur

17. Based on the information in the chart and in the periodic table, what is Element X? Explain your reasoning.

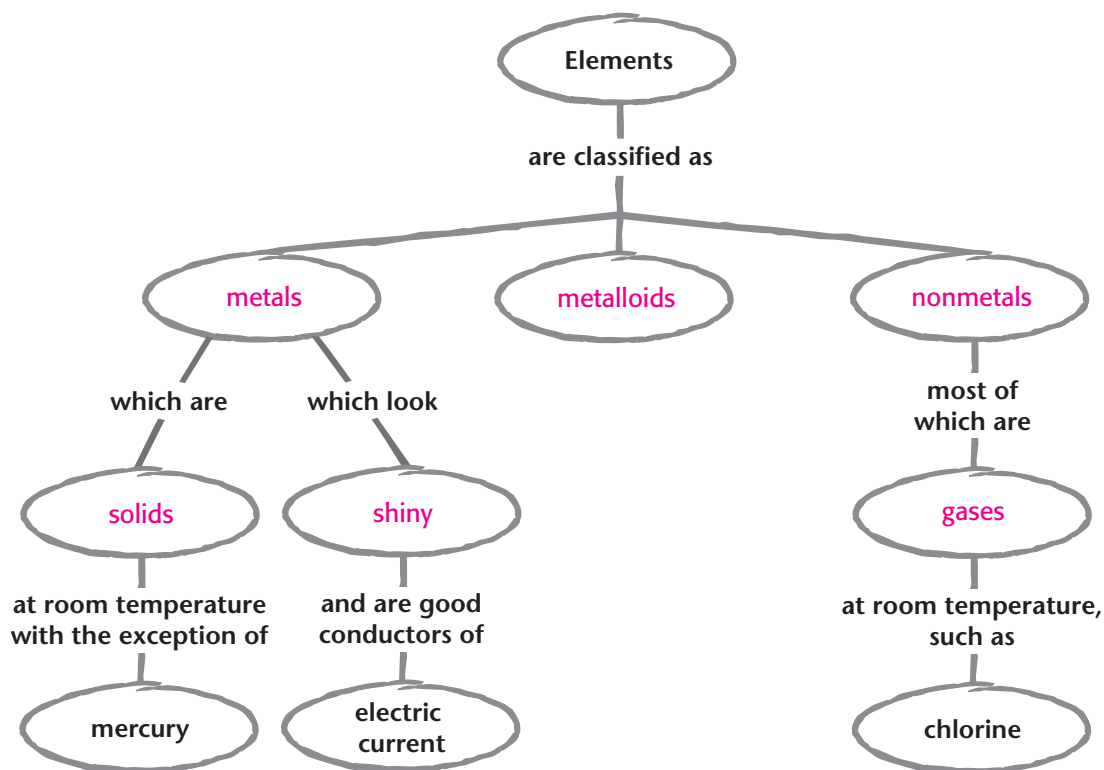
Element X is silver. Silver is located above gold and beneath copper in Group 11 of the periodic table. It is harder than gold and softer than copper. Its position in the periodic table as a transition metal explains its properties of malleability and ductility.



Chapter 13 Test, continued

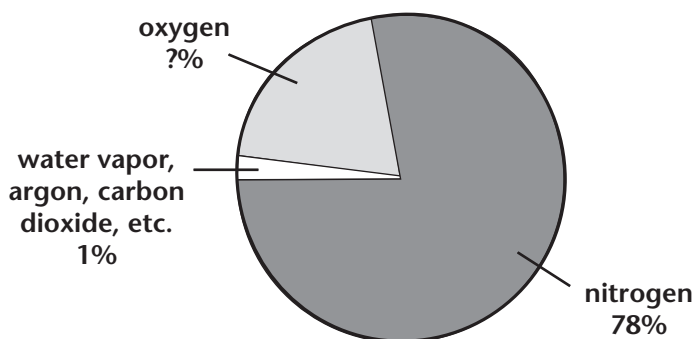
CONCEPT MAPPING (Recommended 2 pts. each)

18. Use the following terms to complete the concept map below: nonmetals, metals, solids, gases, shiny, metalloids.



MATH IN SCIENCE (Recommended 6 pts.)

19. Many people think the words *air* and *oxygen* mean almost the same thing. Use the pie graph below to explain why this is not correct. Show your work.



Air is only about one-fifth (100% - 79% = 21%) oxygen. It is made mostly of nitrogen. A very small percentage of air is made of other gases.

Chapter 13 Test, continued

The Periodic Table of the Elements

1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18																																																																								
H Hydrogen 1.0	Li Lithium 6.9	Be Beryllium 9.0	Na Sodium 23.0	Mg Magnesium 24.3	K Potassium 39.1	Ca Calcium 40.1	Sc Scandium 45.0	Ti Titanium 47.9	V Vanadium 50.9	Cr Chromium 52.0	Mn Manganese 54.9	Fe Iron 55.8	Co Cobalt 58.9	Ni Nickel 58.7	Cu Copper 63.5	Zn Zinc 65.4	Ga Gallium 69.7	Ge Germanium 72.6	As Arsenic 74.9	Se Selenium 79.0	Br Bromine 79.9	Kr Krypton 83.8	Rb Rubidium 85.5	Sr Strontium 87.6	Y Yttrium 88.9	Zr Zirconium 91.2	Nb Niobium 92.9	Mo Molybdenum 95.9	Tc Technetium (97.9)	Ru Ruthenium 101.1	Rh Rhodium 102.9	Pd Palladium 106.4	Ag Silver 107.9	Cd Cadmium 112.4	In Indium 114.8	Sn Tin 118.7	Sb Antimony 121.8	Te Tellurium 127.6	I Iodine 126.9	Xe Xenon 131.3	Cs Cesium 132.9	Ba Barium 137.3	La Lanthanum 138.9	Hf Hafnium 178.5	Ta Tantalum 180.9	W Tungsten 183.8	Re Rhenium 186.2	Os Osmium 190.2	Ir Iridium 192.2	Pt Platinum 195.1	Au Gold 197.0	Hg Mercury 200.6	Tl Thallium 204.4	Pb Lead 207.2	Bi Bismuth 209.0	Po Polonium (209.0)	At Astatine (210.0)	Rn Radon (222.0)	Fr Francium (223.0)	Ra Radium (226.0)	Ac Actinium (227.0)	La Lanthanides	Ce Cerium 140.1	Pr Praseodymium 140.9	Nd Neodymium 144.2	Pm Promethium (144.9)	Sm Samarium 150.4	Eu Europium 152.0	Gd Gadolinium 157.3	Tb Terbium 158.9	Dy Dysprosium 162.5	Ho Holmium 164.9	Er Erbium 167.3	Tm Thulium 168.9	Yb Ytterbium 173.0	Lu Lutetium 175.0	Th Thorium 232.0	Pa Protactinium 231.0	U Uranium 238.0	Np Neptunium (237.0)	Pu Plutonium 244.1	Am Americium (243.1)	Cm Curium (247.1)	Bk Berkelium (247.1)	Cf Californium (251.1)	Es Einsteinium (252.1)	Fm Fermium (257.1)	Md Mendelevium (258.1)	No Nobelium (259.1)	Lr Lawrencium (262.1)

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