

Activity 2: Investigating Elements

Guiding Question: How can scientists use physical properties to identify elements?

Key Words: *atom, density, dissolve, element, malleability, matter, physical property, property, solubility, state*

Get Started:

1. Read the introduction and Guiding Question to Activity 2, “Investigating Elements,” in your Student Book.

2. Look at the list of elements shown. What other elements do you know?

aluminum	iron
carbon	mercury
copper	nitrogen
germanium	sulfur

3. Look at Visual Aid 2.1, “Periodic Table of Elements,” which is attached to this packet. Approximately 90 of the elements are the building blocks of nearly all materials on Earth, both natural and synthetic.

Do the Activity:

1. Read Procedure Steps 1-2 in your Student Book.

2. Watch the LABsent video (found here: <https://labaid.s3.us-east-2.amazonaws.com/labsent-videos/3e+CM+2+v2.mp4>), and record your data. Each time the video says to record, you may want to pause the video to give you ample time to complete your observations. Record your observations on Student Sheet 2.1, “Physical Properties of Elements,” which is attached to this packet.

3. Read and complete Procedure Steps 3-4 in your Student Book.

Analysis:

1. Why do you think it is important for scientists to observe multiple physical properties in order to identify an element? Use examples from the data you collected in this activity to support your ideas.

Name _____

Date _____

2. Copy the lists of words below:

element

gas

metal

iron

solid

property

carbon

liquid

malleable

water

metal

soluble

nitrogen

state

dense

- Look for a relationship between the words in each list. Cross out the word that does not belong.
- Circle the word or phrase that includes all the other words.
- Explain how the word or phrase you circled is related to the other words in the list.

3. Based on the eight elements you have observed so far, and assuming the rest of the elements fit the same pattern, would you expect most elements to be solid, liquid, or gas at room temperature? Explain.

4. When added to water at room temperature, most gases form bubbles that float to the top of the water and release into the air. What does this tell you about the density of gases?

Name _____

Date _____

5. **Revisit the issue:** Describe what you have learned about the physical properties of aluminum in this activity and the “Exploring Materials” activity. What information, if any, from these activities would be helpful in deciding if aluminum would be a good choice for making a drink container?

6. In this activity, you recorded the appearance of each element you observed. Think of and explain two examples from this activity in which appearance does not help identify an element.

VISUAL AID 2.1

PERIODIC TABLE

Periodic Table of the Elements

		2A		3B		4B		5B		6B		7B		8B		8B		1B		2B		3A		4A		5A		6A		7A		8A																																																																																																																																																																							
1	H hydrogen 1.008	3	Li lithium 6.941	11	Na sodium 22.99	19	K potassium 39.10	37	Rb rubidium 85.47	55	Cs cesium 132.9	87	Fr francium (223)	2	He helium 4.003	10	Ne neon 20.18	18	Ar argon 39.95	36	Kr krypton 83.80	54	Xe xenon 131.3	86	Rn radon (222)	4	Be beryllium 9.012	12	Mg magnesium 24.31	20	Ca calcium 40.08	38	Sr strontium 87.62	56	Ba barium 137.3	88	Ra radium (226)	6	C carbon 12.01	14	Si silicon 28.09	32	Ge germanium 72.64	50	Sn tin 118.7	82	Pb lead 207.2	114	Fl flerovium (289)	112	Cn copernicium (285)	14	Si silicon 28.09	32	Ge germanium 72.64	50	Sn tin 118.7	82	Pb lead 207.2	114	Fl flerovium (289)	112	Cn copernicium (285)	16	S sulfur 32.07	34	Se selenium 78.96	52	Te tellurium 127.6	84	Po polonium (209)	116	Lv livermorium (293)	16	S sulfur 32.07	34	Se selenium 78.96	52	Te tellurium 127.6	84	Po polonium (209)	116	Lv livermorium (293)	17	Cl chlorine 35.45	35	Br bromine 79.90	53	I iodine 126.9	85	At astatine (210)	117	Ts tennessine ()	17	Cl chlorine 35.45	35	Br bromine 79.90	53	I iodine 126.9	85	At astatine (210)	117	Ts tennessine ()	5	B boron 10.81	13	Al aluminum 26.98	31	Ga gallium 69.72	49	In indium 114.8	81	Tl thallium 204.4	113	Nh nihonium (284)	5	B boron 10.81	13	Al aluminum 26.98	31	Ga gallium 69.72	49	In indium 114.8	81	Tl thallium 204.4	113	Nh nihonium (284)	7	N nitrogen 14.01	15	P phosphorus 30.97	33	As arsenic 74.92	51	Sb antimony 121.8	83	Bi bismuth 209.0	115	Mc moscovium (288)	7	N nitrogen 14.01	15	P phosphorus 30.97	33	As arsenic 74.92	51	Sb antimony 121.8	83	Bi bismuth 209.0	115	Mc moscovium (288)	8	O oxygen 16.00	16	S sulfur 32.07	34	Se selenium 78.96	52	Te tellurium 127.6	84	Po polonium (209)	116	Lv livermorium (293)	8	O oxygen 16.00	16	S sulfur 32.07	34	Se selenium 78.96	52	Te tellurium 127.6	84	Po polonium (209)	116	Lv livermorium (293)	9	F fluorine 19.00	17	Cl chlorine 35.45	35	Br bromine 79.90	53	I iodine 126.9	85	At astatine (210)	117	Ts tennessine ()	9	F fluorine 19.00	17	Cl chlorine 35.45	35	Br bromine 79.90	53	I iodine 126.9	85	At astatine (210)	117	Ts tennessine ()

57	La lanthanum 138.9	58	Ce cerium 140.1	59	Pr praseodymium 140.9	60	Nd neodymium 144.2	61	Pm promethium (145)	62	Sm samarium 150.4	63	Eu europium 152.0	64	Gd gadolinium 157.3	65	Tb terbium 158.9	66	Dy dysprosium 162.5	67	Ho holmium 164.9	68	Er erbium 167.3	69	Tm thulium 168.9	70	Yb ytterbium 173.0	89	Ac actinium (227)	90	Th thorium 232.0	91	Pa protactinium 231.0	92	U uranium 238.0	93	Np neptunium (237)	94	Pu plutonium (244)	95	Am americium (243)	96	Cm curium (247)	97	Bk berkelium (247)	98	Cf californium (251)	99	Es einsteinium (252)	100	Fm fermium (257)	101	Md mendelevium (258)	102	No nobelium (259)
----	---------------------------------	----	------------------------------	----	------------------------------------	----	---------------------------------	----	----------------------------------	----	--------------------------------	----	--------------------------------	----	----------------------------------	----	-------------------------------	----	----------------------------------	----	-------------------------------	----	------------------------------	----	-------------------------------	----	---------------------------------	----	--------------------------------	----	-------------------------------	----	------------------------------------	----	------------------------------	----	---------------------------------	----	---------------------------------	----	---------------------------------	----	------------------------------	----	---------------------------------	----	-----------------------------------	----	-----------------------------------	-----	-------------------------------	-----	-----------------------------------	-----	--------------------------------

KEY
element state at room temperature

 solid	 gas
 liquid	 unknown

Name _____

Date _____

STUDENT SHEET 2.1**PHYSICAL PROPERTIES OF ELEMENTS**

Element name and symbol	State (solid, liquid, or gas?)	Appearance	Malleability (flexible?)	Solubility (dissolves in water?)	Density (sinks or floats?)
Aluminum (Al)					
Carbon (C)					
Copper (Cu)					
Germanium (Ge)					
Iron (Fe)					
Mercury (Hg)					
Nitrogen (N)					
Sulfur (S)					