

Name \_\_\_\_\_

Class \_\_\_\_\_ Date \_\_\_\_\_

# Finding Out about Matter

## A. Chemical and Physical Changes

Changes that produce new kinds of matter with different properties are called chemical changes. Changes that do not do so are called physical changes. Classify each of the following as either a physical or a chemical change.

boiling	<u>    P    </u>	electrolysis	<u>    C    </u>
freezing	<u>    P    </u>	tearing	<u>    P    </u>
burning	<u>    C    </u>	mixing	<u>    P    </u>
melting	<u>    P    </u>	distillation	<u>    P    </u>
grinding	<u>    P    </u>	decomposition	<u>    C    </u>

## B. Classifying Materials as Elements, Compounds, or Mixtures

Substances that contain only one kind of atom are called elements. Substances that are chemical combinations of different kinds of atoms are called compounds. Combinations of substances that retain their separate identities are called mixtures. Classify each of the following as either an element, a compound, or a mixture.

sodium chloride	<u>    C    </u>	steel	<u>    M    </u>
sugar-water	<u>    M    </u>	carbon dioxide	<u>    C    </u>
wood	<u>    M    </u>	methane	<u>    C    </u>
nitrogen	<u>    E    </u>	chlorine	<u>    E    </u>
water	<u>    C    </u>	ammonia	<u>    C    </u>
iron	<u>    E    </u>	air	<u>    M    </u>

## C. Properties of Mixtures and Pure Substances

The behavior, on heating, of mixtures and pure substances is different. Melting and boiling temperatures are constant for pure substances, and change, with time, for mixtures. The following table contains time and temperature data for samples of two different materials, A and B, that are being heated separately at a constant rate. Graph the data in the table on the temperature-versus-time grid that follows. Then answer the questions that follow.

A		B	
TIME (MIN)	TEMPERATURE (°C)	TIME (MIN)	TEMPERATURE (°C)
0	-25	0	30
1	-20	1	37
2	-16	2	44
3	-14	3	51
4	-12	4	51
5	-10	5	51
6	0	6	51
7	12	7	60
8	25	8	70

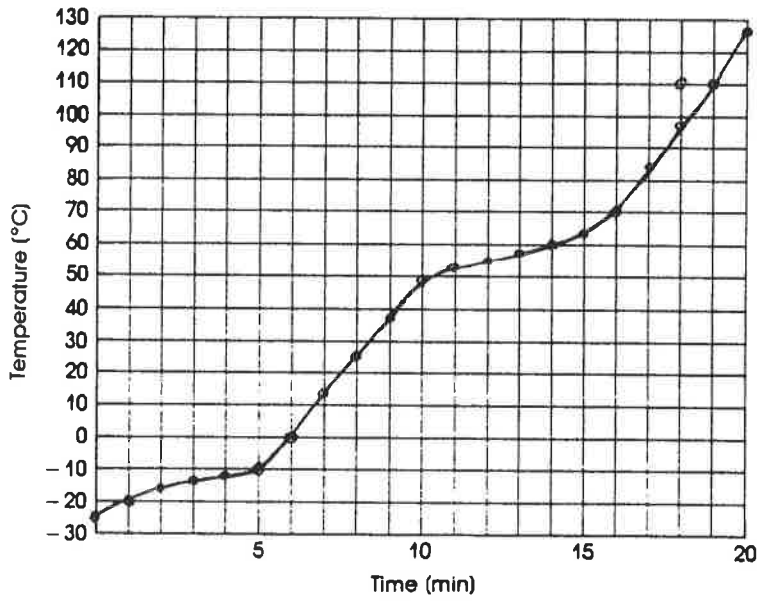
A

TIME (MIN)	TEMPERATURE (°C)
9	38
10	49
11	52
12	54
13	57
14	60
15	63
16	70
17	83
18	97
19	110
20	126

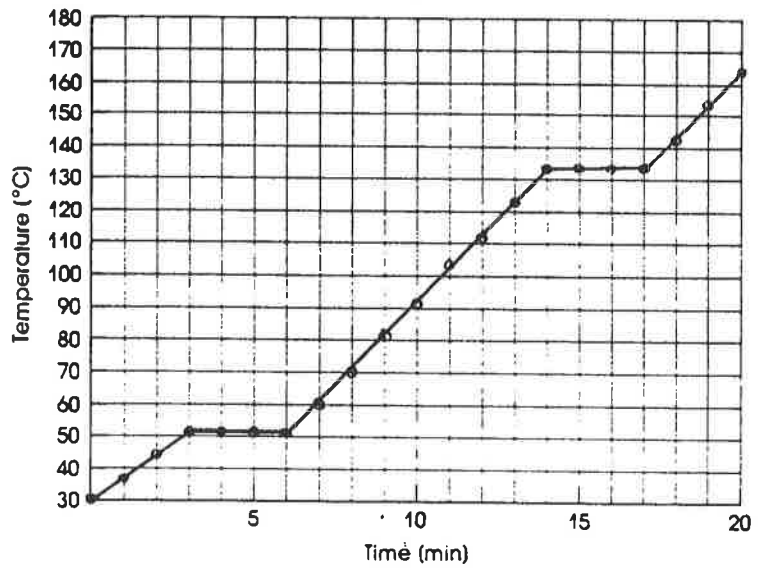
B

TIME (MIN)	TEMPERATURE (°C)
9	81
10	91
11	103
12	111
13	122
14	133
15	133
16	133
17	133
18	142
19	153
20	163

A



B



- Is A a mixture or a pure substance? mixture  
How do you know? Its freezing and boiling points are not constant - shown by the fact that the melting + boiling regions are not horizontal.
- What is A's freezing point or freezing range? roughly  $-16^{\circ}\text{C}$  to  $-10^{\circ}\text{C}$
- What is A's boiling point or boiling range? "  $49^{\circ}\text{C}$  to  $63^{\circ}\text{C}$
- In what range of temperatures is A present as solid only? below about  $-16^{\circ}\text{C}$   
In what range of temperatures is A present as liquid only? above about  $-10^{\circ}\text{C}$  to below about  $49^{\circ}\text{C}$
- Is B a mixture or a pure substance? pure substance  
How do you know? Its freezing + boiling points are constant - shown by the horizontal melting + boiling regions on the graph.
- What is B's freezing point or freezing range?  $51^{\circ}\text{C}$
- What is B's boiling point or boiling range?  $133^{\circ}\text{C}$
- In what range of temperatures is B present as solid only? below  $51^{\circ}\text{C}$   
In what range of temperatures is B present as liquid only? above  $51^{\circ}\text{C}$  + below  $133^{\circ}\text{C}$

## D. Symbols and Names of Elements

Elements are assigned one- or two-letter symbols. Match each of the following elements with its symbol by choosing the correct symbol from the list and writing it to the right of the name.

NAMES		LIST OF SYMBOLS	NAMES		LIST OF SYMBOLS
1. carbon	<u>C</u>	Ag	9. silver	<u>Ag</u>	Co
2. helium	<u>He</u>	H	10. argon	<u>Ar</u>	Pb
3. hydrogen	<u>H</u>	Cd	11. arsenic	<u>As</u>	At
4. calcium	<u>Ca</u>	As	12. astatine	<u>At</u>	F
5. iron	<u>Fe</u>	K	13. cadmium	<u>Cd</u>	Ca
6. fluorine	<u>F</u>	Ar	14. lead	<u>Pb</u>	Fe
7. cobalt	<u>Co</u>	He	15. potassium	<u>K</u>	Cu
8. copper	<u>Cu</u>	C			