Topic 5 Notes and terms

Science 7 Unit 3

Name:

Date:

Specific Heat capacity: this is the amount of energy (in joules) required to heat 1 kilogram of a substance by 1 degree celcius. It is also the amount of energy released by 1 kg. Of a substance as it cools by 1 degree celcuis.

Eg. The specific heat capacity of water 4200 J/kg.C. This means that to heat 1 kg., by one degree celsius it requires 4200 Joules of energy. If you heated the 1 kg. water by 2 degrees it would take 8400 Joules of energy. If you heated 2 kg. of water by 1 degree it would also take 8400 J.

Table pg.153

Table 3-3 *Specific Heat Capacities of Common Substances at 25°C*

SUBSTANCE	SPECIFIC HEAT CAPACITY [J/(kg·°C)]
hydrogen gas	14 400
helium gas	5 300
water	4 200
concrete	3 000
ethanol	2 500
ethylene glycol	2 200
ice (at 0°C)	2 100
steam (at 100°C)	2 100
vegetable oil	2 000
air	995
aluminum	920
glass	840
sand	790
iron	450
copper	390
brass	380
silver	240
lead	130

- A substance with a low specific heat capacity heats up quickly and cools down quickly. Eg.) Lead 130 J/kg.C
- A substance with a high specific heat capacity takes a long time to heat and a long time to cool down. Eg. Water 4200J/kg.C

State Change

Table page 220

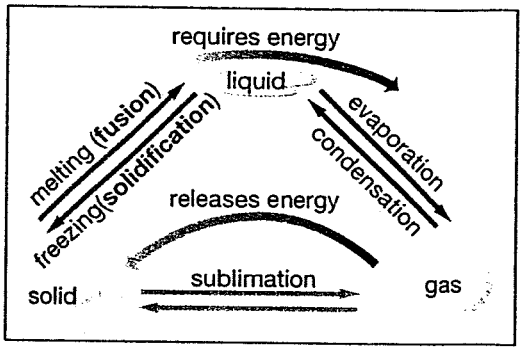


Figure 3.18 Changes of state

Define the following terms

1. Fusion (melting):

2.) solidification (freezing):

3.) evaporation:

4.) condense

5.) sublimation

Science 7

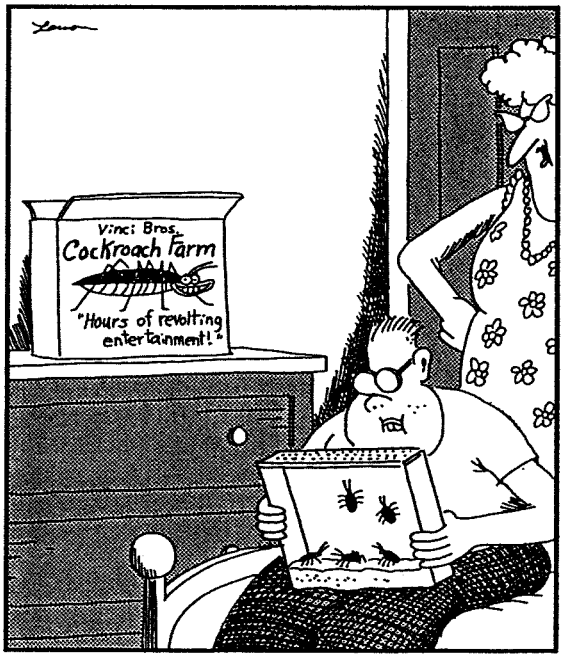
Topic 5 Unit 3

Research and Exploration Questions

mr. Wessner

Date:

Name:



"Now remember, Cory, show us that you can take good care of these little fellows and maybe *next* year we'll get you that puppy."

DATE: NAME: CLASS:

TOPIC 5
SCIENCE INQUIRY

Surprising Water Fact

BLM 3-15

Goal • Learn how water expands when it freezes.

Think About It

Most liquids contract when they change into solids. Water, however, is one of the few liquids that expand when they freeze. In this activity, you will test for this property.

What You Need

- glass
- water
- food colouring
- large ice cube
- tape

What to Do

1. Pour water into the glass until it is half full. Add a drop of food colouring.
2. Place the ice cube in the glass of water.
3. Mark the water level on the side of the glass with a strip of tape.
4. Predict what the water level will be after the ice cube has melted.

What Did You Find Out?

1. What happened to the ice cube when you put it in the water?

2. Where was the ice cube in relation to the water level?

3. What happened to the water level after the ice cube melted?

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TOPIC 5
SCIENCE INQUIRY

Surprising Water Fact (continued)

BLM 3-15

Applications

4. Ice floats. Why is this property important for fish in lakes and rivers?

5. What does your answer to question 3 tell you about the volume of a melted ice cube compared with the volume of a frozen ice cube?

DATE: NAME: CLASS:

TOPIC 5
SCIENCE INQUIRY

Instant Ice

BLM 3-16

Goal • Explore condensation and solidification of water vapour in the air.

Think About It

Condensation is the change of state from a gas to a liquid. Solidification is the change of state from a liquid to a solid. In this activity, you will see water appear out of the air and perhaps even form a sheet of ice.

What You Need

- dry glass
- ice cubes
- salt
- water

What to Do

1. Put ice cubes in the dry glass, so they fill two thirds of the glass.
2. Add a little water to the glass.
3. Stir in 1 tablespoon of salt.
4. Observe the outside of the glass closely.

What Did You Find Out?

1. (a) In the space below, draw and label a diagram of what you observed.

(b) Describe what happened.

Instant Ice (continued)

2. (a) Did water appear on the outside of the glass? Where did the water come from? Was there a leak in the glass? How can you be sure?

4

(b) What is the name for the change of state that you observed on the outside of the glass?

1
1

(c) Use the particle model to explain what happened.

2
2

3. (a) If you leave the glass a little longer, the water on the outside of the glass may turn to ice. Why?

1
1

(b) What are the scientific and common names for this change of state?

2

11

DATE: NAME: CLASS:

TOPIC 5
REINFORCEMENT

Hidden Heat

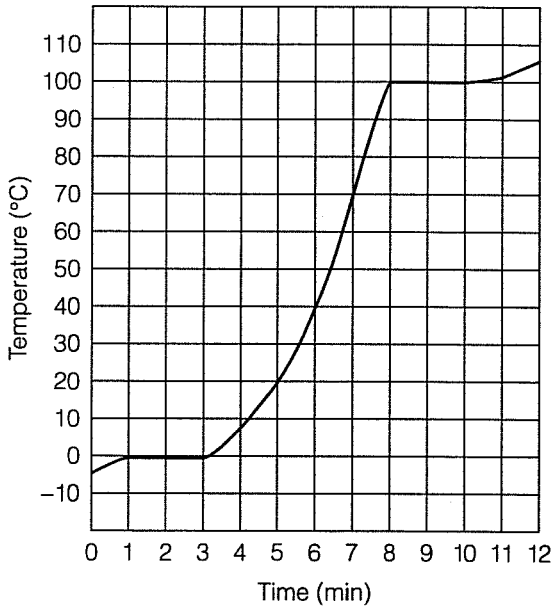
BLM 3-17

Goal • Reinforce the concepts introduced in Inquiry Investigation 3-F: The Plateau Problem.

Think About It

"Hidden heat" is a term used to describe the quantity of energy that flows into a substance as its state changes, without changing its temperature. The graph below is called a heating curve. It shows the temperature change that occurred when a block of ice was heated in an experiment.

Heating Curve for Ice



What to Do

Use the graph to answer the following questions about this experiment.

1. (a) When did the ice begin to melt?

_____

(b) How long did the ice take to melt completely?

_____

(c) What does a plateau in the graph indicate about the temperature?

_____

_____

Hidden Heat (continued)

(d) Describe the temperature change during the plateau. Where has all the added energy gone?

2. (a) Once the ice melted into water, what happened for the next 5 min?

(b) What occurred 8 min into the experiment?

(c) What does the second plateau in the graph represent?

3. Suppose the vapour were cooled in a freezing compartment where the internal temperature was −10°C. In the space below, sketch and label what the cooling curve might look like.

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TOPIC 5
VOCABULARY CHECK

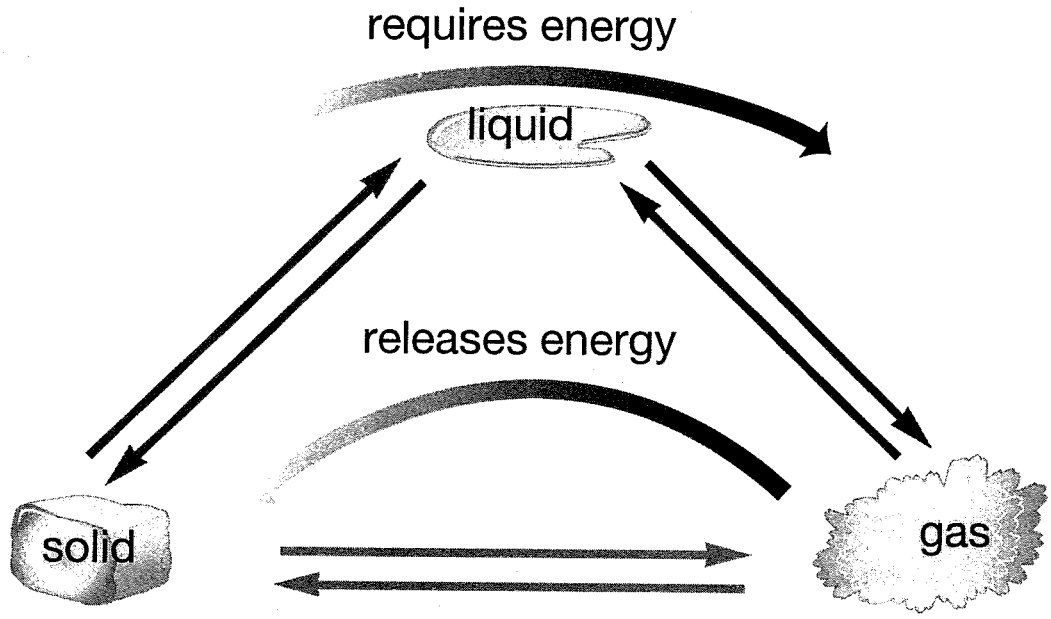
Learn the Lingo

BLM 3-18

Goal • Learn the vocabulary that describes changes of state.

Think About It

There are six possible changes of state, as shown by the arrows on the diagram below. Several of the changes have common names, which you probably know. Some of the changes are identified by technical terms used in science. It will be easier for you to describe and read about changes of state if you learn and practise using both their common and technical names.



What to Do

Answer the following questions in the space provided.

1. Above the correct arrow in the diagram, write each technical term from the table. Also write (in brackets) the common term for the change, if there is one. Notice that one technical term is used to describe two different changes.

Term	Change
solidification (freezing)	liquid to solid
condensation	gas to liquid
sublimation	gas directly to solid
evaporation	liquid to gas
fusion (melting)	solid to liquid
sublimation	solid directly to gas

Learn the Lingo (continued)

2. Read each statement below. Then write a description of each statement, using a technical term, as in the example.

Wet clothes dry in the sunshine.
Description: evaporation of liquid water

(a) Melted wax in a candle hardens when the candle is blown out.

Description: _____

(b) A warm wind makes snow on the ground disappear, but no puddles of water form.

Description: _____

(c) In the winter, invisible moisture in the air sometimes forms frost on car windshields.

Description: _____

(d) On a cold day, you can "see your breath."

Description: _____

3. Classify the six changes of state according to the change of thermal energy they involve. Arrange your answers in a table, with the headings "Receiving thermal energy" and "Releasing thermal energy."

DATE: NAME: CLASS:

TOPIC 5
REINFORCEMENT

BLM 3-19

Changing From State to State

Goal • Review terms related to changes of state.

Think About It

There are three states of matter and six changes of state. A change of state requires energy to be added or removed.

What to Do

Give two examples of each change of state. Use full sentences. One example is done for you.

1. solidification
   (a) *Liquid juice becomes solid popsicle when energy is removed.*
   (b) _____
2. condensation
   (a) _____
   (b) _____
3. sublimation (vapour to solid)
   (a) _____
   (b) _____
4. vaporization
   (a) _____
   (b) _____
5. fusion
   (a) _____
   (b) _____
6. sublimation (solid to vapour)
   (a) _____
   (b) _____