

Energy NOTES

OBJECTIVES

Correctly define: absolute zero, condensation, conduction, convection, kinetic energy, potential energy, radiation, refracted, solidification, specific heat, temperature, vaporization

ENERGY TRANSFER AND TRANSFORMATION

- Describe the difference between kinetic and potential energy and give one real-life example of each.
- Describe the three ways energy is transferred between objects.
- Give at least one real-life example for each type of energy transfer.
- Explain how electromagnetic energy travels.
- Explain how different types of energy are told apart.
- Give examples of materials which make the best absorbers and reflectors of energy.

TEMPERATURE

- Convert temperatures between the three temperature scales.
- Describe the relationship between temperature and molecular motion.
- Describe absolute zero in terms of molecular motion.

SPECIFIC HEAT

- Explain the concept of specific heat in your own words and with real-life examples.
- Use the ESRTs to predict which earth materials will heat the fastest or slowest based upon their specific heats.
- Identify that water (liquid) has the highest specific heat of any Earth material.
- Explain why, in terms of specific heat, materials that are good absorbers are also good radiators.

HEATING OF WATER

- Correctly label the water heating graph with the following characteristics: freezing, melting, condensing, and evaporating.
- Identify when heat is being gained or lost by water on the water heating graph.
- Explain which phase changes require the biggest gains/losses of energy for water.
- Calculate the rate of temperature change for water.

Vocabulary

Absolute Zero:

Condensation:

Conduction:

Convection:

Kinetic Energy:

Potential Energy:

Radiation:

Refracted:

Solidification:

Specific Heat:

Temperature:

Vaporization:

Key Concepts & Questions

Energy Transfer

What is the difference between kinetic and potential energy? Give a real-life example of each

Kinetic Energy	Potential Energy
energy in motion	stored energy
Example: skiing downhill throwing a bowling ball water flowing in a river	Example: at the top of ski slope water behind a dam

What are the three ways that energy can be transferred between objects? Give one real-life example of each.

conduction	convection	radiation
occurs in solids collision of molecules	occurs in liquids and gases caused by differences in density	travel by waves
Example a metal frying pan handle gets hot on the stove	Example convection currents in the Earth's interior, radiators	Example sun tanning booth microwave oven the Sun's energy getting to Earth

From where do convection ovens heat? (top or **bottom**) _____

From where do refrigerators cool? (**top** or bottom) _____

How are different types of energy told apart? by their wavelengths

Which is more powerful---short-wavelength energy or long-wavelength energy? short

How does energy get from the Sun to Earth? radiation

Best Absorbers	Best Reflectors
dark-colored, rough surfaces	light-colored, smooth surfaces

A GOOD ABSORBER IS A GOOD RADIATOR !

SOMETHING THAT ABSORBS ENERGY QUICKLY, MUST GIVE IT OFF QUICKLY!

Temperature Conversion

Fill in the chart below using your Earth Science Reference Tables (PAGE 13).

Fahrenheit	Celsius	Kelvin
30	-1	272
86	30	303
135	57	330

Describe the word TEMPERATURE in relation to molecular motion.

temperature is a measure of the average kinetic energy of the molecules of a substance

What happens to molecular motion at absolute zero? What temperature is this in all temperature scales?

at absolute zero, all molecular motion stops: -459°F, -273°C, 0 K

Specific Heat

Why does water heat up and cool down slower than land?

water has a higher specific heat than land. it takes more energy for it to heat up and cool down

If you heated equal masses of basalt and lead, which one would record a faster increase in temperature? Explain how you know.

lead would heat up faster because it has a lower specific heat (page 1 of the ESRTs)

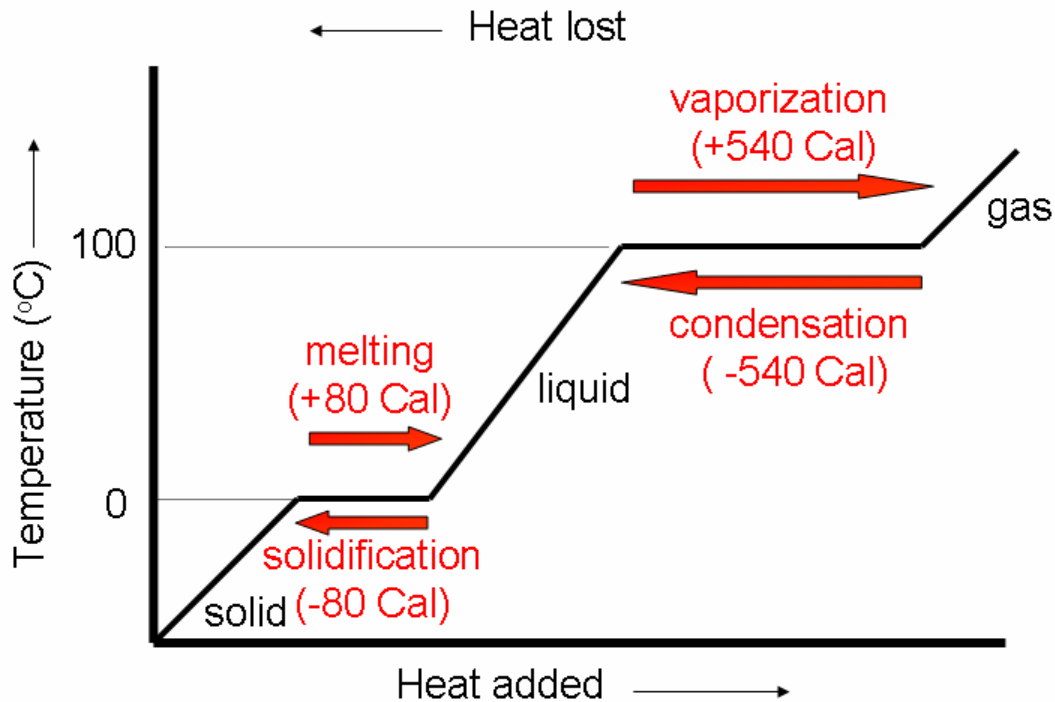
Which Earth material has the greatest specific heat?

liquid water

HEATING OF WATER

Draw the graph of water heating.

- Label the following terms in their correct places: condensation, vaporization, solidification, melting.



Check the box which describes whether energy is gained or lost for each process.

Process	Energy Gained	Energy Lost
Condensation		✓
Evaporation	✓	
Melting	✓	
Solidification		✓

How many calories are gained or lost by water for each of the following processes?

Process	Calories Gained	Calories Lost
Condensation		540
Evaporation	540	
Melting	80	
Solidification		80