

KEY CONCEPTS SUMMARY



Physical properties are characteristics that can be determined without changing the composition of the substance.

- Physical properties may be qualitative or quantitative. (5.2)
- Examples of qualitative physical properties are lustre, optical clarity, brittleness, viscosity, hardness, malleability, ductility, and electrical conductivity. (5.2)
- Examples of quantitative physical properties are mass, height, and temperature. (5.2)



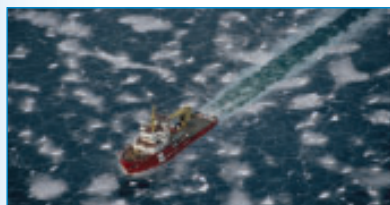
Chemical properties describe the ability of a substance to change its composition to form new substances.

- A chemical property is a property of a substance that describes its ability to undergo changes to its composition to produce one or more new substances. (5.3)
- Many products are useful to us because of their chemical properties. (5.3)



Pure substances have characteristic physical properties.

- A characteristic physical property is a physical property that is unique to a substance and that can be used to identify the substance. (5.6)
- Characteristic physical properties are density, melting/freezing point, and boiling point. (5.6)



Water has unusual characteristic physical properties.

- Solids are usually denser than liquids, but ice is less dense than water when its temperature is close to its melting point. (5.6)
- This property allows ice to float on water, which allows aquatic life to survive. (5.6)



Physical and chemical properties can be used to identify different substances.

- Substances can be identified by observing the physical and chemical changes that they undergo when they are mixed with other substances. (5.2, 5.3, 5.5)
- Examples of physical change are a change of size or shape, a change of state, and dissolving. (5.2, 5.5)
- Evidence of chemical change includes a colour change, an odour change, gas produced, a precipitate produced, or a temperature change. (5.3, 5.5)



Some common useful substances have negative impacts on the environment.

- Salt lowers the freezing point of water, but it causes corrosion and threatens ecosystems. (5.6, 5.7)

WHAT DO YOU THINK NOW?

You thought about the following statements at the beginning of the chapter. You may have encountered these ideas in school, at home, or in the world around you. Consider them again and decide whether you agree or disagree with each one.



- 1** Some chemicals can be both useful and harmful to us.
Agree/disagree?



- 2** The particles in a solid are closer together than they are in a liquid.
Agree/disagree?



- 3** A pure substance, such as gold, melts at different temperatures depending on its size.
Agree/disagree?



- 4** Hair dyes permanently change chemicals inside each strand of hair.
Agree/disagree?



- 5** In a chemical change, the original substance disappears.
Agree/disagree?



- 6** An edible substance, such as table salt, does not pose any harm to the environment.
Agree/disagree?

How have your answers changed since then?
What new understanding do you have?

Vocabulary

particle theory (p. 175)
pure substance (p. 175)
mixture (p. 176)
mechanical mixture (p. 176)
solution (p. 176)
alloy (p. 176)
physical property (p. 179)
qualitative property (p. 179)
quantitative property (p. 179)
viscosity (p. 180)
physical change (p. 181)
chemical property (p. 183)
chemical change (p. 184)
precipitate (p. 184)
characteristic physical property (p. 192)
density (p. 192)
freezing point (p. 194)
melting point (p. 194)
boiling point (p. 194)

BIG Ideas

- ✓ Elements and compounds have specific physical and chemical properties that determine their practical uses.
- ✓ The use of elements and compounds has both positive and negative effects on society and the environment.