Name: _____ Group: _____ Date: _____

CHANGES IN MATTER

STUDENT BOOK	Ch. 2, pp. 43–50
STUDENT BOOK	Ch. 1, pp. 15–16

Physical changes (transformations) (change of state, dissolution, dilution)

1. Complete the following statements using the terms listed below.

thermal	absorbed	solid	release
concentration	shape	liquid	appearance
absorb	characteristic properties	solvent	thermal
gas	changes of state	released	shape
mechanical			concentrated

a) Physical changes modify the _____ and _____ of matter, but not its _____. The substances involved remain the same.

b) _____ are physical changes that involve a transformation between states of _____, _____ or _____. Some changes of state _____ energy, while others _____ energy.

c) Dissolution involves combining a solute with a _____. Depending on the substance dissolved, energy can be _____ or _____. The energy involved in the dissolution process can modify the temperature. This is called _____ energy.

d) Dilution modifies the _____ of a solution (homogeneous mixture) by adding a solvent. The result is a solution that is less _____.

e) Deformation involves a change in the _____ of a body. _____ energy that distorts a spring and _____ energy of a fire that twists an object are two types of energy that can cause deformation.

2. Match each of the following changes with the corresponding change of state.

Change	Change of state
a) From solid to liquid	1. Solidification
b) From liquid to solid	2. Solid condensation
c) From solid to gas	3. Fusion
d) From solid to gas	4. Vaporization
e) From liquid to gas	5. Liquid condensation
f) From gas to solid	6. Sublimation

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Physical changes (transformations) (change of state, dissolution, dilution) (*continued*)

3. Match each type of physical change listed with one of the statements below.

A. Fusion	D. Sublimation	G. Dissolution
B. Solidification	E. Liquid condensation	H. Dilution
C. Solid condensation	F. Vaporization	I. Deformation

a) Adding chlorine to water in a pool _____

b) Humidity in the air from a shower transformed into droplets on the mirror _____

c) Moulding a figure out of plasticine _____

d) Preparing hot chocolate using a concentrated syrup and water (or milk) _____

e) Melting ice that has built up under skis _____

f) Clothes drying in the sun _____

g) Making frozen treats with fruit juice _____

h) Snow crystals forming from water vapour in the air _____

i) Using dry ice to make smoke during a concert _____

4. For each of the following changes of state, indicate if thermal energy is released or absorbed.

	Energy released	Energy absorbed
a) Fusion	☐	☐
b) Solidification	☐	☐
c) Solid condensation	☐	☐
d) Sublimation	☐	☐
e) Liquid condensation	☐	☐
f) Vaporization	☐	☐

5. True or false?

a) When salt is dissolved in water, the temperature of the solution drops; therefore, this dissolution involves energy absorption. _____

b) Folding a piece of paper involves a physical deformation that releases mechanical energy. _____

c) When CO_2 is dissolved in a liquid to create a soft drink, the temperature of the solution rises, which releases energy. _____

d) When ammonium chloride fertilizer is dissolved in water, the temperature of the solution drops because this dissolution releases energy. _____

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CHANGES IN MATTER (*continued*)

STUDENT BOOK | Ch. 2, pp. 50–58

Chemical changes (transformations)

1. Circle each statement relevant to the law of conservation of matter.

a) The number of atoms after a chemical reaction must be the same as before the chemical reaction.
b) Nothing is lost, nothing is created, everything transforms.
c) In a chemical reaction, the total mass of the reactants is always equal to the total mass of the products.
d) A chemical reaction always involves the production of energy.
e) A chemical change can sometimes make matter disappear.
f) The number of atoms of each element must be the same before and after a chemical change.

2. True or false? When a statement is false, give the correct answer.

a) Synthesis is a chemical change that involves only the release of energy.

_____

b) Precipitation is the chemical reaction that involves the least amount of energy.

_____

c) Decomposition is the opposite of synthesis.

_____

d) An oxidation reaction can involve sulphur, chlorine, fluorine or oxygen.

_____

e) Combustion is a decomposition reaction.

_____

f) A chemical change modifies the nature of the matter and its characteristic properties.

_____

3. Matter can be chemically transformed in several ways:

A. Decomposition	B. Oxidation	C. Synthesis	D. Precipitation

a) Indicate the chemical change involved in each of the following examples:

1. $2Na + Cl_2 \rightarrow 2NaCl$ (table salt) _____
2. Rust on a bicycle chain _____
3. $2NO_2 \rightarrow N2 + 2\ O_2$ _____
4. Adding enzymes to milk to make cheese _____
5. CH_4 (methane) + $2\ O_2 \rightarrow CO_2 + 2\ H_2O$ _____
6. Electrolysis of water _____

Chemical changes (transformations) (*continued*)

b) Indicate the type of chemical change that can be identified from the clues below and give an example from the previous exercise or give another example.

		Example
1. Change in colour	_____	_____
2. Release of gas	_____	_____
3. Formation of precipitate	_____	_____
4. Release of heat	_____	_____
5. Release of light	_____	_____

4. Which of the changes below release energy? Which ones absorb energy?

	Energy released	Energy absorbed
a) Combustion of wood	☐	☐
b) Glycogen turning into glucose	☐	☐
c) Electrolysis of water	☐	☐
d) Synthesis of NH_3	☐	☐
e) Synthesis of glucose	☐	☐

5. Ammonia, a colourless gas, is used in industry to make fertilizer. It is produced according to the following equation: $N_2 + 3H_2O \rightarrow 2NH_3 + \text{energy}$.

a) What type of chemical reaction is involved?

_____

b) Does this reaction absorb or release energy?

_____

c) Does the above chemical equation respect the law of conservation of matter? Briefly explain your answer.

_____

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CHANGES IN MATTER (*continued*)

STUDENT BOOK | Ch. 2, pp. 34–42

Forms of energy

1. Circle the definition that does not apply to energy.

a) Ability to move from one place to another (transfer)
b) Ability to accomplish work
c) Ability to change from one form to another (transformation)
d) Ability to cause a change
e) Solid state of a substance
f) Ability to produce heat

2. Match each form of energy with one example.

Form of energy	Example
a) Chemical	1. Heating hot water
b) Thermal	2. Thawing meat in a microwave oven
c) Mechanical	3. A moving bicycle
d) Radiant	4. Fuel combustion

3. Circle the statements that correctly express measures of energy.

a) 10 joules
b) 950 kg
c) 25 cm
d) 980 kJ
e) 9 N
f) 23 Kjoules
g) 44 J
h) 250 m

4. Indicate which form of energy listed corresponds to each statement below.

Radiant | Chemical | Mechanical | Thermal

Form of energy

a) I am carried by electromagnetic waves. _____
b) The stronger the molecular bonds, the larger I am. _____
c) I am produced by wind and can be transformed into electricity. _____
d) I vary according to the position of an object in relation to other surrounding objects. _____
e) I am energy stored in substances and living things. _____
f) I am related to the movement of particles in a substance. _____

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CHANGES IN MATTER (*continued*)

STUDENT BOOK	Ch. 1, pp. 6–9

The particle model

1. Check each statement that applies to the particle model of matter.

- **a)** Particles of matter are in constant motion. ☐
- **b)** The smaller the molecules, the faster they move. ☐
- **c)** Particles move more quickly as temperature rises. ☐
- **d)** Forces of attraction can hold particles together. ☐
- **e)** The particle model explains the organization of the three states of matter. ☐

2. Match each statement below with one of the following states of matter.

State:	A. Gas	B. Liquid	C. Solid

- **a)** You need a container to carry me. _____
- **b)** My particles can move freely. _____
- **c)** I can be picked up and held. _____
- **d)** My particles are held together loosely. _____
- **e)** My particles are very ordered. _____
- **f)** When I change container, I keep my volume, but not my shape. _____
- **g)** I can be moulded and I retain my shape. _____

3. True or false?

- **a)** All atoms are the same size. _____
- **b)** A molecule is always composed of two types of atoms. _____
- **c)** An atom is a basic component of matter. _____
- **d)** Two oxygen atoms are held together by a chemical bond. _____
- **e)** A glucose molecule is composed of six carbon atoms. _____
- **f)** Matter is a continuous structure. _____