

Science Links 10 Workbook Answers

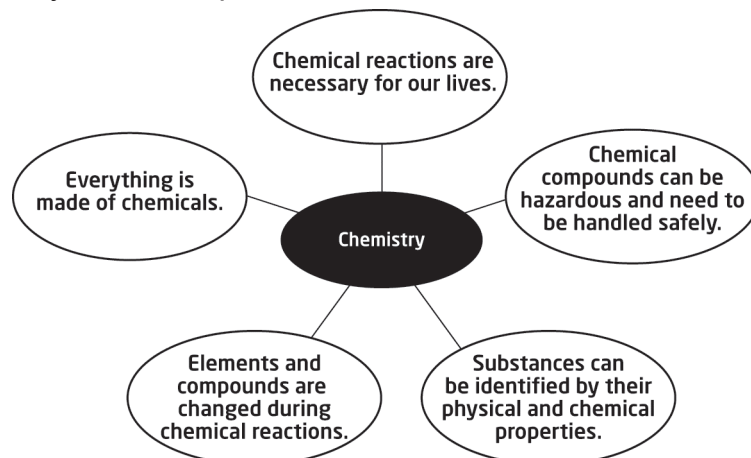
Unit 2 Chemical Reactions and Their Practical Applications

Using Your Appendices, page 37

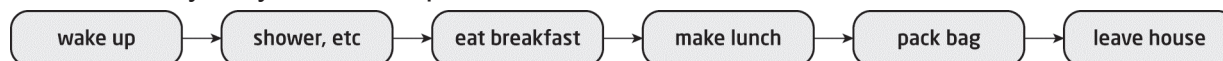
1.

Element	Compound
<ul style="list-style-type: none"> made of only one type of atom each atom in an element is the same cannot be broken down into smaller parts combines with other elements to form compounds 	<ul style="list-style-type: none"> made of more than one type of atom, joined together as molecules each molecule in a compound is the same can be broken down into elements combines with other compounds or elements to form new compounds

2. Answers may vary. For example:



3. Answers may vary. For example:



Topic 2.1 How do chemical reactions affect your life?

Reading Check, page 39

- carbon dioxide + water → sugar + oxygen
 - sugar + oxygen → carbon dioxide + water + energy

2.



3. Workplace Hazardous Materials Information System

Cloze Activity, page 40

1. HHPS
2. cellular respiration, photosynthesis
3. WHMIS
4. reactants
5. MSDS
6. chemical reaction
7. product
8. dilute

Interpreting Illustrations, page 41

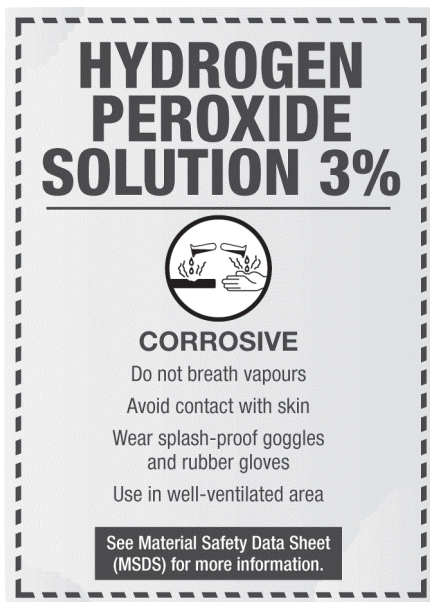
1. a) The shape means the contents inside the container are dangerous.
b) The picture tells you the type of danger: flammable.
c) The words tell you the hazard level: caution.



3. You could become very sick or die.
4. C

Applying Knowledge, page 42

1., 2.



Assessment, page 43

1. C
2. B

3. E

4. A

5. D



7. The reactants undergo a chemical change and become new substances.



9. a Material Safety Data Sheet

Topic 2.2 How can we understand, describe, and name chemical compounds?

Reading Check, pages 45–46

1. The elements in the compound.
2. An atom that has either a positive electrical charge or a negative electrical charge.
3. Ionic compound: a positively charged metal ion and a negatively charged non-metal ion. Molecular compound: two non-metal atoms
4. a) lithium chloride
b) Na_2O
5. a) carbon monoxide
b) NF_3

Analyze the Information, page 49

1. a) silver oxide
b) potassium iodide
c) lithium chloride
d) barium oxide
e) zinc fluoride
f) magnesium phosphide
g) calcium bromide
h) sodium sulfide
i) aluminum chloride
j) beryllium nitride
2. a) BeS
b) Li_3N
c) ZnCl_2

- d) NaBr
- e) CaCl₂
- f) MgO
- g) AgI
- h) Al₂S₃
- i) KF
- j) Ca₃P₂

3.

	Chlorine becomes chloride Cl ¹⁻	Fluorine becomes fluoride F ¹⁻	Oxygen becomes oxide O ²⁻
a) sodium Na ¹⁺	sodium chloride NaCl	sodium fluoride NaF	sodium oxide Na ₂ O
b) Magnesium Mg ²⁺	magnesium chloride MgCl ₂	magnesium fluoride MgF ₂	magnesium oxide MgO
c) Calcium Ca ²⁺	calcium chloride CaCl ₂	calcium fluoride CaF ₂	calcium oxide CaO

Applying Knowledge, page 50

1.
 - a) diphosphorus pentoxide
 - b) carbon disulfide
 - c) dinitrogen tetroxide
 - d) sulfur difluoride
 - e) carbon tetrabromide
 - f) boron trichloride
 - g) diphosphorus trioxide
 - h) nitrogen trifluoride
 - i) oxygen difluoride
 - j) sulphur trioxide
2.
 - a) CCl₄
 - b) N₂O₃
 - c) SCl₂
 - d) CO₂
 - e) N₂O
 - f) PCl₃
 - g) NI₃
 - h) SiF₄
 - i) HBr
 - j) CO

Applying Knowledge, page 51

1.

Chemical formula	Metal or non-metal elements?	Ionic or molecular compound?
a) SrCl ₂	metal, non-metal	ionic
b) P ₂ O ₃	non-metals	molecular
c) SCl ₂	non-metals	molecular
d) CBr ₄	non-metals	molecular
e) Rb ₂ S	metal, non-metal	ionic

2.

Chemical formula	Ionic or Molecular?	Compound name
a) CO	molecular	carbon monoxide
b) BaCl ₂	ionic	barium chloride
c) SF ₆	molecular	sulfur hexafluoride
d) BrCl	molecular	bromine monochloride
e) NaF	ionic	sodium fluoride
f) MgO	ionic	magnesium oxide
g) PF ₅	molecular	phosphorus pentafluoride
h) N ₂ O ₃	molecular	dinitrogen trioxide
i) AgCl	ionic	silver chloride
j) Li ₂ Se	ionic	lithium selenide

3.

Compound	Ionic or Molecular?	Compound name
a) carbon dioxide	molecular	CO ₂
b) zinc oxide	ionic	ZnO
c) potassium bromide	ionic	KBr
d) dinitrogen pentoxide	molecular	N ₂ O ₅
e) aluminum sulfide	ionic	Al ₂ S ₃
f) phosphorus trichloride	molecular	PCl ₃
g) disulfur dinitride	molecular	S ₂ N ₂
h) magnesium phosphide	ionic	Mg ₃ P ₂
i) lithium iodide	ionic	LiI
j) diphosphorus hexoxide	molecular	P ₂ O ₆

Assessment, page 52

1. A
2. C
3. B
4. E
5. D
6. Answers may vary. For example, oxygen O.
7.
 - a) ionic
 - b) molecular
 - c) ionic
 - d) molecular
8.
 - a) magnesium bromide
 - b) aluminum oxide
 - c) sulfur triiodide
 - d) diphosphorus trioxide
 - e) silicon tetrafluoride
9.
 - a) NaF
 - b) Ca_3N_2
 - c) P_2O_3
 - d) BI_3
 - e) BeCl_2
10. Step 1: Use the periodic table to find the symbols for the elements. Sodium: Na.
Sulfide: sulfur S.
Step 2: Write the ion charges above the symbols for the ions: Na^{1+} , S^{2-} .
Step 3: Drop the + and -, and criss-cross the ion charges to get the subscripts:
 Na_2 and S_1 .
Step 4: Write the chemical formula: Na_2S .

Topic 2.3 What happens during a chemical reaction, and how can it be described?**Reading Check, page 54–56**

1. Three of the following: there is a change in energy, there is a change in colour, a gas is formed, or a solid substance (precipitate) is formed.
2. synthesis
3. $2 \text{Na} + \text{CuCl}_2 \rightarrow \text{Cu} + 2 \text{NaCl}$

Cloze Activity, page 57

1. single displacement
2. react to produce, and
3. word equation
4. balanced
5. a gas forms, a precipitate forms
6. reactants, products
7. synthesis
8. decomposition
9. chemical formulas

Comprehension, page 58

1. SD
2. S
3. SD
4. DD
5. D
6. S
7. DD
8. D
9. SD
10. SD
11. SD
12. D
13. S
14. DD
15. DD
16. S

Comprehension, page 59

1. S, $\text{Mg} + \text{S} \rightarrow \text{MgS}$
2. D, $\text{NaOH} \rightarrow \text{Na}_2\text{O} + \text{H}_2\text{O}$
3. DD, $\text{CaS} + \text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{S}$

4. $\text{SD}, \text{Cl}_2 + \text{SrI}_2 \rightarrow \text{SrCl}_2 + \text{I}_2$
5. $\text{D}, \text{Ag}_2\text{O} \rightarrow \text{Ag} + \text{O}_2$
6. $\text{DD}, \text{Ca}(\text{OH})_2 + \text{H}_3\text{N} \rightarrow \text{HOH} + \text{Ca}_3\text{N}_2$
7. $\text{SD}, \text{Li} + \text{AgF} \rightarrow \text{LiF} + \text{Ag}$
8. $\text{DD}, \text{AlCl}_3 + \text{NaBr} \rightarrow \text{NaCl} + \text{AlBr}_3$
9. $\text{SD}, \text{Zn} + \text{Mg}_3\text{P}_2 \rightarrow \text{Mg} + \text{Zn}_3\text{P}_2$
10. $\text{S}, \text{Na} + \text{O}_2 \rightarrow \text{Na}_2\text{O}$

Analyze the Information, page 60

1. $2 \text{NI}_3 \rightarrow \text{N}_2 + 3 \text{I}_2$
2. $\text{Fe}_2\text{O}_3 + 6 \text{HCl} \rightarrow 2 \text{FeCl}_3 + 3 \text{H}_2\text{O}$
3. $3 \text{Zn} + \text{Cu}_3\text{N}_2 \rightarrow 3 \text{Cu} + \text{Zn}_3\text{N}_2$
4. $\text{PbCl}_2 + 2 \text{NaI} \rightarrow \text{PbI}_2 + 2 \text{NaCl}$
5. $3 \text{H}_2\text{S} + 2 \text{Al} \rightarrow 3 \text{H}_2 + \text{Al}_2\text{S}_3$
6. $4 \text{As} + 5 \text{O}_2 \rightarrow 2 \text{As}_2\text{O}_5$
7. $2 \text{Al} + 3 \text{I}_2 \rightarrow 2 \text{AlI}_3$
8. $2 \text{HgO} \rightarrow 2 \text{Hg} + \text{O}_2$
9. $\text{Ba} + 2 \text{HOH} \rightarrow \text{H}_2 + \text{Ba}(\text{OH})_2$
10. $2 \text{K} + \text{Br}_2 \rightarrow 2 \text{KBr}$
11. $\text{SiO}_2 + 4 \text{HF} \rightarrow \text{SiF}_4 + 2 \text{H}_2\text{O}$
12. $2 \text{S} + 3 \text{O}_2 \rightarrow 2 \text{SO}_3$
13. $3 \text{Cl}_2 + 2 \text{FeBr}_3 \rightarrow 2 \text{FeCl}_3 + 3 \text{Br}_2$
14. $\text{H}_2 + \text{F}_2 \rightarrow 2 \text{HF}$
15. $2 \text{Li} + 2 \text{H}_2\text{O} \rightarrow 2 \text{LiOH} + \text{H}_2$
16. $\text{CuI}_2 + \text{Fe} \rightarrow \text{FeI}_2 + \text{Cu}$
17. $2 \text{BN} + 3 \text{F}_2 \rightarrow 2 \text{BF}_3 + \text{N}_2$
18. $2 \text{FeCl}_3 + 3 \text{Ca}(\text{OH})_2 \rightarrow 2 \text{Fe}(\text{OH})_3 + 3 \text{CaCl}_2$

Applying Knowledge, page 61–62

1. aluminum + oxygen \rightarrow aluminum oxide; $4 \text{Al} + 3 \text{O}_2 \rightarrow 2 \text{Al}_2\text{O}_3$
2. water + sodium oxide \rightarrow sodium hydroxide; $\text{H}_2\text{O} + \text{Na}_2\text{O} \rightarrow 2 \text{NaOH}$
3. hydrogen + nitrogen trifluoride \rightarrow nitrogen + hydrogen fluoride;
 $3 \text{H}_2 + 2 \text{NF}_3 \rightarrow \text{N}_2 + 6 \text{HF}$

4. mercury oxide \rightarrow mercury + oxygen; $2 \text{HgO} \rightarrow 2 \text{Hg} + \text{O}_2$
5. phosphorus + oxygen \rightarrow phosphorus trioxide; $2 \text{P} + 3 \text{O}_2 \rightarrow 2 \text{PO}_3$
6. copper sulfide \rightarrow copper + sulfur; $\text{CuS} \rightarrow \text{Cu} + \text{S}$
7. chlorine + sodium iodide \rightarrow sodium chloride + iodine; $\text{Cl}_2 + 2 \text{NaI} \rightarrow 2 \text{NaCl} + \text{I}_2$
8. silver chloride + sodium sulfide \rightarrow sodium chloride + silver sulfide;
 $2 \text{AgCl} + \text{Na}_2\text{S} \rightarrow 2 \text{NaCl} + \text{Ag}_2\text{S}$
9. zinc + sulfur \rightarrow zinc sulfide; $\text{Zn} + \text{S} \rightarrow \text{ZnS}$
10. hydrogen chloride + sodium hydroxide \rightarrow sodium chloride + water;
 $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

Assessment, page 63

1. C
2. B
3. D
4. E
5. A
6. $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
7. a) $\text{GaF}_2 + 2 \text{Cs} \rightarrow 2 \text{CsF} + \text{Ga}$
b) $2 \text{Na} + \text{O}_2 \rightarrow \text{Na}_2\text{O}_2$
8. a) D
b) SD
9. a) S, $\text{P}_2 + 3 \text{Cl}_2 \rightarrow 2 \text{PCl}_3$
b) DD, $\text{Zn}(\text{OH})_2 + 2 \text{HCl} \rightarrow \text{ZnCl}_2 + 2 \text{H}_2\text{O}$

Topic 2.4 What are acids and bases, and how do they react?**Reading Check, page 65**

1. 1. Answers may vary. For example, acids taste sour and bases taste bitter.
2. 2. acid
3. 3. 7, neutral

Applying Knowledge, page 66

1. a) An acid-base indicator is a substance that changes colour when added to an acid or a base. An example is litmus paper.
b) The pH scale is a sequence of numbers from 0 to 14 that describes how acidic or how basic a substance is. 7 is neutral, 0 is most acidic, and 14 is most basic.

2.

Substance	pH value	Acid or base?	Most acidic (1) to most basic (9)
lemon	2	acid	1
ammonia	11	base	8
milk	6	acid	4
tomato	4	acid	3
oven cleaner	13	base	9
egg	8	base	6
soap	10	base	7
grapes	3	acid	2
pure water	7	neither	5

Comprehension, page 67**1. Examples may vary.**

	Acids	Bases
Definition	a compound that tastes sour, corrodes metals and tissue, and turns blue litmus paper red	a compound that tastes bitter, has a slippery texture, corrodes tissue, and turns red litmus paper blue
pH range	0 to 6	8 to 14
Taste	sour	bitter
Touch	no characteristic texture	slippery texture
Electrical conductivity	conduct electrical current when dissolved in water	conduct electrical current when dissolved in water
Reaction with metals	reactive with metals	not reactive with metals
Reaction with litmus paper	turn blue litmus paper red	turn red litmus paper blue
Examples	aspirin, lemons, grapes, vinegar	cheese, soap, ammonia, bleach

2. Acids and bases corrode living tissue. They can cause severe burns, resulting in disfigurement or even death.

3. a) B

b) A

4. i) $\text{HBr} + \text{KOH} \rightarrow \text{KBr} + \text{HOH}$

ii) $3 \text{HF} + \text{Fe}(\text{OH})_3 \rightarrow \text{FeF}_3 + 3 \text{HOH}$

iii) $2 \text{HCl} + \text{Ca}(\text{OH})_2 \rightarrow \text{CaCl}_2 + 2 \text{HOH}$

5. a) A salt is an ionic compound that is a product of a neutralization reaction between an acid and a base.
- b) i) potassium bromide
ii) iron fluoride
iii) calcium chloride

Cloze Activity, page 68

1. red, acid
2. blue, base
3. acid-base indicator
4. pH scale, neutral
5. neutralization reaction, salt
6. antacid

Assessment, page 69

1. C
2. E
3. B
4. A
5. D
6. The apple must contain acid, because acids are sour. Use litmus to check if the apple is acidic.
7. Bases do not react with metals so they are safe to use on metal ovens and pipes. Bases do corrode tissue so they are good for removing grease from ovens and hair from clogged drains.
8. a) basic
b) basic
c) basic
d) acid
9. a) ii)
b) The reactants are a base and an acid, and the products are a salt and water. These are the reactants and products in a neutralization reaction.
c) potassium chloride and water (hydrogen hydroxide)

Literacy Test Preparation, page 71

1. C

2. C

3. D

4. B

5. A

6. Answers may vary. Students should state an opinion about whether road salt should be used on bridges, and support that opinion using evidence from the selection and the student textbook.