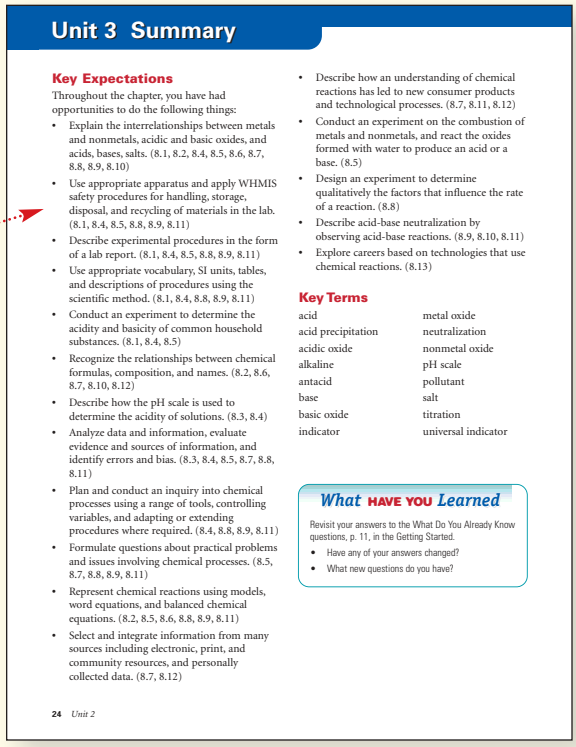
Unit Summary

The *Unit Summary* includes all of the expectations for the unit, and is aligned to the organization of the curriculum. Each expectation is linked to one or more sections in the unit that the student may wish to review or revisit to ensure the expectation has been addressed.

Curriculum Links
Each curriculum expectation is linked to specific sections in the unit where students can find the knowledge and skills to enable them to meet the expectation.



Unit 3 Summary

Key Expectations

Throughout the chapter, you have had opportunities to do the following things:

- Explain the interrelationships between metals and nonmetals, acidic and basic oxides, and acids, bases, salts. (8.1, 8.2, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 8.10)
- Use appropriate apparatus and apply WHMIS safety procedures for handling, storage, disposal, and recycling of materials in the lab. (8.1, 8.4, 8.5, 8.8, 8.9, 8.11)
- Describe experimental procedures in the form of a lab report. (8.1, 8.4, 8.5, 8.8, 8.9, 8.11)
- Use appropriate vocabulary, SI units, tables, and descriptions of procedures using the scientific method. (8.1, 8.4, 8.8, 8.9, 8.11)
- Conduct an experiment to determine the acidity and basicity of common household substances. (8.1, 8.4, 8.5)
- Recognize the relationships between chemical formulas, composition, and names. (8.2, 8.6, 8.7, 8.10, 8.12)
- Describe how the pH scale is used to determine the acidity of solutions. (8.3, 8.4)
- Analyze data and information, evaluate evidence and sources of information, and identify errors and bias. (8.3, 8.4, 8.5, 8.7, 8.8, 8.11)
- Plan and conduct an inquiry into chemical processes using a range of tools, controlling variables, and adapting or extending procedures where required. (8.4, 8.8, 8.9, 8.11)
- Formulate questions about practical problems and issues involving chemical processes. (8.5, 8.7, 8.8, 8.9, 8.11)
- Represent chemical reactions using models, word equations, and balanced chemical equations. (8.2, 8.5, 8.6, 8.8, 8.9, 8.11)
- Select and integrate information from many sources including electronic, print, and community resources, and personally collected data. (8.7, 8.12)
- Describe how an understanding of chemical reactions has led to new consumer products and technological processes. (8.7, 8.11, 8.12)
- Conduct an experiment on the combustion of metals and nonmetals, and react the oxides formed with water to produce an acid or a base. (8.5)
- Design an experiment to determine qualitatively the factors that influence the rate of a reaction. (8.8)
- Describe acid-base neutralization by observing acid-base reactions. (8.9, 8.10, 8.11)
- Explore careers based on technologies that use chemical reactions. (8.13)

Key Terms

acid, acid precipitation, acidic oxide, alkaline, antacid, base, basic oxide, indicator, metal oxide, neutralization, nonmetal oxide, pH scale, pollutant, salt, titration, universal indicator

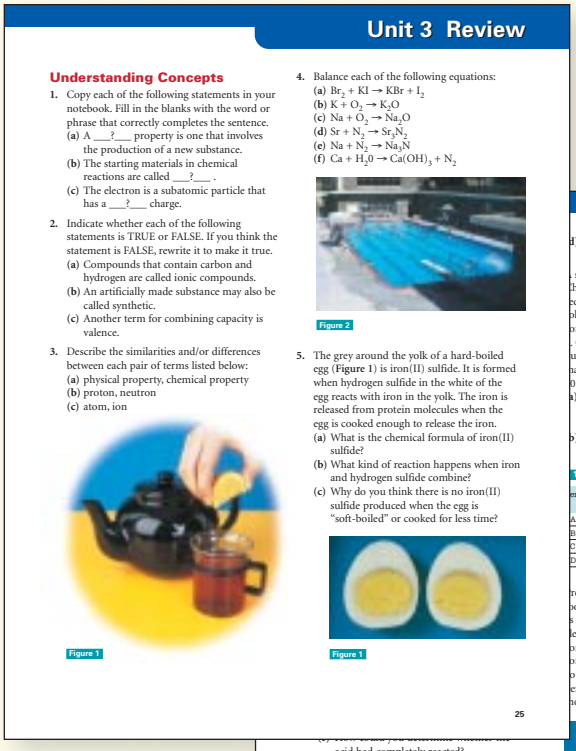
What HAVE YOU Learned

Revisit your answers to the What Do You Already Know questions, p. 11, in the Getting Started.

- Have any of your answers changed?
- What new questions do you have?

Unit Review

The *Unit Review* provides a source of additional questions that can be used for formative or summative assessment. Questions are organized under each of the goals of the curriculum, or achievement chart categories: *Understanding Concepts, Applying Skills,* and *Making Connections*.



Unit 3 Review

Understanding Concepts

1. Copy each of the following statements in your notebook. Fill in the blanks with the word or phrase that correctly completes the sentence.
   (a) A ___?___ property is one that involves the production of a new substance.
   (b) The starting materials in chemical reactions are called ___?___ .
   (c) The electron is a subatomic particle that has a ___?___ charge.
2. Indicate whether each of the following statements is TRUE or FALSE. If you think the statement is FALSE, rewrite it to make it true.
   (a) Compounds that contain carbon and hydrogen are called ionic compounds.
   (b) An artificially made substance may also be called synthetic.
   (c) Another term for combining capacity is valence.
3. Describe the similarities and/or differences between each pair of terms listed below:
   (a) physical property, chemical property
   (b) proton, neutron
   (c) atom, ion

Figure 1

4. Balance each of the following equations:
   (a) $Br_2 + KI \rightarrow KBr + I_2$
   (b) $K + O_2 \rightarrow K_2O$
   (c) $Na + O_2 \rightarrow Na_2O$
   (d) $Sr + N_2 \rightarrow Sr_3N_2$
   (e) $Na + N_2 \rightarrow Na_3N$
   (f) $Ca + H_20 \rightarrow Ca(OH)_3 + N_2$

Figure 2

5. The grey around the yolk of a hard-boiled egg (**Figure 1**) is iron(II) sulfide. It is formed when hydrogen sulfide in the white of the egg reacts with iron in the yolk. The iron is released from protein molecules when the egg is cooked enough to release the iron.
   (a) What is the chemical formula of iron(II) sulfide?
   (b) What kind of reaction happens when iron and hydrogen sulfide combine?
   (c) Why do you think there is no iron(II) sulfide produced when the egg is "soft-boiled" or cooked for less time?

Figure 1

d) What effect would you expect Z to have on litmus or phenolphthalein indicator?

, series of experiments are performed by hris Student, who is investigating the time equired for a chemical reaction between olutions A and B. Chris tries different ombinations of variables as shown in **Table** . Chris records times for each of the trials, ut unfortunately, does not record which time natches which trial. The times recorded are: 0 s, 40 s, 100 s, and 200 s.

a) Use your knowledge of rates of reaction to predict which time matches which experiment.

b) Do you think Chris should claim and report these times? Explain.

1

eriment	Concentration of solution A (mol/L)	Concentration of solution B (mol/L)
A	1.0	1.0
B	2.0	1.0
C	1.0	1.0
D	2.0	1.0

reservatives are not the only additives in oods. Some cereals that advertise themselves s containing dietary iron actually contain the lement itself as iron filings! Design and onduct an experiment to identify cereals that ontain elemental iron. Make sure to have our procedure approved by your teacher efore beginning. Make a poster to summarize he results of your experiment.

Figure 2
Acids and bases show a range of colours in different indicators.

12. Design and carry out an experiment to test the effectiveness of liquid antacids. Make sur to include all necessarysafety precautions, an check your procedure with your teacher before starting.

Making Connections

13. Many toxic chemicals are byproducts of agriculture, industrial processes, and household use. Many of these chemicals are seen as necessary by their users. How is hazardous chemical waste disposed of in you area? Write a report to describe local metho and suggest improvements.
14. Should we be burning hydrocarbons when they can be made into useful synthetic products? Make a "P-M-I" graphic organizer classify the arguments and questions around this issue.
15. Imagine that you are living in a rural county where there has been debate over the use of synthetic chemicals as pesticides. Many farmers use chemical sprays to help them grow vegetables, grains, and fruit. Write a letter to your local member of parliament to express your opinion on whether these synthetic chemicals should or should not be used in growing crops. Back up your opinion with research.
16. Automobiles have many plastic parts that are formed in polymerization reactions. Most of these reactions are very slow under normal conditions; industrial catalysts make the production of these plastics possible by increasing the rate of reaction. The antifreeze used in automobile cooling systems also contains inhibitors that slow down the natural corrosion reactions that attack the radiator and other metal parts in the cooling system. Research and report on the use of catalysts in the automobile industry.
17. Choose an example of an important acid or base. Design a website to promote the importance of this molecule.
18. "Acids are both helpful and harmful." Write a short essay to explain this statement.

Figure 2

Table 2

Experiment	Concentration of solution A (mol/L)	Concentration of solution B (mol/L)	Temperature (°C)
A	1.0	1.0	20
B	2.0	1.0	20
C	1.0	1.0	30
D	2.0	1.0	30

End of Unit Features

- Glossary of Terms – Terms that appear in bold throughout the unit are listed and defined
- Index