

Unit 2 *Review***Other Assessment Opportunities**

- Assessment Checklist 1, Making Observations and Inferences
- Assessment Checklist 3, Designing an Experiment
- Assessment Checklist 4, Laboratory Report
- Assessment Checklist 25, Safety Checklist
- Process Skills Rubric 7, Predicting
- Process Skills Rubric 8, Interpreting Data
- Process Skills Rubric 10, Measuring and Reporting
- Assessment Rubric 5, Conduct an Investigation Rubric
- Assessment Rubric 11, Communication Rubric
- Assessment Rubric 12, Using Tools, Equipment, and Materials Rubric

■ INTEGRATED RESEARCH INVESTIGATION ■**Chemicals Among Us, p. 331****Purpose**

- Students develop research skills finding out about chemicals that could be hazardous to their health or to the environment.

Activity Notes

- This activity is a variation of Activity 5-3B, which involved researching an important organic compound or class of organic compounds. The focus here is a slightly greater depth of research and a narrowing of the options to those compounds or classes of compounds that might pose environmental or health risks.
- Searching the Internet using “list of environmental health hazards” will produce several compendiums with literally hundreds of compounds worth researching. Consider using examples given in the student book, or perhaps assigning them to groups. Students could begin their research at www.bcsce10.ca.
- Have students select (or simply assign to them) a class of compounds or a particular compound to research.
- This activity would work well in pairs.
- Select a method of reporting out. A slide show format is useful since many compounds are available as illustrations.

Supporting Diverse Student Needs

- Check with ESL students to see whether they have a good understanding of the instructions, and decide whether they will be required to actually present in front of the class.
- This assignment may allow for individual choice.

- For enrichment, have students attempt to construct a physical model of their compound. The type of model depends on the compound. Many common toxins are quite small and can be modelled using the methods illustrated in Section 5.3, Organic Compounds.

Other Assessment Opportunities

- Assessment Checklist 2, Asking Questions
- Assessment Checklist 5, Investigating an Issue
- Assessment Checklist 6, Developing Models
- Assessment Checklist 7, Scientific Drawing
- Assessment Checklist 12, Classification System
- Assessment Checklist 13, Concept Map
- Assessment Checklist 21, Project Self-Assessment
- Process Skills Rubric 1, Developing Models
- Process Skills Rubric 8, Interpreting Data
- Process Skills Rubric 9, Questioning
- Assessment Rubric 4, Scientific Drawing Rubric
- Assessment Rubric 8, Research Project Rubric
- Assessment Rubric 9, Collecting Information Rubric
- Assessment Rubric 10, Presentation Rubric
- Assessment Rubric 11, Communication Rubric

■ UNIT 2 REVIEW ANSWERS, p. 332-337 ■**Visualizing Key Ideas**

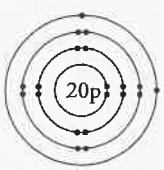
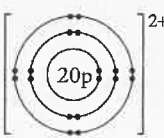
1. This chart is available for students to use on BLM 2-49, Visualizing Key Ideas.

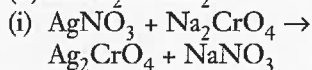
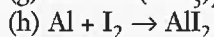
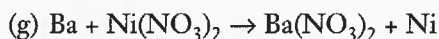
	Pattern in Reactants	Pattern in Products	Reaction Type
(a)	♥ + ♦	♥♦	Synthesis
(b)	■ □	■ + □	Decomposition
(c)	◇ □ + ▼ (a metal)	▼ □ + ◇	Single replacement
(d)	◇ □ + * (a non-metal)	◇ * + □	Single replacement
(e)	$C_xH_y + O_2$	$CO_2 +$	Combustion
(f)	$H^+ + OH^-$	H_2O	Neutralization
(g)	♣ ♀ + ☺ ♂	♣ ♂ + ☺ ♀	Double replacement

Using Key Terms

2. (a) False. Isotopes
- (b) False. A basic solution
- (c) True
- (d) False. an acid with a base
- (e) False. single replacement
- (f) True
- (g) False. catalyst
- (h) False. fission

Checking Concepts

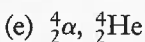
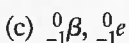
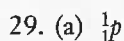
3. (a) Proton, electron, neutron
(b) Proton (1+), electron (1-), neutron (0)
(c) Protons and neutrons are in the nucleus, and electrons surround the nucleus in a regular pattern.
4. (a) 
(b) Boron
5. (a) 
(b) Aluminum
6. (a) 
(b) 
7. (a) $[\text{Na}]^+ [\text{:}\ddot{\text{Cl}}:]^-$
(b) $[\text{Na}]^+ [\text{:}\ddot{\text{O}}:]^{2-}$
(c) $\text{H}-\ddot{\text{F}}:$
(d) $\begin{array}{c} \text{H}-\ddot{\text{N}}-\text{H} \\ | \\ \text{H} \end{array}$
8. Covalent
9. The mass of the reactants is equal to the mass of the products according to the law of conservation of mass.
10. The pH scale measures the acidity levels in solution.
11. (a) 7
(b) Less than 7
(c) Greater than 7
12. (a) An acid has one or more H on the left side of the formula, as in phosphoric acid (H_3PO_4). Organic acids have H on the right side of the formula, as in acetic acid (CH_3COOH).
(b) A base has an OH on the right side of the formula and a metal on the left, as in $\text{Mg}(\text{OH})_2$.
13. A salt
14. Acid-base indicators
15. (a) 5
(b) 11
(c) 6
16. (a) Yellow
(b) Blue
(c) Green
17. (a) Increased
(b) 10 times
18. (a) Hydrochloric acid, HCl
(b) Sodium hydroxide, NaOH
(c) Sulfuric acid, H_2SO_4
19. (a) Basic
(b) Acidic
20. (a) The term "organic compound" refers to almost all carbon-containing compounds; exceptions include carbon dioxide, carbon monoxide, and ionic carbonates, which are considered inorganic.
(b) The term "inorganic compound" refers to compounds that generally do not contain carbon; the few exceptions include carbon dioxide, carbon monoxide, and ionic carbonates, which, despite containing carbon, are considered inorganic.
21. (a) A hydrocarbon is a compound containing the elements carbon and hydrogen.
(b) Methane is used in heating, ethane is used in manufacturing, and propane is used in camp fuel.
22. Carbon, hydrogen, and oxygen
23. (a) Organic
(b) Inorganic
(c) Inorganic
(d) Organic
(e) Inorganic
(f) Inorganic
(g) Organic
(h) Inorganic
24. (a) Synthesis
(b) Synthesis
(c) Decomposition
(d) Combustion
(e) Neutralization
(f) Neutralization
(g) Double replacement
25. (a) $\text{Ca} + \text{CuF}_2 \rightarrow \text{CaF}_2 + \text{Cu}$
(b) $\text{Rb} + \text{O}_2 \rightarrow \text{Rb}_2\text{O}$
(c) $\text{C}_3\text{H}_7\text{OH} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
(d) $\text{Cl}_2 + \text{PbI}_4 \rightarrow \text{PbCl}_4 + \text{I}_2$
(e) $\text{Li}_2\text{O} \rightarrow \text{Li} + \text{O}_2$
(f) $\text{HF} + \text{Ca}(\text{OH})_2 \rightarrow \text{CaF}_2 + \text{H}_2\text{O}$



26. (a) Temperature
 (b) Concentration
 (c) Concentration
 (d) Catalyst
 (e) Surface area
 (f) Oxygen (Possibly temperature too, because the flame temperature likely increases. However, the mixture is given extra oxygen so that the iron in the steel will also oxidize, which is a concentration effect.)

27. Alpha, beta, and gamma

28. Isotopes are atoms of the same element that differ in the number of neutrons they possess.



30. (a) Both possess eight protons and eight electrons.

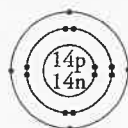
(b) Oxygen-16 has eight neutrons, and oxygen-17 has nine neutrons.

31. A beta particle is released from the nucleus of an atom through a process in which a neutron decays into other particles including a proton and an electron. The electron escapes from the nucleus as a beta particle. The newly formed proton remains in the nucleus, which increases the atomic number of the nucleus by one, creating a new element.

32.

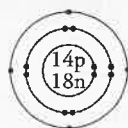
(a)

silicon-28



(b)

silicon-32



(c)

beryllium-7



(d)

beryllium-10



33.

Isotope	Mass Number	Atomic Number	Number of Neutrons
helium-3	3	2	1
helium-4	4	2	2
nitrogen-14	14	7	7
nitrogen-15	15	7	8
oxygen-18	18	8	10
neon-20	20	10	10

34. In a fusion nuclear reaction, small atomic nuclei combine together to form larger ones, typically with the release of energy. In a fission nuclear reaction, more massive atomic nuclei fragment to form less massive nuclei.
35. Currently, fission nuclear reactions are used in the generation of electricity and in nuclear weapons.

Understanding Key Ideas

36. (a) Nickel
 (b) Nitrogen
 (c) Helium, krypton
 (d) Helium, oxygen, chlorine, nitrogen, and krypton
 (e) Nickel, tin, sodium, gold
37. (a) $4\text{Na} + \text{O}_2 \rightarrow 2\text{Na}_2\text{O}$
 (b) $\text{Mg} + \text{CuCl}_2 \rightarrow \text{Cu} + \text{MgCl}_2$
 (c) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
 (d) $\text{CrCl}_3 + 3\text{KOH} \rightarrow 3\text{KCl} + \text{Cr}(\text{OH})_3$
 (e) $2\text{NaCH}_3\text{COO} + \text{Mn}(\text{NO}_3)_2 \rightarrow \text{Mn}(\text{CH}_3\text{COO})_2 + 2\text{NaNO}_3$
38. Hydrocarbons are compounds that contain both carbon and hydrogen but not other elements.
 (a) Hydrocarbon
 (b) Not a hydrocarbon due to the presence of oxygen
 (c) Hydrocarbon
 (d) Not a hydrocarbon due to the presence of calcium and oxygen
 (e) Not a hydrocarbon due to the presence of oxygen and the absence of carbon
39. (a) $2\text{NaF} \rightarrow 2\text{Na} + \text{F}_2$
 (b) $6\text{Li} + \text{N}_2 \rightarrow 2\text{Li}_3\text{N}$
 (c) $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
 (d) $\text{K}_2\text{CrO}_4 + 2\text{AgNO}_3 \rightarrow 2\text{KNO}_3 + \text{Ag}_2\text{CrO}_4$

- (e) $2\text{LiI} + \text{Br}_2 \rightarrow 2\text{LiBr} + \text{I}_2$
 (f) $\text{Cd} + \text{I}_2 \rightarrow \text{CdI}_2$
 (g) $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$
 (h) $3\text{MgSO}_4 + 2\text{In} \rightarrow \text{In}_2(\text{SO}_4)_3 + 3\text{Mg}$
 (i) $\text{AlCl}_3 + \text{Ru}(\text{NO}_3)_3 \rightarrow \text{Al}(\text{NO}_3)_3 + \text{RuCl}_3$
 (j) $\text{H}_2\text{CO}_3 + \text{Mg}(\text{OH})_2 \rightarrow \text{MgCO}_3 + 2\text{H}_2\text{O}$
40. 5 g
41. (a) Greater than 10 million years
 (b) 1:1
 (c) 1420 million years (the time equivalent to two half-lives)
42. (a) $^{211}_{87}\text{Fr}$
 (b) $^{239}_{93}\text{Np}$
 (c) $^{24}_{12}\text{Mg}^*$
 (d) $^{232}_{90}\text{Th}$
 (e) $^{82}_{35}\text{Br}$
 (f) $^{175}_{78}\text{Pt}$
43. (a) $^{20}_9\text{F} \rightarrow ^{20}_{10}\text{Ne} + ^0_{-1}\beta$
 (b) $^{211}_{87}\text{Fr} \rightarrow ^{207}_{85}\text{At} + ^4_2\alpha$
 (c) $^{149}_{64}\text{Gd}^* \rightarrow ^{149}_{64}\text{Gd} + ^0_0\gamma$
44. (a) Gamma
 (b) Beta
 (c) Alpha
45. (a) $^0_{-1}\beta$
 (b) $^0_0\gamma$
 (c) $^{162}_{65}\text{Tb}$
 (d) $^0_{-1}\beta$

Thinking Critically

46. In a non-metal atom, there are typically more than four valence electrons. In a metal atom, there are typically fewer than four valence electrons. (Note that for metals, this is more often the case for the main block elements than for the transition metals.)

47. (a) Accept all logical responses. For example, potassium forms a 1+ ion while fluorine forms a 1- ion. The formula given would not be electrically neutral, which makes the formula incorrect.
 (b) Calcium forms a 2+ ion while bromine forms a 1- ion. The formula given would not be electrically neutral, which makes the formula incorrect.
 (c) Lithium forms a 1- ion while sulphate is a polyatomic ion with a charge of 2-. The formula given would not be electrically neutral, which makes the formula incorrect.
48. Magnesium reacts to form solid magnesium oxide, which contains all the original magnesium plus additional mass from the oxygen. Wood burns to form mostly gaseous products such as CO_2 and H_2O , which escape, decreasing the mass of the remaining ash.
49. When struck with a hammer, the ions shift their position so that ions with like charges are adjacent all along the fracture plane. This causes the entire plane to break away, leaving a flat surface on both sides of the fracture.

Developing Skills

50. (a) Synthesis, $4\text{Cr} + 3\text{O}_2 \rightarrow 2\text{Cr}_2\text{O}_3$
 (b) Single replacement, $\text{Cu} + 2\text{AgNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + 2\text{Ag}$
 (c) Double replacement, $\text{Pb}(\text{NO}_3)_2 + 2\text{KI} \rightarrow 2\text{KNO}_3 + \text{PbI}_2$
 (d) Combustion, $2\text{C}_2\text{H}_6 + 7\text{O}_2 \rightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}$
 (e) Decomposition, $2\text{NaCl} \rightarrow 2\text{Na} + \text{Cl}_2$
 (f) Neutralization, $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$ (balanced)
51. (a) Oxide ion, O^{2-}
 (b) Neon atom, Ne

Applying Your Understanding

52. B
 53. C
 54. C
 55. A
 56. B
 57. A
 58. D
 59. D
 60. A
 61. D
 62. B
 63. C