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UNIT 1

Unit 1 Summary

BLM 1-1

Goal • Use this summary to review the concepts in Unit 1, Atoms, Elements, and Compounds.

Chapter 1 Atomic theory explains the composition and behaviour of matter.

- Safe practice in the science laboratory includes knowledge of hazards, awareness of safe procedures during lab work, and the ability to take action to correct a problem. (1.1)
- Warning labels and WHMIS labels identify materials that are risky. (1.1)
- A physical property is anything you can observe about matter, such as density, state, colour, melting point, and boiling point. (1.2)
- A chemical property describes how a substance reacts with other substances.
- John Dalton proposed that matter is made of atoms, which can be part of an element (one kind of atom) or a compound (more than one kind of atom joined together). (1.3)
- Ernest Rutherford discovered the nucleus, a tiny, dense region at the centre of an atom. (1.3)
- The nucleus was found to contain two types of particles: protons, which are positively charged, and neutrons, which have no electric charge; negatively charged electrons surround the nucleus. (1.3)
- Most of the volume of an atom is occupied by electrons, which exist in specific electron shells first discovered by Niels Bohr. (1.3)

Chapter 2 Elements are the building blocks of matter.

- Each element contains only one kind of atom, and all other forms of matter are made from combinations of these atoms and elements. (2.1)
- The periodic table lists the elements in order of increasing atomic number, arranged into families according to their properties. (2.2)
- In the periodic table, metals are on the left side, non-metals are on the right, transition metals are in groups 3-12 in the middle, and metalloids form a diagonal line near the right side. (2.2)
- Electrons can be pictured as arranged in shells in a specific pattern around the nucleus. (2.3)
- Elements in the same chemical family have the same number of electrons in their outermost occupied electron shell. (2.3)
- A Bohr-Rutherford diagram shows the arrangement of electrons in a specific pattern around the nucleus. (2.3)

Chapter 3 Elements combine to form compounds.

- A compound is a pure substance made up of two or more different elements in which the atoms are connected. (3.1)
- In covalent compounds, atoms join together by sharing electrons, whereas in ionic compounds, oppositely charged ions attract each other. (3.1)
- In an ionic compound with only two elements, the first ion is always a positive metal ion, and the second ion is always a negative non-metal ion. (3.2)
- A chemical formula indicates the proportion of elements present in a compound. (3.2)
- When naming ionic compounds, the suffix of the first element's name is unchanged, while the suffix of the second element's name is changed to "ide". (3.2)
- When naming covalent compounds, prefixes are used to express the ratio of atoms in the molecule. (3.2)
- Chemical changes produce new substances with new properties, whereas physical changes do not change the identity of a substance. (3.3)

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UNIT 1

Physical and Chemical Properties of Matter

BLM 1-10

Table 1.1 Physical Properties

Physical Property	Description
Qualitative	
State	Solid, liquid, gas
Colour	Colour
Malleability	Ability to be bent or beaten into sheets
Ductility	Ability to be drawn into wires
Texture	Appearance and feel of the surface
Magnetism	Tendency to be attracted to a magnet
Lustre	Degree to which the material reflects light
Quantitative	
Solubility	Ability to dissolve in water
Conductivity	Ability to conduct electricity or heat
Viscosity	Resistance to flow
Density	Ratio of a material's mass to its volume
Melting point	Temperature of melting/freezing
Boiling point	Temperature of boiling/condensing

Table 1.2 Chemical Properties

Chemical Property	Description
Reactivity	Degree to which the substance combines chemically with other substances (water, acid, other substances)
Combustibility	Degree to which the substance burns (reacts with air or pure oxygen)
Toxicity	Degree to which the substance reacts in the body to produce harmful substances

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UNIT 1

A Chemical Family

BLM 1-11

Goal • Use this table to help you complete Think About It Actvity 1-2B, A Chemical Family.

Property	Elements				
	Aluminum (Al)	**Copper (Cu)**	**Gold (Au)**	**Iron (Fe)**	**Silver (Ag)**
Effect of acid on clean, bare, pure metal	Reacts with acid; hydrogen gas released	Unreactive with most acids	Unreactive with most acids	Reacts with acid; hydrogen gas released	Unreactive with most acids
Compound formed with oxygen	Readily	Not readily	Not readily	Readily	Not readily
Malleability	Very malleable	Very malleable	Highly malleable	Malleable	Very malleable
Electrical conductivity	Very good	Second best of all metals	Excellent	Good	Best of all metals

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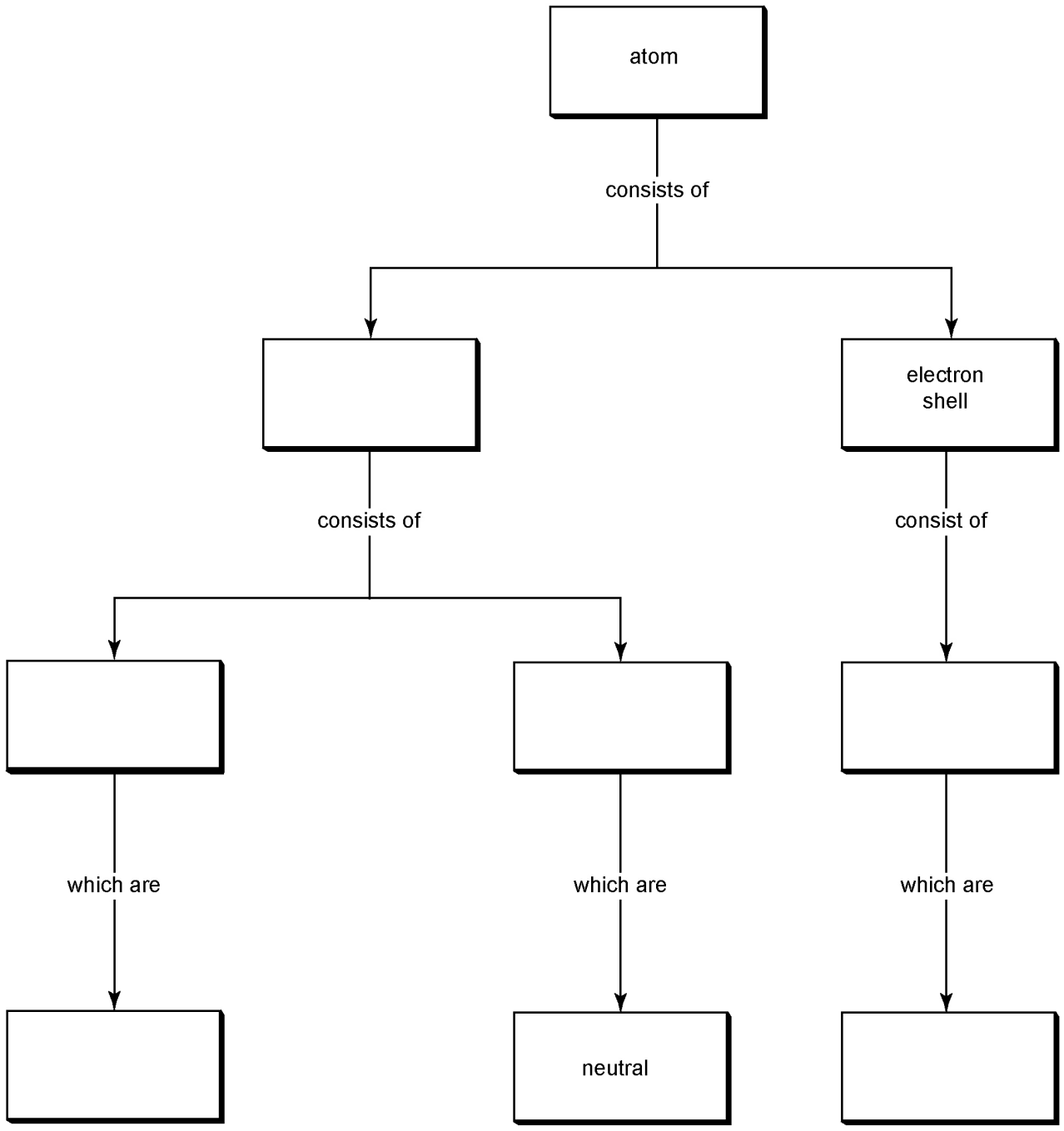
UNIT 1 # Parts of the Atom Concept Map **BLM 1-12**

Goal • Complete the concept map to show the relationship among the parts of the atom.

What to Do

Complete this concept map for the parts of an atom. Use each of the following terms
electron, *negatively charged*, *neutron*, *proton*, *nucleus*, *positively charged*



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UNIT 1

Subatomic Particles

BLM 1-13

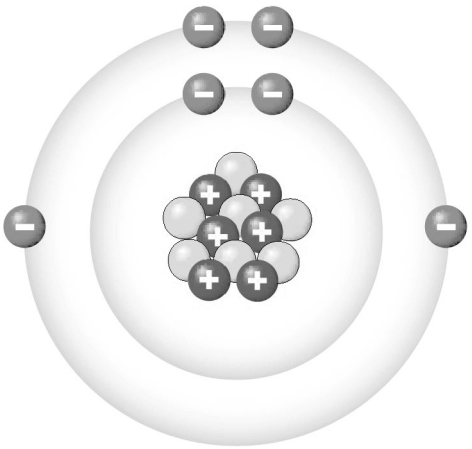
Goal • Demonstrate your knowledge of subatomic particles.

What to Do

1. Complete the chart below to show the location and electric charge of the three subatomic particles.

Particle	Location in Atom	Electric Charge
Electron		
Proton		
Neutron		

Use the diagram of an atom to answer the following questions.



2. Label the parts of the atom. Include the following labels: proton, electron, neutron, energy level, nucleus.

3. (a) What is the electric charge of this nucleus? _____

   (b) What is the electric charge of this atom? _____

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UNIT 1

Chapter 1 Review

BLM 1-14

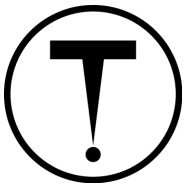
Goal • Check your understanding of Chapter 1.

What to Do

Circle the letter of the best answer.

1. Which of the following hazard label symbols warn that the chemical is poisonous?

I. 

II. 

III. 

IV. 

A. I and II
B. II and IV
C. I, II, and IV
D. IV only

2. If a fire erupts in the laboratory, what should you do first?
   A. Call out "Fire!"
   B. Get a fire extinguisher.
   C. Throw water on the fire.
   D. Pull the evacuation alarm.

3. Personal prescription eyeglasses provide as much protection as
   A. a face shield
   B. safety goggles
   C. safety glasses
   D. sunglasses

4. Which is a chemical property
   A. density
   B. ductility
   C. magnetism
   D. toxicity

5. Which term describes the temperature at which a solid turns to a liquid?
   A. boiling point
   B. melting point
   C. reactivity
   D. temperature

6. Which physical property can be measured numerically?
   A. colour
   B. density
   C. lustre
   D. malleability

7. J. J. Thomson discovered that all atoms contain particles that later became known as electrons. What did this discovery make it possible to conclude about atoms?
   A. All atoms are composed of a combination of subatomic particles.
   B. All atoms are identical to all other atoms.
   C. All atoms are negatively charged.
   D. All atoms conduct electricity.

8. Which best describes the nucleus?
   A. contains neutrons and electrons; negatively charged
   B. contains protons and electrons; electrically neutral
   C. contains protons and electrons; positively charged
   D. contains protons and neutrons; positively charged

9. Which best describes an atom?
   A. electrically neutral
   B. positively charged
   C. negatively charged
   D. positively or negatively charged

Match the Term on the left with the best Descriptor on the right.
Each Descriptor may be used only once.

Term	Descriptor
_____ 10. nucleus	A. a subatomic particle with a charge of zero
_____ 11. electron	B. dense part of an atom
_____ 12. conductive	C. able to be drawn into a wire
_____ 13. density	D. able to transmit heat or electricity
_____ 14. neutron	E. occupies an energy level surrounding the nucleus
_____ 15. malleable	F. change in state from liquid to gas
	G. able to be hammered into a sheet
	H. ratio of mass to volume
	I. a measure of hardness

Short Answer Questions

16. Provide one reason for why we have each of the following safety rules.

(a) Always work under supervision and only on approved activities.

_____

_____

(b) Wear your safety eyewear in the lab as long as any chemicals are still being used, even if you are finished your own work.

_____

_____

(c) Do not eat, drink, or chew gum in the lab.

_____

_____

17. (a) Dalton's atomic theory says that all matter is made of small particles called atoms. Use Dalton's theory to explain why a piece of copper cannot be turned into piece of gold.

_____

_____

(b) Rutherford's model of the atom resulted from an experiment in which alpha particles were made to pass through a thin gold sheet. Most alpha particles passed straight through, but some were deflected. Explain what Rutherford was able to conclude from this about the composition of atoms.

_____

_____

(c) Bohr studied the results of experiments on the light released by gaseous samples of atoms, such as those of hydrogen. What was he able to conclude from this about the way electrons exist in atoms?

_____

_____

18. (a) Where is 99.99% of the mass in an atom located?

_____

(b) Which particles in an atom occupy 99.99% of the volume of the atom?

_____

(c) Where is all of the positive charge in an atom located?

_____

DATE: NAME: CLASS:

UNIT 1

Meet the Elements

BLM 1-15

Goal • Use this table to record your data from Find Out Activity 2-1A, Meet the Elements.

Name	Symbol	Colour	State	Lustre	Conducts Electricity?	Magnetic?

DATE: NAME: CLASS:

UNIT 1

Symbols for Elements

BLM 1-16

Goal • Check your knowledge and understanding of the periodic table.

What to Do

Use the descriptions to identify the names and symbols of the elements. If you need help, use the periodic table on page 50 of *Discover Science 9*.

Description of Element	Name of Element	Symbol
It is the only gas in group 1.		
This inert gas is in period 3.		
There is no heavier member of group 2.		
This element is the lightest of the halogens.		
Group 16 contains this reactive non-metal gas.		
The atomic mass of this metal is about 56.		
Period 6 contains this group 2 metal.		
This is the only liquid halogen.		
This metallic element is liquid at room temperature.		
Photosynthesis produces this element.		
This is the lightest element in period 2.		

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UNIT 1

Common Elements

BLM 1-17

Goal • Use the following charts to help you learn about the elements.

Complete each chart.

Name of Element	Symbol	Origin of Element's Symbol
hydrogen		**H**ydros genes = water forming
helium		**He**lios = sun
neon		**Ne**on = new
nitrogen		**N**itron = saltpeter (an explosive)
oxygen		**O**xygenes = acid forming
fluorine		**F**luere = Latin for flowing
chlorine		**Cl**oros from khloros = pale green
bromine		**Br**omos = smelly
mercury		**H**ydrar**g**yrum = Latin for liquid silver
lithium		**Li**thos = stone
sodium		**Na**trium = Latin for sodium
potassium		**K**alium = Latin for potash
rubidium		**Rb**idus = Latin for red
cesium		**Cs**ius = Latin for bluish-grey
beryllium		**Be**ryllos = emerald
magnesium		**Mg**nesia = a place in Greece
calcium		**Ca**lx = Latin for limestone
strontium		**Sr**ontian = a village in Scotland
barium		**Ba**rys = heavy
titanium		**Ti**tans = gods from Greek mythology
chromium		**Cr**oma = colour
manganese		**Mn**esia negra = Latin for black magnesium
iron		**Fe**rrum = Latin for iron
cobalt		**Co**bald from kobold = German for goblin
nickel		kupfer **Ni**ckel = German for devil's copper
copper		**Cu**prum = Latin for Cyprian
zinc		**Zn**k = German for zinc
silver		**Ag**entum = Latin for silver
gold		**Au**rum = Latin for gold
tin		**Sn**num = Latin for tin
lead		**Pb**um = Latin for lead
carbon		**C**arbo = Latin for coal
phosphorus		**P**hosphoros = bringer of light
sulphur		**S**ulphurium = Latin for sulphur
iodine		**I**odes = violet

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BLM 1-17 continued

Name of Element	Symbol	Origin of Element's Symbol
hydrogen	H	
helium	He	
neon	Ne	
nitrogen	N	
oxygen	O	
fluorine	F	
chlorine	Cl	
bromine	Br	
mercury	Hg	
lithium	Li	
sodium	Na	
potassium	K	
rubidium	Rb	
cesium	Cs	
beryllium	Be	
magnesium	Mg	
calcium	Ca	
strontium	Sr	
barium	Ba	
titanium	Ti	
chromium	Cr	
manganese	Mn	
iron	Fe	
cobalt	Co	
nickel	Ni	
copper	Cu	
zinc	Zn	
silver	Ag	
gold	Au	
tin	Sn	
lead	Pb	
carbon	C	
phosphorus	P	
sulphur	S	
iodine	I	

DATE: NAME: CLASS:

BLM 1-17 continued

Symbol	Name of Element
H	
He	
Ne	
N	
O	
F	
Cl	
Br	
Hg	
Li	
Na	
K	
Rb	
Cs	
Be	
Mg	
Ca	
Sr	
Ba	
Ti	
Cr	
Mn	
Fe	
Co	
Ni	
Cu	
Zn	
Ag	
Au	
Sn	
Pb	
C	
P	
S	
I	

DATE: NAME: CLASS:

BLM 1-17 continued

Name of Element	Symbol	Origin of Element's Symbol
hydrogen		
helium		
neon		
nitrogen		
oxygen		
fluorine		
chlorine		
bromine		
mercury		
lithium		
sodium		
potassium		
rubidium		
cesium		
beryllium		
magnesium		
calcium		
strontium		
barium		
titanium		
chromium		
manganese		
iron		
cobalt		
nickel		
copper		
zinc		
silver		
gold		
tin		
lead		
carbon		
phosphorus		
sulphur		
iodine		

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UNIT 1

Assessing Attitudes

BLM 1-18

Goal • Assess your performance during a laboratory activity. Compare your comments to those of your teacher.

What to Do

In the "Self" column, give yourself a mark out of 10 for each of the Assessment Points.

- 8–10 means that you performed the action most of the time
- 6–7 means that you performed the action some of the time
- 4–5 means that you performed the action infrequently or only once in a while
- 3 or lower means that you performed the action rarely

Assessment Points	Self	Teacher
Takes charge of the activity, shows initiative, and makes necessary decisions.		
Carries out her or his share of the work.		
Persists when problems arise and follows the investigation through to completion.		
Remains on task and is not easily distracted.		
Is considerate toward others and co-operates willingly.		
Shows interest in the work.		
Shows respect for others.		
Shows respect for the equipment and facilities.		
Disposes of waste properly and leaves the lab station in good condition.		
Takes charge of personal safety by following instructions and using personal protective equipment.		
Total	**/100**	**/100**

Two things I do well during lab activities are:

_____

_____

Two things I would like to improve about my lab work are:

_____

_____

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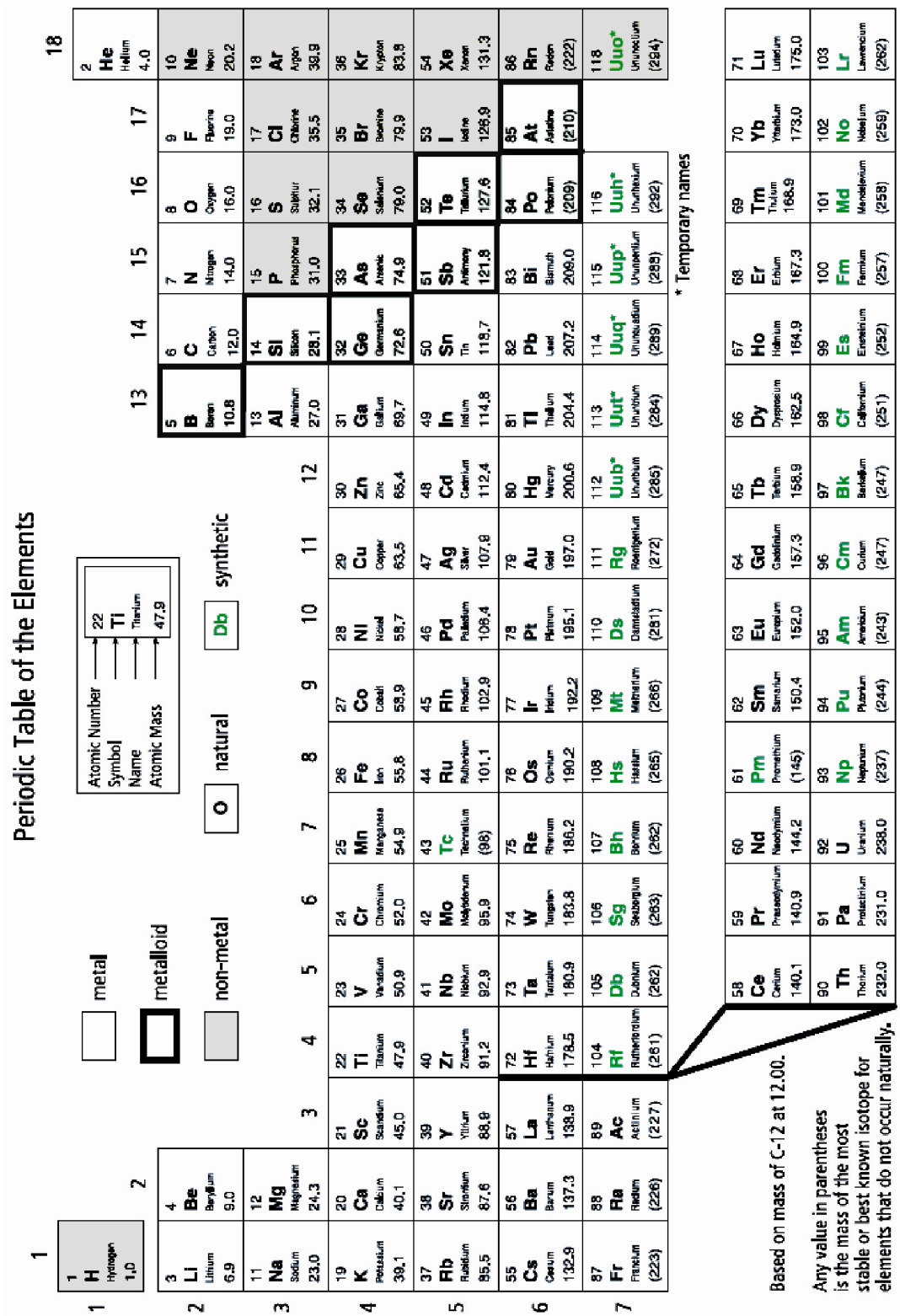
UNIT 1 # The Modern Periodic Table **BLM 1-19**

Goal • Use this periodic table to learn about the elements.



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UNIT 1 # Key Terms **BLM 1-2**

Goal • Review the Unit 1 Key Terms.

Chapter 1	Chapter 2	Chapter 3
atom	alkali metals	chemical bonds
atomic theory	alkaline earth metals	chemical change
boiling point	atomic mass	chemical formula
chemical properties	atomic number	chemical name
combustibility	Bohr-Rutherford diagram	combustion
conductivity	chemical family	condensation
density	chemical symbol	corrosion
electron	electron shells	covalent compound
element	energy levels	dissolving
hazard symbol	halogens	evaporation
mass	metal	freezing
matter	metalloid	ionic compound
melting point	noble gases	melting
neutron	non-metal	molecule
nucleus	period	physical change
physical properties	periodic table	products
proton	transition metals	reactants
reactivity		
state		
subatomic particle		
volume		
WHMIS		

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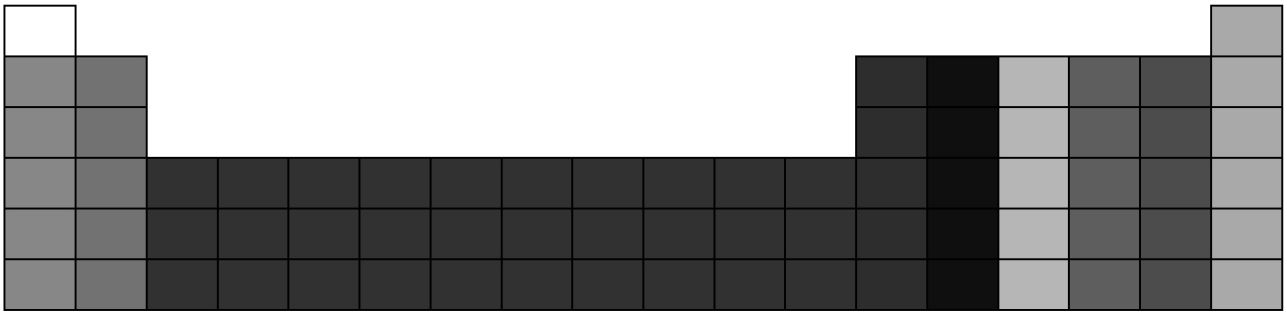
UNIT 1

Groups in the Periodic Table

BLM 1-20

Goal • Use this periodic table to help you in Think About It Activity 2-2B, The Modern Periodic Table.



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UNIT 1

Simplified Periodic Table

BLM 1-21

Goal • Use this periodic table to help you in Think About It Activity 2-2B, The Modern Periodic Table.

gas = circle
liquids = square
solids = no mark

metals
metalloids
non-metals

(H)																	(He)
Li	Be											B	C	(N)	(O)	(F)	(Ne)
Na	Mg											Al	Si	P	S	(Cl)	(Ar)
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	[Br]	(Kr)
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	(I)	(Xe)
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	[Hg]	Ti	Pb	Bi	Po	At	(Rn)

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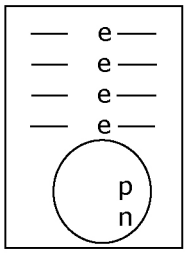
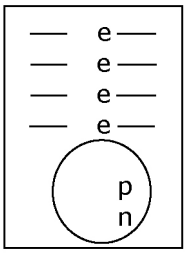
UNIT 1

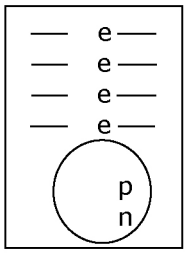
Bohr-Rutherford Diagram Template

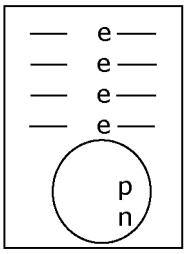
BLM 1-22

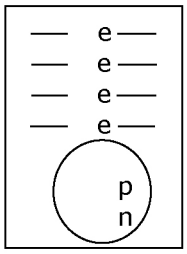
Goal • Practise drawing Bohr-Rutherford diagrams.

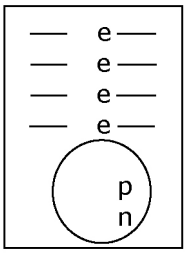


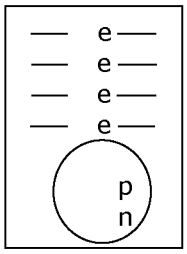


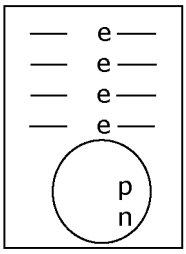


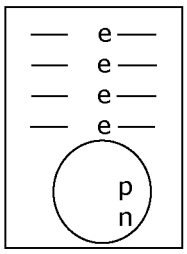


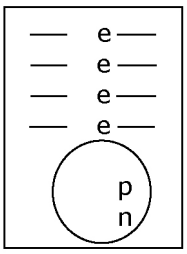


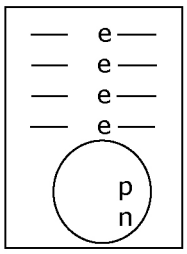


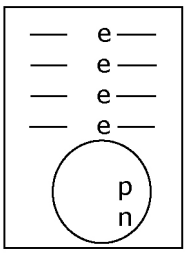


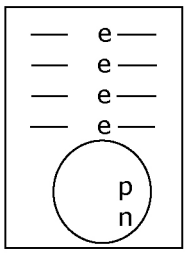


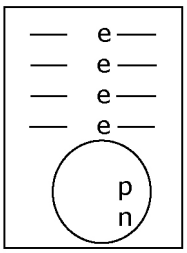


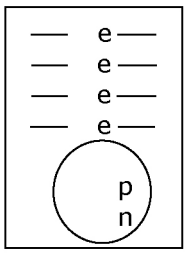


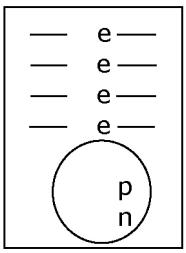


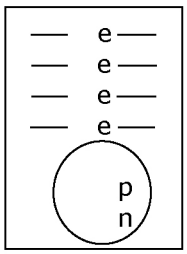


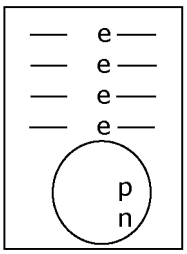


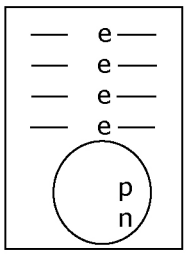


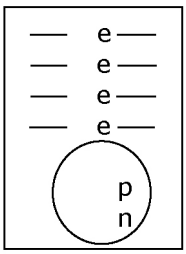












DATE: NAME: CLASS:

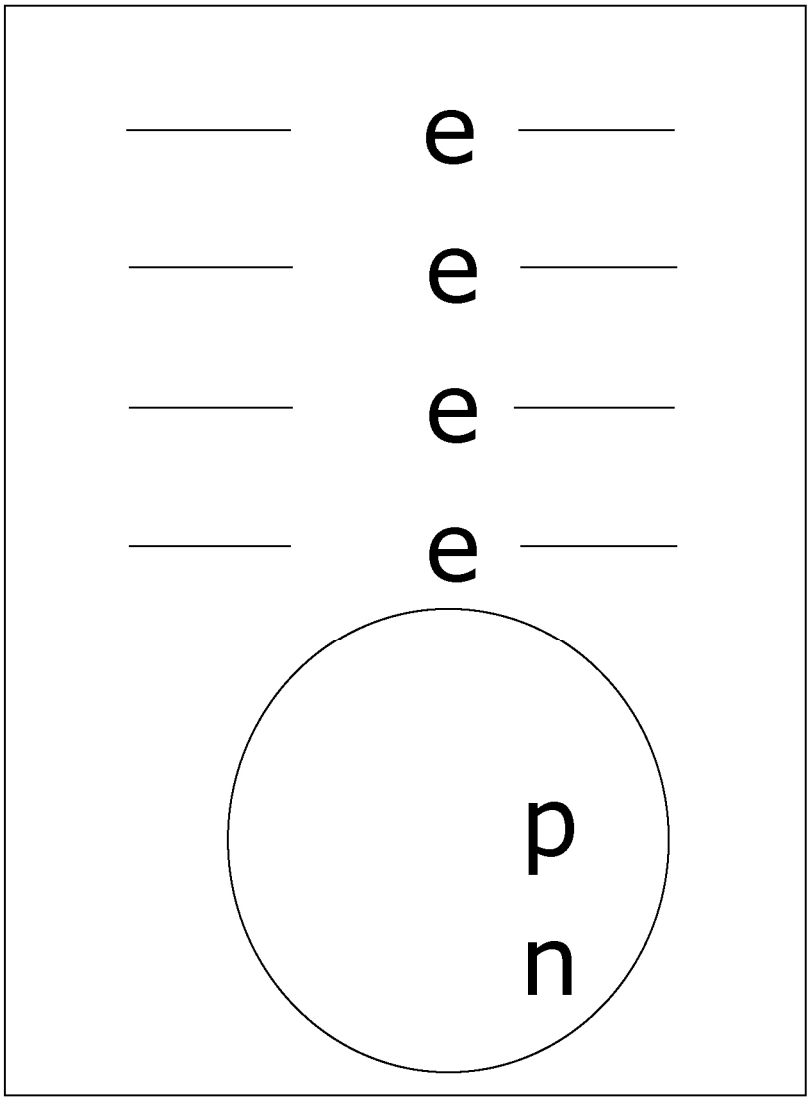
UNIT 1

Looking for Patterns in Atoms

BLM 1-23

Goal • Use this template for Think About It Activity 2-3A, Looking for Patterns in Atoms.

ELEMENT NAME



DATE: NAME: CLASS:

UNIT 1 # Bohr-Rutherford Diagrams **BLM 1-24**

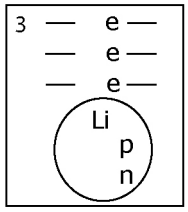
Goal • Review your understanding of Bohr-Rutherford diagrams.

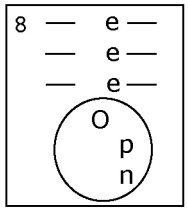
What to Do

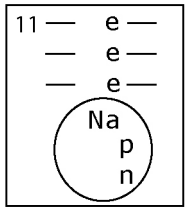
Answer the following questions.

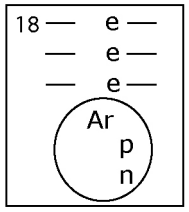
Questions

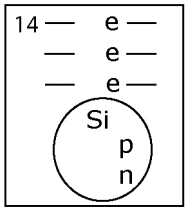
1. Complete the Bohr-Rutherford diagrams for the five named elements.

(a) 

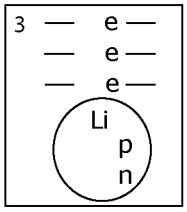
(b) 

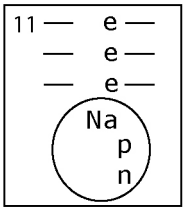
(c) 

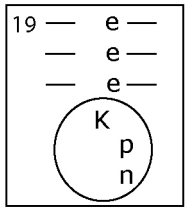
(d) 

(e) 

2. Complete the Bohr-Rutherford diagrams for the elements in Group 1 (alkali metals) shown below.

(a) 

(b) 

(c) 

3. In what ways are the Bohr-Rutherford diagrams for the alkali metals similar?

_____

_____

_____

4. Examine the rows of the periodic table. As the rows increase, what happens to the number of electron shells?

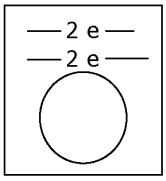
_____

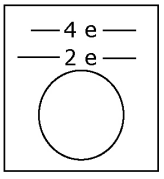
_____

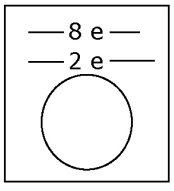
5. How many electrons are there in the outer shell of a sulphur (S) atom? _____

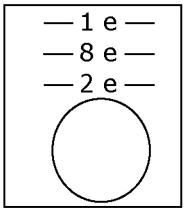
6. How many electron shells would you expect to find in a sulphur atom? _____

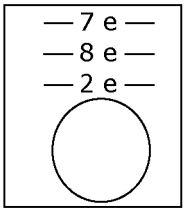
7. Identify the elements whose Bohr-Rutherford diagrams are shown below. Write the names of the elements in the spaces provided.

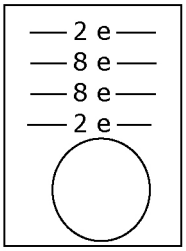












(a) _____ (b) _____ (c) _____ (d) _____ (e) _____ (f) _____

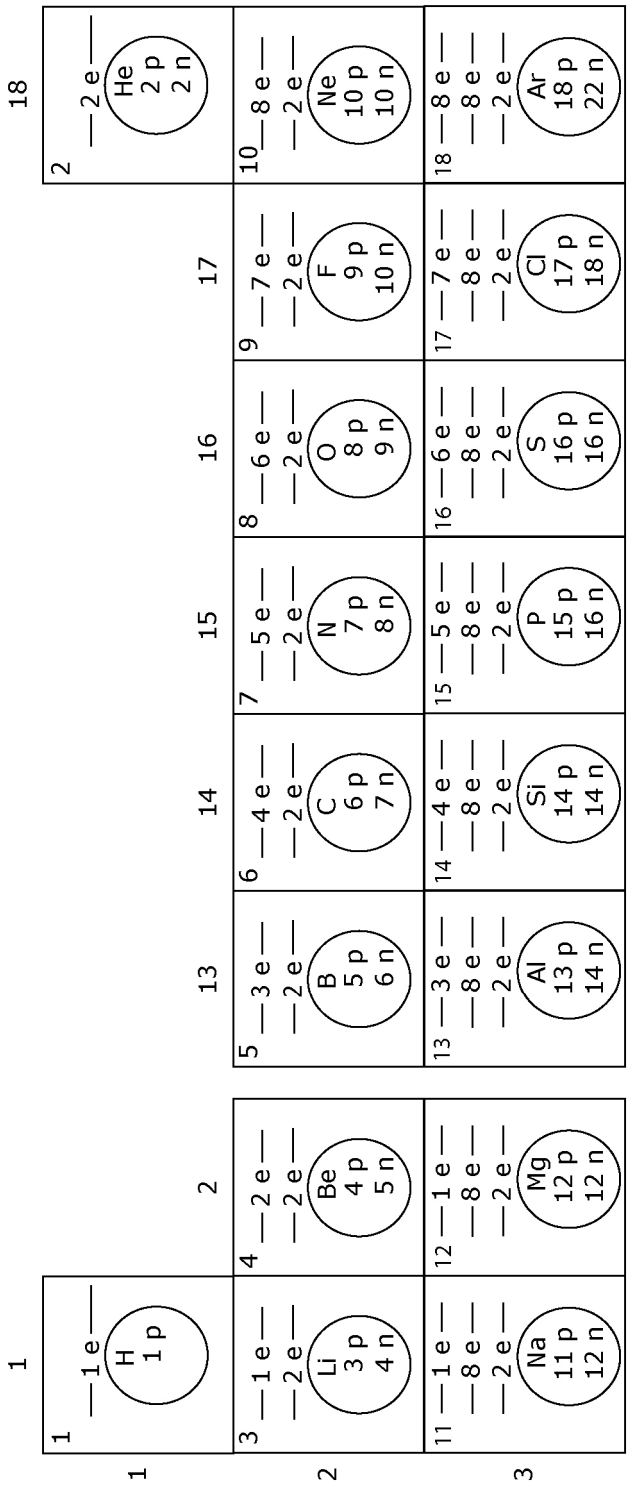
DATE: NAME: CLASS:

UNIT 1

Bohr-Rutherford Diagrams of the First 18 Elements

BLM 1-25

Goal • Review Bohr-Rutherford diagrams for the first 18 elements.



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UNIT 1

Electron Arrangements in the First 20 Elements

BLM 1-26

Goal • Refer to this chart to learn about the electron arrangements of the first 20 elements.

Element	Protons	Electrons			
		First shell	Second shell	Third shell	Fourth shell
H	1	1			
He	2	2			
Li	3	2	1		
Be	4	2	2		
B	5	2	3		
C	6	2	4		
N	7	2	5		
O	8	2	6		
F	9	2	7		
Ne	10	2	8		
Na	11	2	8	1	
Mg	12	2	8	2	
Al	13	2	8	3	
Si	14	2	8	4	
P	15	2	8	5	
S	16	2	8	6	
Cl	17	2	8	7	
Ar	18	2	8	8	
K	19	2	8	8	1
Ca	20	2	8	8	2

DATE: NAME: CLASS:

UNIT 1

Chapter 2 Review

BLM 1-27

Goal • Check your understanding of Chapter 2.

What to Do

Circle the letter of the best answer.

1. Approximately how many elements have been discovered?
   A. 3
   B. 35
   C. 100
   D. 300

2. Name two metals.
   A. copper and chlorine
   B. copper and gold
   C. sulphur and chlorine
   D. sulphur and gold

3. Which of the following is a metalloid?
   A. silicon
   B. sodium
   C. strontium
   D. sulphur

4. What is a period in the Periodic Table?
   A. a family of elements with similar properties
   B. a group of elements all of which have the same number of valence electrons
   C. a horizontal row
   D. a vertical column

5. What do the noble gases He and Kr have in common?
   A. Both gases will make a balloon tend to float
   B. Filled valence energy levels
   C. The same number of electrons
   D. The same number of valence electrons

6. How is the periodic table arranged?
   A. by atomic mass and chemical properties
   B. by atomic number and chemical properties
   C. by ion charge and atomic mass
   D. by ion charge and atomic number

7. Which family of elements contains a solid, a liquid, and a gas at room temperature?
   A. Group 1
   B. Group 2
   C. Group 17
   D. Group 18

8. Which phrase is correct for a Bohr-Rutherford model of a noble gas?
   A. empty outer electron shell
   B. full outer electron shell
   C. more electrons than protons
   D. more protons than electrons

9. Which best describes the alkaline earth metal family?
   A. family of metals that is magnetic
   B. family of metals used to make coins
   C. family whose elements have two electrons in their outer shell
   D. the most reactive family of metals

10. Which best describes an element?
    A. a family of substances all of which have different but similar properties
    B. a mixture of different kinds of atoms, with different numbers of protons
    C. a pure substance that can be decomposed further by physical means
    D. a pure substance that cannot be broken down or separated into simpler substances

Match the Term on the left with the best Descriptor on the right.
Each Descriptor may be used only once.

Term	Descriptor
_____ 11. atomic mass	A. a family of chemically reactive elements
_____ 12. noble gases	B. the number of protons in an atom
_____ 13. atomic number	C. contain the element fluorine
_____ 14. Bohr-Rutherford model	D. has properties of both metals and non-metals
_____ 15. metalloid	E. compares the inside of an atom to a raisin bun
_____ 16. alkali metal	F. the mass of an average atom of an element
	G. family of chemically unreactive gases
	H. shows the arrangement of electrons in an atom

Short Answer Questions

17. List any four types of information usually recorded on a periodic table in addition to the element's name.

_____

_____

18. Calcium has the atomic number 20. Draw a simple Bohr-Rutherford diagram showing the number of electrons in each energy level of a calcium atom.

19. List four properties of alkali metal elements that make them different from iron.

_____

_____

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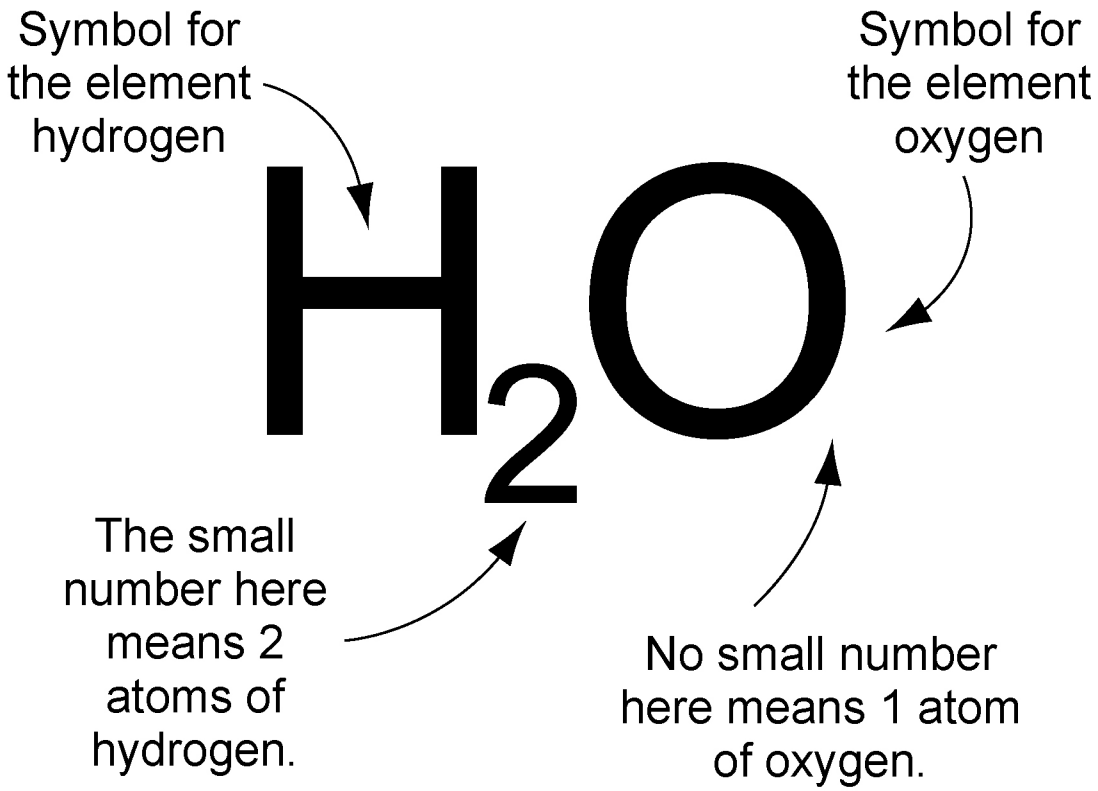
Anatomy of a Chemical Formula



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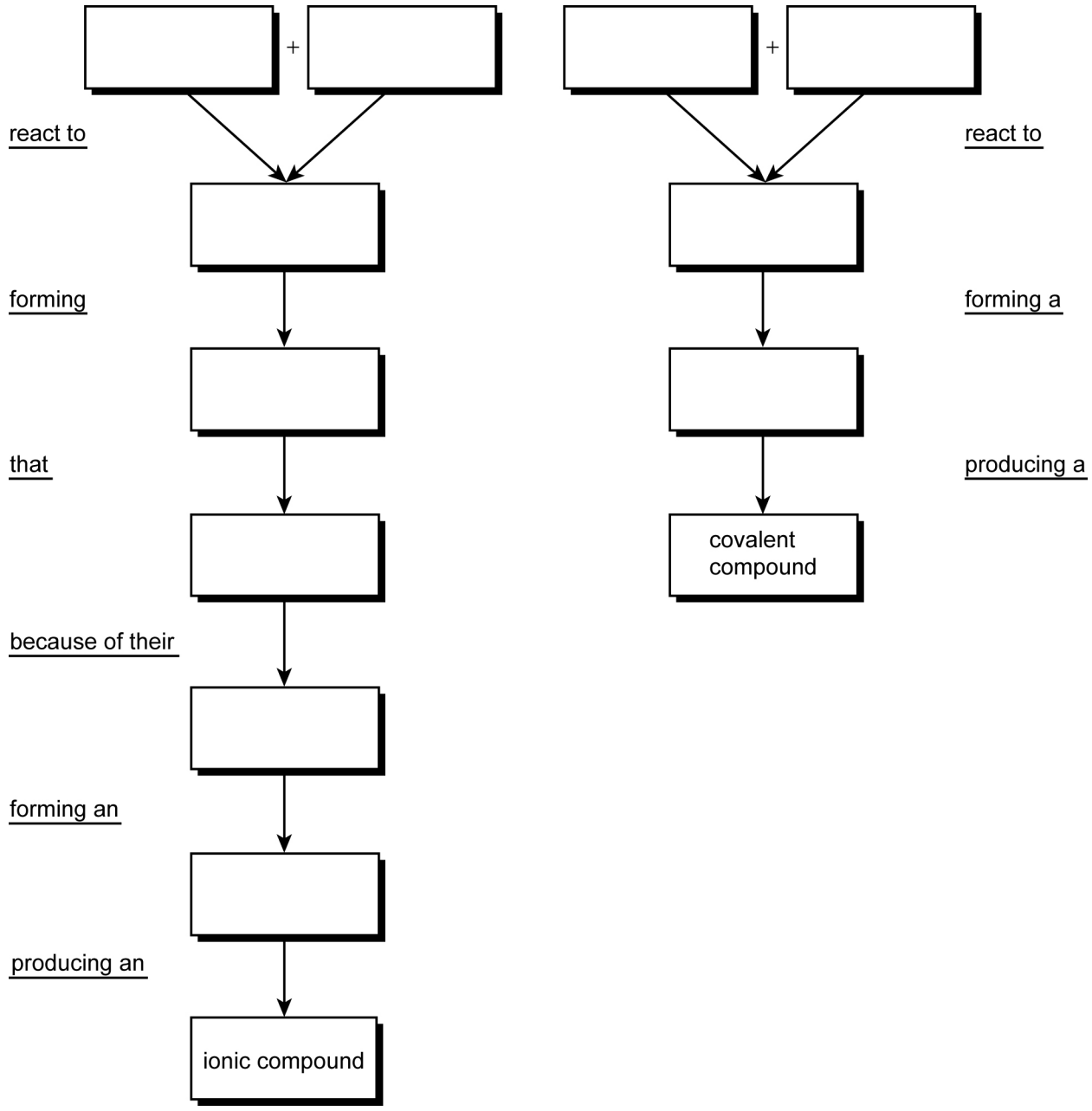
UNIT 1 # Chemical Bonds Concept Map **BLM 1-29**

Goal • Complete a concept map to demonstrate your knowledge of how atoms form bonds.

What to Do

Use the following words to complete the concept map. You can use each term more than once.

attract, *covalent bond*, *ionic bond*, *ions*, *metal atom*, *non-metal atom*, *opposite charges*, *share electrons*, *transfer electrons*



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UNIT 1

Chapter 1 Key Terms

BLM 1-2A

Goal • Review the Key Terms in Chapter 1.

Match each key term in the left column with its definition in the right column.

Key Term	Definition
_____ 1. atom	A. the amount of matter in a substance or object (often measured in grams)
_____ 2. atomic theory	B. ratio of material's mass to its volume
_____ 3. boiling point	C. degree to which the substance combines chemically with other substances (water, acid, other substances)
_____ 4. chemical properties	D. a particle with a positive electric charge
_____ 5. combustibility	E. a smaller particle (proton, neutron, electron) within the atom
_____ 6. conductivity	F. the amount of space a substance or an object occupies (often measured in litres)
_____ 7. density	G. tiny, dense, positively charged centre of the atom
_____ 8. electron	H. characteristics of matter that are often observed or measured
_____ 9. element	I. degree to which the substance burns (reacts with air or pure oxygen)
_____10. hazard symbol	J. the smallest particle of an element that retains the properties of the element
_____11. mass	K. a system used to ensure that everyone has access to appropriate safety information about any hazardous substance they may encounter that is manufactured and sold
_____12. matter	L. temperature of boiling/condensing
_____13. melting point	M. a symbol that provides two kinds of safety warnings
_____14. neutron	N. a substance that contains only one kind of matter and cannot be broken down or separated into simpler substances
_____15. nucleus	O. various descriptions of matter and how it behaves
_____16. physical properties	P. negatively charged particles

_____17. proton	Q. a particle with no electric charge
_____18. reactivity	R. anything that has mass and volume
_____19. state	S. characteristics that can be observed when substances react with each other
_____20. subatomic particle	T. solid, liquid, gas
_____21. volume	U. ability to conduct electricity or heat
_____22. WHMIS	V. temperature of melting/freezing

DATE: NAME: CLASS:

UNIT 1

Chapter 2 Key Terms

BLM 1-2B

Goal • Review the Key Terms in Chapter 2.

Create a list of 10 key terms from the descriptions below. Then find the key terms in the puzzle.

Description	Key Term
1. soft, highly reactive metals with low melting points (6 letters, 6 letters)	
2. average mass of the atoms of an element (6 letters, 4 letters)	
3. a diagram that shows how many electrons are in each electron shell surrounding the nucleus (4 letters, 10 letters)	
4. a symbol for an element, consisting of one or two letters (8 letters, 7 letters)	
5. the regions surrounding the nucleus of an atom (8 letters, 6 letters)	
6. highly reactive non-metals (8 letters)	
7. elements that are typically hard, shiny, malleable, ductile, and good conductors of heat and electricity (6 letters)	
8. elements that are usually gases or brittle solids at room temperature (9 letters)	
9. a chart that organizes the elements according to their physical and chemical properties (8 letters, 5 letters)	
10. a set of metallic elements that are found at the centre of the periodic table (10 letters, 6 letters)	

DATE: NAME: CLASS:

BLM 1-2B continued

B T R A N S I T I O N M E T A L S G P
A O C P K R Q N A Z L B A V F T Y R E
P D H M N B O Q T S R E T S M J H A R
H M E R K C S I H R I X O B Y U A L I
E P M U R B A L K A L I M E T A L S O
S J I N Q U C O M U N U I C L C O G D
D E C Y O H T P D G O E C O J K G D I
I B A M G N Y H Q T F T M J I F E M C
O T L R E A M X E W V X A E Z S N H T
L O S F C X R E F R G W S A T J S K A
L D Y W I W D C T N F D S P V A P L B
A A M S U K G W N A V O H Z K C L N L
T I B Y L Y H D J X L E R W B H I S E
E F O R V E X P L Z O S I D M Q J Z A
M E L E C T R O N S H E L L S K S Q F

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UNIT 1

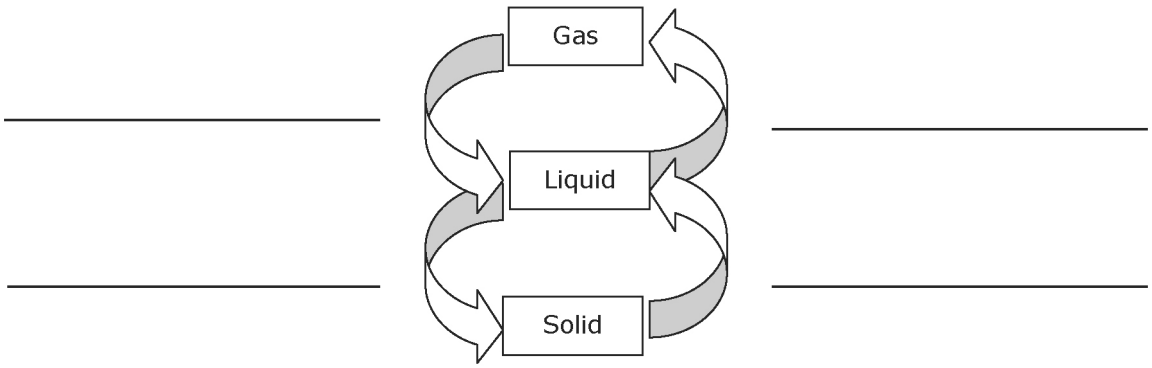
Chapter 3 Key Terms

BLM 1-2C

Goal • Review the Key Terms in Chapter 3.

Label the diagram and complete the sentences with the key terms below.

condensation
corrosion
evaporation
freezing
melting
physical change
product
reactants



_____ is an example of chemical change. The _____ are iron and oxygen, and the _____ is iron oxide (rust).

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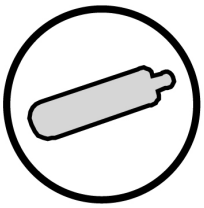
UNIT 1 # Safety Symbols **BLM 1-3**

Goal • Review the meaning of warning labels in your science classroom and at home.

Think About It

Throughout Canada, standard symbols are used to identify dangerous materials. These sets of symbols provide warnings about the possible hazards of using a product, and the necessary precautions to take when using it.

- The Workplace Hazardous Materials Information System (WHMIS) has produced symbols for such work places as science laboratories. These are known as WHMIS symbols.

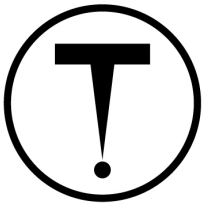

Compressed Gas


Flammable and Combustible Material


Oxidizing Material


Corrosive Material


Poisonous and Infectious Material Causing Immediate and Serious Toxic Effects


Poisonous and Infectious Material Causing Other Toxic Effects


Biohazardous Infectious Material


Dangerously Reactive Material

1. Find two objects in the lab that have WHMIS symbols. Fill in the chart.

WHMIS Symbol	Meaning of Symbol	Precautions
(a)		
(b)		

DATE: NAME: CLASS:

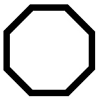
BLM 1-3 continued


Poisonous


Flammable


Explosive


Corrosive


Dangerous Product


Dangerous Container

Hazardous Household Product Symbols (HHPS) were developed for people buying and using materials around the home.

2. Briefly explain what kind of hazard each of the following words describes.

poisonous _____

flammable _____

explosive _____

corrosive _____

3. Study the display your teacher has provided of products many people use in their homes.
   - Look for symbols that are HHPS.
   - Read the labels to find out how each product is used and decide why it has an HHPS.
   - Complete the chart below.

Hazard Symbol	How Product Used	Suggested Precautions
(a)		
(b)		
(c)		

DATE: NAME: CLASS:

UNIT 1

Researching a Compound

BLM 1-30

Goal • Research information about a compound.

What to Do

Select a compound from the list provided by your teacher. Follow the steps below to prepare a presentation on this compound.

1. List five physical properties of this compound.

_____

_____

_____

_____

_____

2. List three chemical properties of this compound.

_____

_____

_____

3. Check the MSDS for this compound. What are the hazards?

_____

_____

4. Decide on a format to present this information to the class. Choose something that will help students remember the compound. For example, you could create a poster, design a T-shirt, or draw a cartoon. Explain the format and design you will use below.

_____

_____

5. Use the back of this page to make the first draft of your idea. Discuss your idea and draft with another student before developing a good copy.

DATE: NAME: CLASS:

UNIT 1

Kitchen Chemistry

BLM 1-31

Goal • Examine the ingredients in a common food.

Think About It

Natural foods such as apples and processed foods such as fruit leather, all contain chemicals. However, only processed foods are labelled to show their chemical make-up. The ingredients on a label are listed in order of decreasing amount. The label for table salt might read: salt (sodium chloride), calcium silicate, sugar, potassium iodide. That means there is less potassium iodide in the product than any other component. Sodium chloride is the main ingredient.

What to Do

Select one processed food product found in your home and then answer the following questions.

Questions

1. Give the product's name._____

2. List the ingredients in the same order that they are listed on the label.

   _____

   _____

3. Select any three of the ingredients for which you can provide the following information, then fill in the blanks in the chart below.

	Ingredient 1	Ingredient 2	Ingredient 3
Name			
Formula			
Elements it contains			

4. Research the properties of one of the ingredients in the table in question 3. Explain why this substance is added to the food.

   _____

   _____

DATE: NAME: CLASS:

UNIT 1 # Chemical Formulas **BLM 1-32**

Goal • Practise reading chemical formulas for ionic and covalent compounds.

Rules for writing the names of ionic compounds containing two elements
1. Write the name of the metal ion.
2. Write the name of the non-metal ion by ending the element name with the suffix "ide".

1. Write the names of the following compounds.
   (a) NaCl _____
   (b) KI _____
   (c) LiF _____
   (d) CuO _____
   (e) $PbCl_2$ _____
   (f) $ZnBr_2$ _____

Rules for writing the names of covalent compounds
1. Write the name of the first atom.
2. Write the name of the second atom by ending with the suffix "ide".
3. Add prefixes to the atom names to indicate the number of each atom in the compound (mono, di, tri, tetra).

2. Write the names of the following compounds.
   (a) CO_2 _____
   (b) SO_2 _____
   (c) H_2O _____
   (d) Al_2O_3 _____
   (e) CCl_4 _____
   (f) NH_3 _____

DATE: NAME: CLASS:

UNIT 1

Ionic Compounds

BLM 1-33

Goal • Check your understanding of forming ionic compounds.

Questions

1. Use the words from the list to fill in the blanks in the paragraph below.

   attract, *charge*, *electron*, *ionic bond*, *negative*, *negatively charged*, *opposite*, *positive*, *positively charged*, *transferred*,

   (a) When an atom gains or loses a(n) _____, an ion is formed. All ions have a(n) _____.
   (b) Metals tend to form _____ ions. Non-metals tend to form _____ ions.
   (c) When a metal atom reacts with a non-metal atom, one or more electrons are _____, which results in the formation of ions. One of these ions will be _____ and one will be _____. Because of these _____ charges, the ions _____ each other, forming a(n) _____.

2. Name the compound that is formed when each pair of atoms forms an ionic bond.
   (a) sodium and chlorine
   (b) lithium and fluorine
   (c) silver and bromine
   (d) magnesium and nitrogen

3. Lithium and fluorine react to form lithium fluoride. Draw a diagram to show how these two atoms would react.

DATE: NAME: CLASS:

UNIT 1

Forming Ionic Compounds

BLM 1-34

Goal • Demonstrate your knowledge of forming ionic compounds.

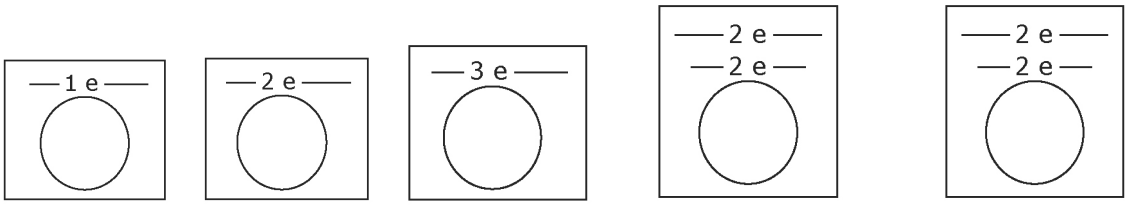
What to Do

Show your knowledge of ionic bonding by answering the following questions in the spaces provided.

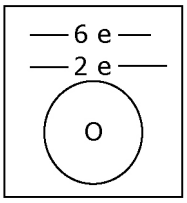
Questions

1. Examine the Bohr-Rutherford diagrams below. Circle the atoms that are stable.
   Hint: remember the maximum number of electrons each energy level can hold.

(a) (b) (c) (d) (e)



2. The following Bohr-Rutherford diagram represents an oxygen atom. Examine the diagram, then answer the following questions.



   (a) Why is this not a stable electron arrangement?

   _____

   (b) What would make this atom stable?

   _____

   (c) Use a coloured pencil to adjust the diagram so that it shows a stable electron arrangement.

3. Define the term "ionic bond."

   _____

   _____

DATE: NAME: CLASS:

UNIT 1

Chapter 3 Review

BLM 1-35

Goal • Check your understanding of Chapter 3.

Note: A periodic table and an ion chart are required for this review.

What to Do

Circle the letter of the best answer.

1. Which of the following can form a covalent compound?
   A. a metal and a metal
   B. a metal and a non-metal
   C. a non-metal and a non-metal
   D. two metals and a non-metal

2. What happens when ionic compounds are formed?
   A. atoms always gain one or more electrons
   B. atoms always lose one or more protons
   C. atoms gain or lose one or more electrons
   D. atoms gain or lose one or more protons

3. Ionic compounds are in what state at room temperature?
   A. any of the three states
   B. gas
   C. liquid
   D. solid

4. When naming an ionic compound, which element should you name first?
   A. the element with the lowest atomic number
   B. the metal
   C. the metal with the name that comes first alphabetically
   D. the non-metal

5. When naming a covalent compound with two atoms of the same element, what suffix is used?
   A. di
   B. ide
   C. mono
   D. tri

6. What is the name of MgS?
   A. magnesium sulphate
   B. manganese sulphate
   C. magnesium sulphide
   D. manganese sulphite

7. Which of the following is a physical change?
   A. fire
   B. sugar dissolving in water
   C. rotting fruit
   D. rusting

8. Which is an example of a physical change used traditionally in Newfoundland and Labrador?
   A. burning lamp oil made from blubber
   B. drying fish
   C. smoking fish
   D. tanning hides

Match the Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.

Term	Descriptor
_____ 9. atom _____10. ionic compound _____11. product _____12. reactant	A. refers to metal and a non-metal chemically bonded B. the substance produced in a chemical reaction C. non-metal that has a negative charge D. ion made of several atoms joined together by covalent bonds F. the smallest particle of an element that has the properties of the element G. material that is made during a chemical reaction H. the starting material in a chemical reaction

Short Answer Questions

13. Write the formula:
   (a) magnesium nitride _____
   (b) silicon disulphide _____
   (c) ammonium sulphate _____

14. What is the difference between a chemical change and a physical change?

_____

_____

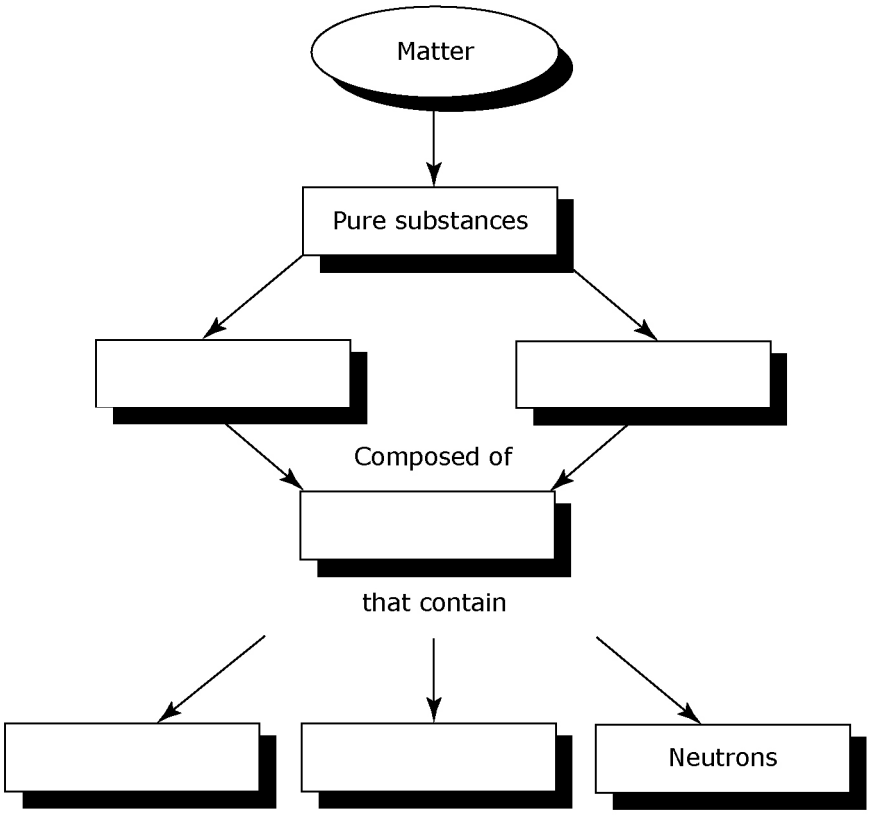
DATE: NAME: CLASS:

UNIT 1

Unit 1 Review Concept Map

BLM 1-36

Goal • Use this concept map to complete question 1, Unit 1 Review, page 102 of *Discover Science 9*.



DATE: NAME: CLASS:

UNIT 1

Unit 1 Test

BLM 1-37

Goal • Test your understanding of Unit 1, Atoms, Elements, and Compounds.

What to Do

Circle the letter of the best answer.

1. Which of the following hazard label symbols warns that the chemical is dangerously reactive?

I. 

II. 

III. 

IV. 

A. I
B. I, III
C. II, III
D. II, III, IV

2. Which phrase best describes the physical property known as density?
   A. the ability of a material to flow
   B. the ability to dissolve in water
   C. the ratio of a material's mass to its volume
   D. the tendency to be solid, liquid, or gas

3. Which of the following best describes atoms?
   A. nucleus contains electrons and neutrons; nucleus is surrounded by protons
   B. nucleus contains neutrons; nucleus is surrounded by protons and electrons
   C. nucleus contains protons and electrons; nucleus is surrounded by neutrons
   D. nucleus contains protons and neutrons; nucleus is surrounded by electrons

4. Which of the following is a metal?
   A. fluorine
   B. phosphorus
   C. potassium
   D. selenium

5. What is meant by the term "group" in the periodic table?
   A. a collection of elements in the same period
   B. a collection of elements that are all solids
   C. a family of elements with similar properties
   D. a horizontal row of elements

6. Which of the following is a covalent compound?
   A. Fe
   B. FeF_3
   C. OF_2
   D. O_3

7. How many atoms in total are represented by the formula $Fe(CH_3COO)_3$?
   A. 6
   B. 9
   C. 11
   D. 22

Match the Descriptor on the left with the best Term on the right. Each Term may be used only once.

Descriptor	Term
_____ 8. an example of a physical property	A. alkaline earth metal
_____ 9. the smallest particle of a piece of iron	B. atom
_____ 10. water is an example	C. atomic mass
_____ 11. cannot be decomposed by chemical means	D. atomic number
_____ 12. elements in this family have 7 valence electrons	E. Bohr-Rutherford model
_____ 13. a model that shows how electrons are arranged	F. boiling point
_____ 14. this subatomic particle has no electric charge	G. covalent compound
_____ 15. this number identifies the element	H. element
_____ 16. involves shared pairs of electrons	I. halogen
_____ 17. contains a metal and a non-metal chemically combined	J. ionic compound
	K. molecule
	L. neutron
	M. proton

Short Answer Questions

18. Draw a simple sketch of an atom containing 5 protons, 6 neutrons, and as many electrons as are needed to make the atom neutral. Show the correct number of electrons in each energy level.

19. Sketch a Bohr-Rutherford diagram indicating the number of protons as well as the number and arrangement of electrons in each:
    (a) Ca (b) Al (c) Cl

20. Use a periodic table to identify these elements.
    (a) the metal in period 5, group 11 _____
    (b) the element with atomic mass 16.0 amu _____
    (c) the metalloid in the second period _____
    (d) the metal in period 4 with three common ion charges _____
    (e) the halogen whose atoms are heavier than sulphur's atoms and which has an atomic number less than selenium _____

21. List six chemical or physical properties typical of alkali metal elements.

    _____

    _____

    _____

22. Write names for the following compounds.
    (a) NaCl _____
    (b) Mg_3P_2 _____
    (c) FeO _____
    (d) $(NH_4)_3PO_4$ _____
    (e) K_2S _____

23. (a) Explain the difference between a physical change and a chemical change.

    _____

    _____

    (b) Give an example of each type of change.

    _____

    _____

Unit 1 BLM Answers

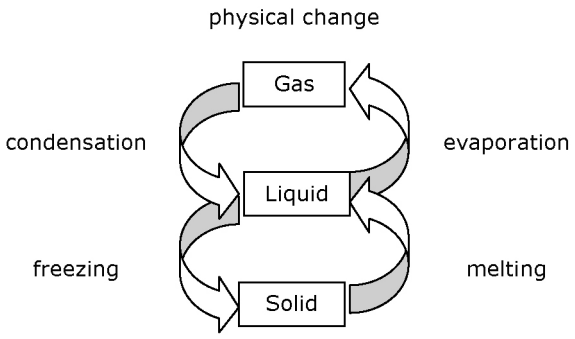
BLM 1-2A, Chapter 1 Key Terms

1. J
2. O
3. L
4. S
5. I
6. U
7. B
8. P
9. N
10. M
11. A
12. R
13. V
14. Q
15. G
16. H
17. D
18. C
19. T
20. E
21. F
22. K

BLM 1-2B, Chapter 2 Key Terms

1. alkali metals
2. atomic mass
3. Bohr-Rutherford
4. chemical symbol
5. electron shells
6. metalloids
7. metals
8. non-metals
9. periodic table
10. transition metals

BLM 1-2C, Chapter 3 Key Terms



Corrosion is an example of chemical change. The **reactants** are iron and oxygen, and the **product** is iron oxide (rust).

BLM 1-3, Safety Symbols

1. Answers will vary.
2. Poisonous: likely to cause illness or death if ingested or spilled on skin
   Flammable: will readily burst into flame
   Explosive: capable of exploding or likely to explode
   Corrosive: will corrode substances with which it comes in contact, including human flesh
3. Answers will vary.

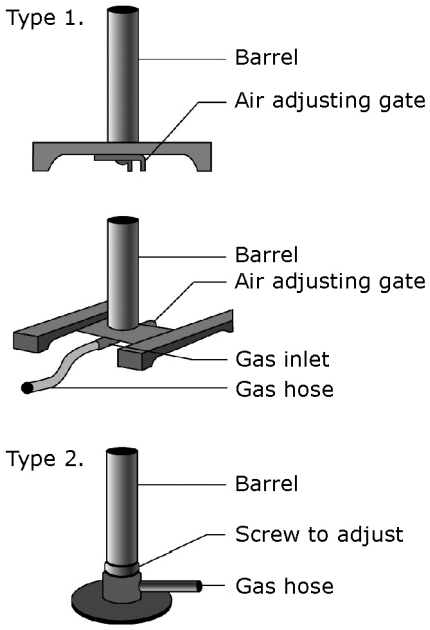
BLM 1-4, Using Material Safety Data Sheets

1.–13. Answers will vary depending on the MSDS chosen. The following answers should always be the same:
2. Nine sections.
3. Preparation Information: Product Identification; Components: Physical Data; Fire and Explosion; Hazard Data; Health Hazard and First Aid Data; Reactivity Data; Preventative Measures; Special Precautions or Comments.

BLM 1-5, Safety Scavenger Hunt

1. Fire blanket
2. Fire extinguisher
3. Emergency shower
4. Eye wash
5. Safety glasses
6. Emergency vent or fume closet
7. Emergency power off switch
8. First aid kit
9. Fire alarm/drill notice
10. Waste container(s)

BLM 1-6, Using a Bunsen Burner

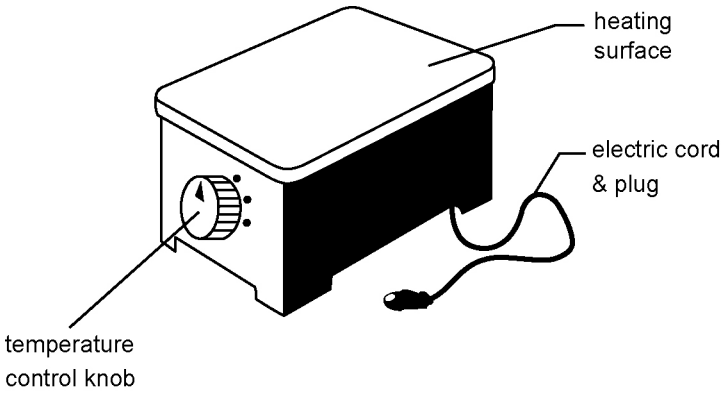


In order to light:

- Hold a lighted match or gas lighter next to the barrel of the burner.
- Turn on the gas.
- Adjust the flame from the air inlet.

1. (b) reduce the gas
2. (a) increase the amount of gas
3. (b) reduce the amount of air
4. (a) increase the amount of air

BLM 1-7, Using a Hot Plate



1. No, to avoid spills and burns, never leave heating equipment unattended.
2. The steps include:
   - Flush the area with cold water for 10 min.
   - Report the problem to the teacher.
   - Seek medical attention.
3. A safer way to heat an item. This involves heating water in which a beaker of another material is placed in order to heat the material inside the beaker with little risk.

   Using a hot plate, heat a large container of water. Fill another, smaller container with substance you want to heat, and place it in the hot water. Do not let the beaker touch the bottom of the container.
4. The steps include:
   - Make sure it is cool.
   - Wipe off all surfaces.
   - Coil the cord so that it does not get caught on other items.
   - Place a cover if one is available.

BLM 1-8, Using a Balance

1. Move riders to 0 to make sure that the balance is balanced before you attempt to determine the mass of the tem.
2. The largest
3. Room temperature (20°C). Substances change size with temperature. 100 cc of water is lighter or heavier depending on the temperature. Substances may also change state.
4. (a) Protect platform and prevent cross-contamination.
   (b) You have to subtract the mass of the beaker from the total mass in order to calculate the mass of the contents.
5. Students might show their markers at 100 g. They could then alter the amount of substance until the balance balances.

6. (a) pan
   (b) rider
   (c) pointer
   (d) beam
   (e) adjustment screw

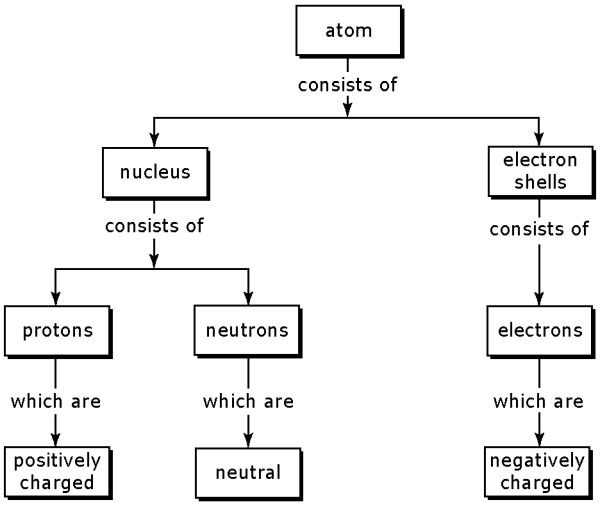
7.

Parts of a Balance	Function of Part
Pan	Holds item being weighed or massed.
Pointer	Located on the right side of the beams, this indicates whether or not something is in balance. The pointer should swing equal amounts above and below 0 when something is in balance.
Beam	Arm along which riders slide.
Adjustment screw	Used to adjust the scale if an empty platform does not make the pointer swing equally above and below 0 when the riders are at their 0 points.
Rider(s)	Weight(s) that can be moved along the beam to find the mass of the item.

BLM 1-9, Science Equipment

1. beaker
2. hot plate
3. graduated cylinder
4. test tube
5. funnel
6. tongs
7. microscope
8. balance
9. thermometer
10. stirring rod
11. Erlenmeyer flask

BLM 1-12, Parts of the Atom Concept Map



BLM 1-13, Subatomic Particles

1. Electron: in electron shell around nucleus; negative charge
   Proton: in nucleus; positive charge
   Neutron: in nucleus; neutral charge (uncharged)
2. A proton is any of the positive particles in the nucleus; an electron is any of the six particles in the two energy levels around the nucleus; a neutron is any of the uncharged particles in the nucleus; and the nucleus is the collection of protons and neutrons.
3. (a) positive
   (b) neutral (uncharged)

BLM 1-14, Chapter 1 Review

1. B
2. A
3. D
4. D
5. B
6. B
7. A
8. D
9. A
10. B
11. E
12. D
13. H
14. A
15. G
16. (a) Something unexpected and hazardous might occur when working without supervision or on an unapproved activity that you might not be able to deal with.
    (b) Another person working in the laboratory might spill something into your eye.
    (c) The lab is full of poisons–even the bench tops should be viewed as unclean from the point of view of food safety. (Students might also mention the distractibility of eating while they should be paying attention to their investigation.)
17. (a) All the atoms in a piece of copper are different from the atoms in a piece of gold. A copper atom cannot be converted (by non-nuclear means) into an atom of gold.
    (b) Atoms contain a tiny, dense, positively charged centre, which he called the nucleus.
    (c) Electrons exist in atoms by occupying specific energy levels or shells.
18. (a) In the nucleus
    (b) Electron(s)
    (c) In the nucleus (or in the protons)

BLM 1-16, Symbols for Elements

Description of Element	Name of Element	Symbol
It is the only gas in group 1.	hydrogen	H
This inert gas is in period 3.	argon	Ar
There is no heavier member of group 2.	radium	Ra
This element is the lightest of the halogens.	fluorine	F
Group 16 contains this reactive non-metal gas.	oxygen	O
The atomic mass of this metal is about 56.	iron	Fe

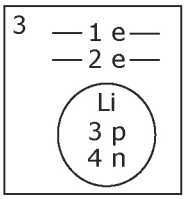
Period 6 contains this group 2 metal.	barium	Ba
This is the only liquid halogen.	bromine	Br
This metallic element is liquid at room temperature.	mercury	Hg
Photosynthesis produces this element.	oxygen	O
This is the lightest element in period 2.	lithium	Li

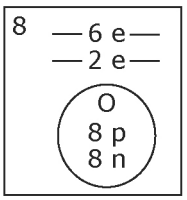
BLM 1-17, Common Elements

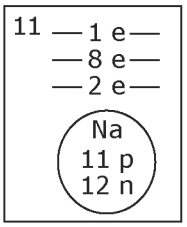
Name of Element	Symbol	Origin of Element's Symbol
Hydrogen	H	**H**ydros genes = water forming
helium	He	**He**lios = sun
Neon	Ne	**Ne**on = new
nitrogen	N	**N**itron = saltpeter (an explosive)
oxygen	O	**O**xygenes = acid forming
fluorine	F	**F**luere = Latin for flowing
chlorine	Cl	**C**h**l**oros from khloros = pale green
bromine	Br	**Br**omos = smelly
mercury	Hg	**H**ydrar**g**yrum = Latin for liquid silver
lithium	Li	**Li**thos = stone
sodium	Na	**Na**trium = Latin for sodium
potassium	K	**K**alium = Latin for potash
rubidium	Rb	**Rub**idus = Latin for red
cesium	Cs	**C**ae**s**ius = Latin for bluish-grey
beryllium	Be	**Be**ryllos = emerald
magnesium	Mg	**Mag**nesia = a place in Greece
calcium	Ca	**Ca**lx = Latin for limestone
strontium	Sr	**Str**ontian = a village in Scotland
barium	Ba	**Ba**rys = heavy
titanium	Ti	**Ti**tans = gods from Greek mythology
chromium	Cr	**Ch**roma = colour
manganese	Mn	**M**ag**n**esia negra = Latin for black magnesium
Iron	Fe	**Fe**rrum = Latin for iron
cobalt	Co	**Co**bald from kobold = German for goblin
nickel	Ni	kupfer **Ni**ckel = German for devil's copper
copper	Cu	**Cu**prum = Latin for Cyprian
Zinc	Zn	**Zin**k = German for zinc
silver	Ag	**Arg**entum = Latin for silver

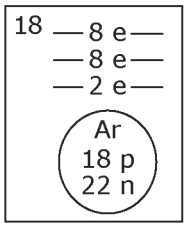
Gold	Au	**Au**rum = Latin for gold
Tin	Sn	**Sta**n**n**um = Latin for tin
Lead	Pb	**P**lum**b**um = Latin for lead
carbon	C	**C**arbo = Latin for coal
phosphorus	P	**P**hosphoros = bringer of light
sulphur	S	**S**ulphurium = Latin for sulphur
iodine	I	**I**odes = violet

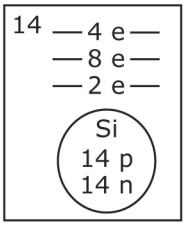
BLM 1-24, Bohr-Rutherford Diagrams

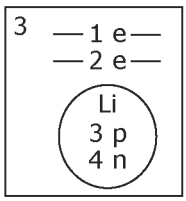
1. (a) 

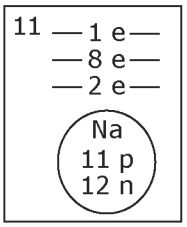
(b) 

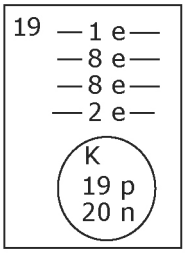
(c) 

(d) 

(e) 

2. (a) 

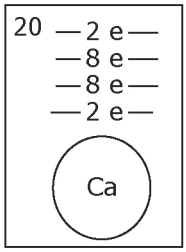
(b) 

(c) 

3. Each of the Bohr model diagrams for the alkali metals has the same number of electrons in the outer shell.
4. The elements in each row have one more shell than the elements in the row above it.
5. Six
6. Three
7. (a) beryllium
   (b) oxygen
   (c) neon
   (d) sodium
   (e) chlorine
   (f) calcium

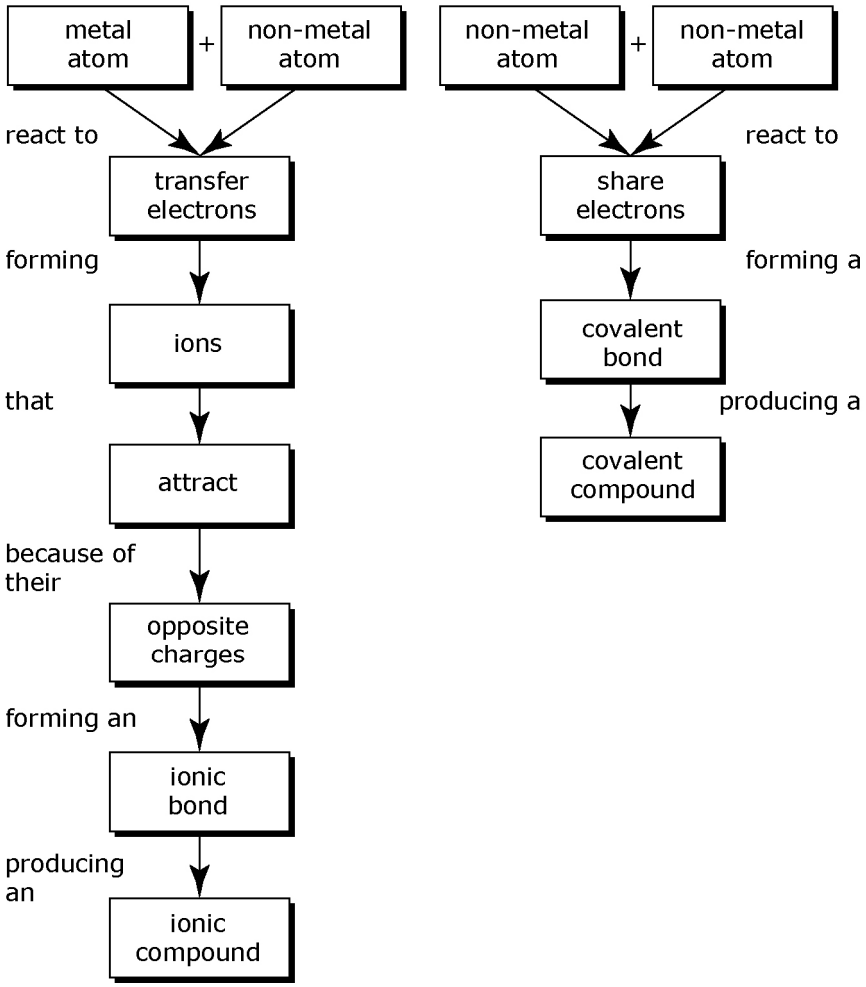
BLM 1-27, Chapter 2 Review

1. C
2. B
3. A
4. C
5. B
6. B
7. C
8. B
9. C
10. D

11. F
12. G
13. B
14. H
15. D
16. A
17. element symbol, atomic number, atomic mass, common ion charge
18. 

19. For example, soft, low melting point, highly reactive with air, highly reactive with water.

BLM 1-29, Chemical Bonds Concept Map



BLM 1-31, Kitchen Chemistry

Answers will depend on the product chosen. A sample answer for table salt is provided below.

1. Table salt
2. Salt (sodium chloride), calcium silicate, sugar, and potassium iodide
3.

	Ingredient 1	Ingredient 2	Ingredient 3
Name	sodium chloride	calcium silicate	potassium iodide
Formula	NaCl	Ca_2Sio_4	KI
Elements it contains	sodium and chlorine	calcium, silicon, and oxygen	potassium and iodine

4. Potassium iodide is added to salt to combat thyroid disease. Iodine prevents this disease, which often results in diminished mental capacity, physical exhaustion, and an enlarged thyroid gland, called a goitre.

BLM 1-32, Chemical Formulas

1. (a) sodium chloride
   (b) potassium iodide
   (c) lithium fluouride
   (d) copper oxide
   (e) lead chloride
   (f) zinc bromide
2. (a) carbon dioxide
   (b) sulphur dioxide
   (c) hydrogen monoxide (water)
   (d) aluminum dioxide
   (e) carbon dichloride
   (f) nitrogen trihydride (ammonia)

BLM 1-33, Ionic Compounds

1. (a) When an atom gains or loses an **electron**, an ion is formed. All ions have a **charge.**
   (b) Metals tend to form **positively charged** ions. Non-metals tend to form **negatively charged** ions.
   (c) When a metal atom reacts with a non-metal atom, one or more electrons are **transferred**, which results in the formation of ions. One of these ions will be **positive** and one will be **negative.** Because of these **opposite** charges, the ions **attract** each other, forming a(n) **ionic bond.**
2. (a) sodium chloride
   (b) lithium fluoride
   (c) silver bromide
   (d) magnesium nitride
3. Diagrams should show lithium with three electrons and fluorine with nine electrons. One electron from lithium is transferred to fluorine. They form an ionic bond where lithium is +1 and fluorine is –1.

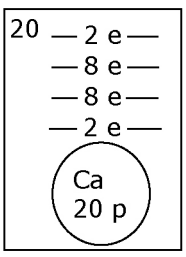
BLM 1-34, Forming Ionic Compounds

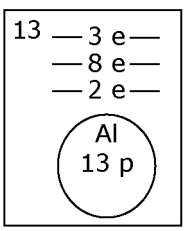
1. (b) and (c)
2. (a) Because it does not have eight electrons in the outer shell.
   (b) This atom must gain two electrons to become stable.
   (c) Diagram should show eight electrons in the outer shall.
3. An ionic bond is an attractive force between ions arising from their opposite charges.

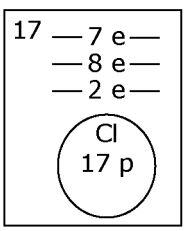
BLM 1-35, Chapter 3 Review

1. C
2. C
3. D
4. B
5. A
6. C
7. B
8. B
9. F
10. A
11. B
12. H
13. (a) Mg_3N_2
    (b) SiS_2
    (c) $(NH_4)_2SO_4$
14. In a chemical change new substances with new properties are produced, while in a physical change no new substances are produced.

BLM 1-37, Unit 1 Test

1. A
2. C
3. D
4. C
5. C
6. C
7. D
8. F
9. B
10. G
11. H
12. I
13. E
14. L
15. D
16. G
17. J
18. Diagrams should show five protons and six neutrons in the nucleus and five electrons, two in the first energy level and three in the second energy level.
19. (a) 

(b) 

(c) 

20. (a) silver
    (b) oxygen
    (c) boron
    (d) manganese
    (e) chlorine
21. For example, six of: silver/grey coloured, conduct heat, conduct electricity, malleable, ductile, shiny, react with air, react with water, low melting point, soft.
22. (a) sodium chloride
    (b) magnesium phosphide
    (c) iron(II) oxide
    (d) Potasium sulphide
23. (a) In a physical change, no new substances are formed, however in a chemical change new substances with new properties are formed as new chemical bonds form, and old ones break.
    (b) For example, melting ice is a physical change, while burning wood is a chemical change.

DATE: NAME: CLASS:

UNIT 1

Using Material Safety Data Sheets

BLM 1-4

Goal • Learn about the parts of a Material Safety Data Sheet.

Introduction

Material Safety Data Sheets (MSDS) contain important information about a substance. On an MSDS for a particular substance, you can find information about its chemical composition, safety precautions to take when handling it, first aid, and long-term effects of exposure. There are also directions on how to dispose of the chemical safely and clean up any spills. Whether it is toilet bowl cleaner, film developer, or sweetener, all chemicals have an MSDS.

What to Do

Choose a chemical, examine its MSDS, and then provide the information requested in the questions below.

Questions

1. Write the name and formula of the chemical.

   Name _____ Formula _____

2. How many sections is an MSDS divided into? _____

3. Name the titles of these sections.

   _____

   _____

   _____

   _____

   _____

4. Record the values from the MSDS for the following physical properties of this substance (be sure to include the proper units):

   (a) melting point _____

   (b) boiling point _____

   (c) vapour point _____

   (d) solubility in water _____

5. Does the MSDS indicate any special fire instructions or explosion hazard? If so, describe them.

_____

_____

_____

6. Describe two important health hazards associated with this substance.

_____

_____

_____

_____

7. If you get this substance in your eye, what first aid should be administered?

_____

_____

8. What skin protection should be used when handling this substance?

_____

9. How should spills be handled?

_____

10. How can this substance be disposed of safely?

_____

11. Describe any special storage or handling precautions.

_____

_____

_____

12. Where can the MSDS be found in your school?

_____

13. If you have a part-time job, ask your employer to show you where the MSDS are stored and how they are used in the business. Report your findings to the class.

_____

_____

_____

_____

DATE: NAME: CLASS:

UNIT 1

Safety Scavenger Hunt

BLM 1-5

Goal • Review your understanding of the equipment in your science classroom.

What to Do

Working in pairs, read the descriptions in the first column of the chart below.

- Identify each item by name.
- Find each item in your classroom.
- Taking turns, instruct each other on the proper use of each item.
- Record the name, location, and proper use of each item on the chart below.

Description	Name	Location	Proper Use
1. A piece of flameproof material.			
2. A cylinder with a nozzle at the top.			
3. A place with taps, spray, and drain.			
4. Bottles of saline solution.			
5. Eyewear with impact resistant lenses.			
6. A vent that takes fumes out of the air.			
7. A switch that controls the electrical source.			
8. A box containing gauze, swabs, bandages, and other medical equipment.			
9. The notice about where to go when you hear an alarm.			
10. The place for dangerous waste (e.g., broken glass).			

DATE: NAME: CLASS:

UNIT 1

Using a Bunsen Burner

BLM 1-6

Goal • Review what you know about Bunsen burners and their use.

Background Information

In elementary school, your classroom was possibly not equipped with a full science laboratory. For safety reasons, you probably used a hot plate to do all necessary heating. In high school, you are more likely to work with a Bunsen burner.

Bunsen burners use gas as a heat source. For this reason, they need to be handled with caution.

The burner has an inlet for gas and a vent for adjusting air to mix with the gas. To light a gas burner, first connect the burner's hose to the gas valve. Hold a lighted match or a gas lighter next to the end of the barrel of the burner, and then turn on the gas valve. Use the air inlet at the bottom of the burner to adjust the amount of air and the size of the flame. It takes practice to get the right mix of gas and air.

For maximum heat, place the object to be heated at the tip of the blue flame.

What to Do

Take the following steps to learn about the Bunsen burner or review how to use it.

- On the back of this page, draw a Bunsen burner and label its parts.
- List the three steps to take to safely light a gas burner.
- Answer the questions below.

Questions

Read the statements below. From your experience, choose the correct ending for the sentence. Write the letter in the space beside the question number.

____ 1. When the flame rises from a lighted Bunsen burner, you should...
(a) increase the gas.
(b) reduce the gas.

____ 2. If the flame appears to blow out on a lighted Bunsen burner, you should...
(a) increase the amount of gas.
(b) reduce the amount of gas.

____ 3. If a blue core appears in the flame, you should...
(a) increase the amount of air.
(b) reduce the amount of air.

____ 4. If the flame is yellow with no blue core, you should...
(a) increase the amount of air.
(b) reduce the amount of air.

DATE: NAME: CLASS:

UNIT 1

Using a Hot Plate

BLM 1-7

Goal • Review what you know about using hot plates as science equipment.

What to Do

Answer the questions below. Use the answers to create a poster to alert other students about the safe use of a hot plate. Draw your design on the back of this page. Be sure to include:

- a labelled diagram of a hot plate
- where a hot plate should be placed on a counter
- how to handle the power cord safely
- other equipment needed when using a hot plate (e.g., tongs, safety glasses)

Use a cartoon to show your most important safety message.

Questions

1. Is it okay to leave a hot plate unattended when it is on?
   Explain why or why not.

2. List the three steps to take if you burn yourself while using a hot plate:
   (a) _____
   (b) _____
   (c) _____

3. What is a "hot water bath"? Describe how to set one up using a hot plate.

4. What steps should you take when putting a hot plate away after use?

DATE: NAME: CLASS:

UNIT 1

Using a Balance

BLM 1-8

Goal • Review what you know about using a balance.

What to Do

- Label the diagram of the balance on the next page. Use the words provided.
- Complete the chart describing each part of a balance and what it does.
- Answer the questions below.

Questions

1. Describe what to do with the riders of a balance scale when you want to measure the mass of an object. Explain why this is necessary.

2. When determining the mass of an object on a balance, which rider do you move first?

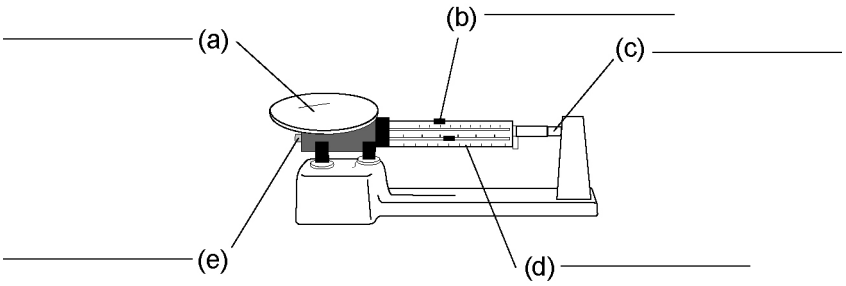
3. For an accurate measurement, an object should be at what temperature? Why?

4. Explain the importance of the following procedures:
   (a) Chemicals and powders must not be placed directly on the balance.

   (b) You must measure the mass of a beaker before measuring the mass of a chemical or powder inside the beaker.

5. Draw a diagram to show how to use a balance to measure a fixed amount of a substance with a mass of 100 g.

6. Label the balance with the following terms: pan, pointer, rider, beam, adjustment screw.



7. List the parts of a balance below. Describe the function of each part.

Parts of a Balance	Function of Part

DATE: NAME: CLASS:

UNIT 1

Science Equipment

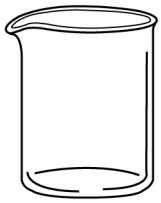
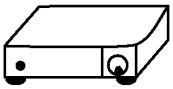
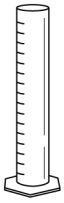
BLM 1-9

Goal • Identify equipment used in a science classroom.

What to Do

Study each picture in the chart, and find the piece of equipment in your classroom.

- In the second column, write the name of the piece of science equipment.
- In the other three columns, describe where you can find the equipment, how you use it, and what safety procedures are necessary.

Equipment	Name	Location	How It Is used	Safety Procedures
				
				
				
				
				

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BLM 1-9 continued

Equipment	Name	Location	How It Is used	Safety Procedures