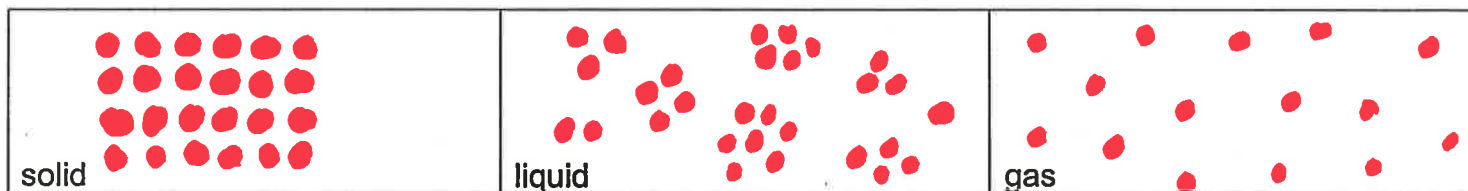


A. Particle Theory of Matter

1. Explain why heating an aerosol can might cause it to explode according to the Particle Theory.

Particles move faster, hit with more force on sides of can until it explodes

2. Draw an ice cube in its solid, liquid, and gaseous state, using the particle theory:



B. Physical & Chemical Properties and Changes

1. Show that you understand the following properties of matter BY READING THE DEFINITION IN YOUR NOTES AND EXPLAINING IT IN YOUR OWN WORDS. Also identify each property as chemical or physical.

(P) State → solid, liquid or gas (P) Malleability → bend & hammer into shapes
 (P) Ductility → stretch into wires (C) Combustibility → burns with oxygen
 (C) Reacts with acid → new substance forms (P) Conductivity → transfers heat and electricity

2. What type of change (physical or chemical) occurs?

- a) mixing salt and pepper Physical why? mixture, nothing new
- b) burning a log Chemical why? new products, heat + light
- d) demolishing a car Physical why? change of shape only
- e) baking a cake Chemical why? new properties; taste, colour, texture, smell

C. Classification of Matter

1. Complete the table: (Use your notes!)

Type	Explain what this type is	Hetero/Homogeneous	Two examples
solution	(one phase) Mixture	Homogeneous	1. Salt water 2. Koolaid
mechanical mixture	(2 or more phases) Mixture	Hetero	1. Oil + Vinegar 2. Sand
element	Pure (one atom) Substance	Homogeneous	1. Sulfur 2. Carbon
compound	Pure (2 atoms bonded) Substance	Homogeneous	1. Sodium chloride 2. Water (H ₂ O)

A. Particle Theory of Matter

1. What are the points of the Particle Theory?

1. Matter is made of tiny particles.
2. Particles are in constant motion.
3. Particles are attracted to each other.
4. Spaces between particles are large compared to the particles themselves.
5. Each substance has unique particles.
6. Particles move faster at higher temps.

2. Explain why heating an aerosol can might cause it to explode according to the Particle Theory.

3. Draw an *ice cube* in its solid, liquid, and gaseous state, using the particle theory:

solid	liquid	gas
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B. Physical & Chemical Properties and Changes

1. Show that you understand the following properties of matter **BY READING THE DEFINITION IN YOUR NOTES AND EXPLAINING IT IN YOUR OWN WORDS.** Also identify each property as chemical or physical.

State

Malleability

Ductility

Combustibility

Reacts with acid

Conductivity

2. Fill in the chart below:

Example	Physical or chemical property?
A piece of aluminum is shiny	Physical
Sodium bicarbonate will bubble when acid is added to it	Chemical
Copper can be pulled into wires	Physical
Wood will burn when exposed to a flame	Chemical
Iron will rust when exposed to oxygen	Chemical

3. What type of change (physical or chemical) occurs? Give a reason why you know this.

- a) mixing salt and pepper _____ why? _____
- b) burning a log _____ why? _____
- d) demolishing a car _____ why? _____
- e) baking a cake _____ why? _____

- f) melting popsicle physical why? change of state
- g) dissolving sugar in water physical why? dissolving only
- h) toasting marshmallows chemical why? new colour, taste

3. What are five clues that a chemical change has occurred?

- colour change
- heat or light produced
- new gas produced
- new solid (precipitate)
- change of taste
- new texture

4. Density Word Problems ($D = m/V$)

Use the following table to help with your questions.

Substance	Density (g/cm ³)
aluminum	2.7
ice	0.92
distilled water	1.0



Show all appropriate steps to solve the following problems.

a) What is the mass of 30 cm³ of aluminum?

$$m = D \times V$$

$$= 2.7 \times 30$$

$$= 81g$$

b) What is the volume of 100 g of ice?

$$V = \frac{m}{D} = \frac{100g}{0.92} = 108.7 \text{ mL}$$

c) What is the density of a substance that has a mass of 67g and a volume of 44mL? Will it float or sink in water?

$$D = \frac{m}{V} = \frac{67g}{44 \text{ mL}} = 1.5 \text{ g/mL} \quad \underline{\underline{\text{Sink}}}$$

d) What is the density of a rectangular solid with dimensions 16 cm x 50 cm x 100 cm and a mass of 30 000 g?

$$V = l \times w \times h$$

$$= 16 \times 50 \times 100$$

$$= 80000 \text{ cm}^3$$

$$D = \frac{m}{V}$$

$$= \frac{30000g}{80000 \text{ cm}^3}$$

$$= 0.375 \text{ g/cm}^3$$

C. Classification of Matter

1. Complete the table: (Use your notes!)

Type	Definition of term	Hetero/Homo- geneous	Example
solution			
mechanical mixture			
element			
compound			

2. Identify the following as an element, compound, solution or mechanical mixture.

Sodium chloride (NaCl)	COMPOUND
Salt water	SOLUTION
Mixed vegetable	MECHANICAL MIXTURE
Aluminum (Al)	ELEMENT
Tomato juice	MECHANICAL MIXTURE

D. Elements and the Periodic Table

1. Use the periodic table to complete this table:

Symbol	Element name	Atomic number	Atomic MASS number	# of Protons	# of Electrons	# of Neutrons
Pd	Nitrogen	74				
Co						
F	Fluorine	9	19	9	9	10

2. Fill in the following table.

	State	Appearance and One Example	Conductivity	Malleable and Ductile?
Metals				

D. Elements and the Periodic Table

1. Use the periodic table to complete this table:

Mass-Atomic

Symbol	Element name	Atomic number	Atomic MASS number	# of Protons	# of Electrons	# of Neutrons
Pd	palladium	46	106	46	46	60
N	Nitrogen	7	14	7	7	7
W	tungsten	74	184	74	74	110
Co	cobalt	27	59	27	27	32
O	oxygen	8	16	8	8	8
U	uranium	92	238	92	92	146

2. Fill in the following table.

	State	Appearance	Conductivity	Malleable and Ductile?
Metals	(1 liquid) Solids	shiny, silver tin, silver	Yes	Yes
Non-metals	S, L, G	brittle, many colours Sulphur Carbon	No	No
Metalloids	Solids	inbetween silicon	Semi-	No

- What are the only two liquids at room temperature on the periodic table? Hg, Br
- Are there more solids or gases on the periodic table? Solids
- On the periodic table, the columns are called groups or families.
- On the periodic table, the rows are called periods.
- What do all of the elements have in common if they're in the same column of the periodic table?
- Name each of the following groups and state what makes them unique.
 - Group 18 - Noble gases (full outer shell, stable)
 - Group 17 - Halogens (mostly gases, reactive)
 - Group 1 - Alkali Metals (reactive metals)
 - Group 2 - Alkaline Earth Metals (quite reactive)
- List the elements (metals) from the Flame Test Lab and identify their flame colour.

Element	Flame Colour	Element	Flame Colour
Copper	Green	Potassium	Pink
Sodium	Orange	Calcium	Orange
Strontium	Lavender	Lithium	Red

E. Chemical Formulas

1. Complete this table.

Name of Substance	Chemical Formula	Compound or Element?	Elements present	How many atoms of each element?	Total no. of atoms

helium gas	He	E	helium	1	1
iron (II) sulfate	FeSO ₄	C	iron sulfur oxygen	1 Fe, 1 S 4 O	6
iron (II) nitrate	Fe(NO ₃) ₂	C	iron, oxygen nitrogen	1 Fe, 2 N, 6 O	9
potassium iodide	KI	C	potassium iodine	1 K, 1 I	2
chlorine	Cl ₂	E	chlorine	2 Cl	2

2. What is the smallest unit of an element called? atom

3. What is the smallest unit of a compound called? molecule

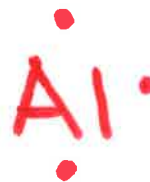
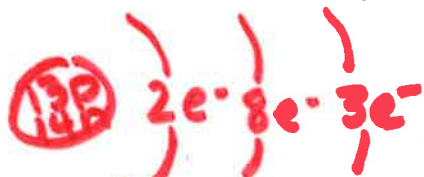
F. Models of the Atom, Elements and Isotopes

1. Draw a Bohr-Rutherford model for an atom with 7 protons, 7 neutrons, 7 electrons. Label all parts, including the nucleus. Then draw the electron dot diagram for this element.



What element is it? nitrogen

2. Draw an atom with 13 protons, 14 neutrons, and 13 electrons. Label all parts, including the nucleus. Then draw the electron dot diagram for this element.



What element is it? aluminum

G. Gas Tests

1. List the three gases and the tests used to identify them, in the "Mystery Gases" Lab.

H. Ionic and Covalent Bonds

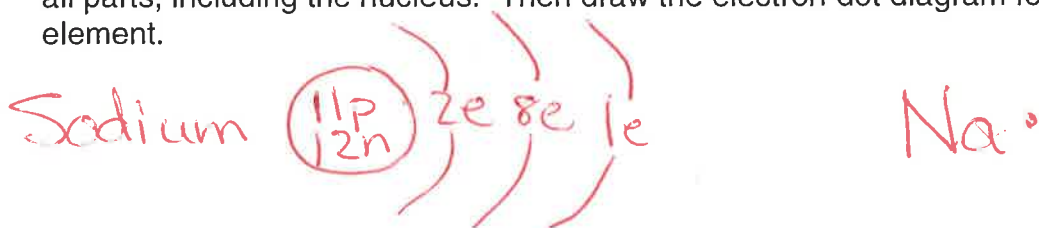
When an object is found in the periodic table, it is not considered stable unless it is found in group 18. All of the atoms in this group have full shells. All atoms on the periodic table want to be stable. They either lose, gain or share electrons to do this. Metals lose electrons; this means that they have a positive charge when they are ions. Non-metals gain electrons; this means that they have a negative charge when they are ions. When non-metals bond with non-metals they share electrons.

F. Models of the Atom, Elements and Isotopes

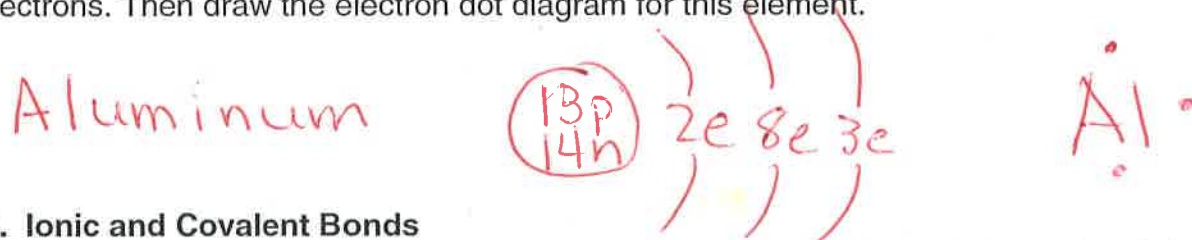
1. Complete the following chart for the atom.

Subatomic particle	Relative size/mass	Location	Electrical charge
Proton	1 amu	in nucleus	+1
Electron	0	outside nucleus	-1
Neutron	1	in nucleus	0

2. Draw a Bohr-Rutherford model for an atom with 11 protons, 12 neutrons, and 11 electrons. Label all parts, including the nucleus. Then draw the electron dot diagram for this element. Name the element.



3. Draw a Bohr-Rutherford model of Aluminum. Identify the number of protons, neutrons and electrons. Then draw the electron dot diagram for this element.



G. Ionic and Covalent Bonds

When an object is found in the periodic table, it is not considered stable unless it is found in group 18. All of the atoms in this group have full shells. All atoms on the periodic table want to be stable. They either lose, gain or share electrons to do this. Metals lose electrons; this means that they have a positive charge when they are ions. Non-metals gain electrons; this means that they have a negative charge when they are ions. When non-metals bond with non-metals they share electrons.

2. What are the two types of compounds we learned? Indicate four characteristics/properties that can be used to tell them apart.

Type of Compounds	Ionic	Covalent/ Molecular
Characteristics or Properties	<ul style="list-style-type: none"> - soluble in water - good conductors when liquid - crystalline - hard & brittle - solid - high boiling points 	<ul style="list-style-type: none"> - not soluble - do not conduct - low b.p. - soft - solid, liquid, gas

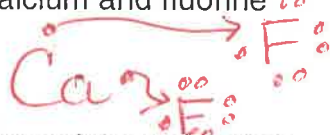
3. The bonds that form in ionic compounds are called ionic bonds. How are they formed? What type of elements are they always formed between? Electrons transferred from metals to non-metals

4. The types of bonds that form in molecular compounds are covalent. How are they formed? What type of elements are they always formed between?

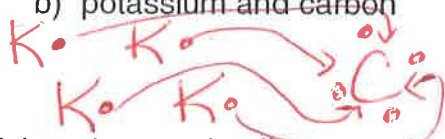
electrons shared between non-metals

5. Show how ionic bonds would form between the following elements.

a) calcium and fluorine



b) potassium and carbon



6. Using electron dot diagrams show how the following molecules would form by sharing electrons.

a) HCl



b) OF₂



c) NH₃



7. Write the chemical formulas for the following ionic compounds.

Sodium fluoride NaF

Calcium chloride CaCl₂

Magnesium nitride Mg₃N₂

Beryllium phosphide Be₃P₂

Sodium oxide Na₂O

Magnesium sulphide MgS

8. Write the chemical formulas for the following molecular compounds.

Carbon dioxide CO₂

trinitrogen tetraphosphide N₃P₄

Diphosphorus trisulfide P₂S₃

silicon monoxide SiO

9. Name the following ionic compounds.

ZnS zinc sulphide

K₂O potassium oxide

AgI silver iodide

Ca₃P₂ calcium phosphide

10. Name the following molecular compounds.

P₅N₃ pentaphosphorus trinitride

SO₃ sulfur trioxide

P₂O₄ diphosphorus tetraoxide

H. Gas Tests

1. List the three gases and the tests used to identify them.

Gas	Test
Oxygen	glowing splint relights
Hydrogen	burning splint pops
Carbon dioxide	burning splint goes out