Chemistry Unit ~ Learning Guide

Name: _____

INSTRUCTIONS

Complete the following practice questions as you work through the related lessons. You are required to have this package completed **BEFORE** you write your unit test. Do your best and ask questions about anything that you don't understand **BEFORE** you write the unit test.

2.1 PRACTICE: SAFETY RULES

1. Please indicate whether the following statements are true or false. If the statement is false please provide a corrected statement in the space provided below it. (6 marks)

a. _____ If you are unsure about any lab instructions you should proceed (go ahead) with the lab using your best judgment.

b. _____ Science requires creativity so feel free to create and do any of your own experiments without adult supervision.

c. _____ You should know the location of all safety and first aid equipment before you proceed with an experiment.

d. _____ It is only necessary to tie back long hair and avoid loose clothing such as scarves, ties, long necklaces and head/ear phone cords if you are using fire.

e. _____ You should wear all proper safety protection as instructed by your teacher.

f. _____ It is fine to proceed with an experiment if you are unsure of the safety symbols (HHPS and WHMIS) as long as you do not see a skull and cross bones label.

2. Below is a picture of a poorly managed Science 10 laboratory. Please identify and list at least five activities being performed in the picture below that appear unsafe and likely to lead to undue pain and suffering either for the perpetrator or those around him/her. (5 marks)

a. _____

_____

b. _____

_____

c. _____

_____

d. _____

_____

e. _____

_____

3. Below is a picture of a poorly managed Science 10 laboratory. Despite poor management some students have figured out how to keep themselves and those around them safe. Please identify and list at least five activities being performed in the picture below that appear safe and will likely prevent undue pain and suffering either for the perpetrator or those around him/her. (5 marks)

a. _____

_____

b. _____

_____

c. _____

_____

d. _____

_____

e. _____

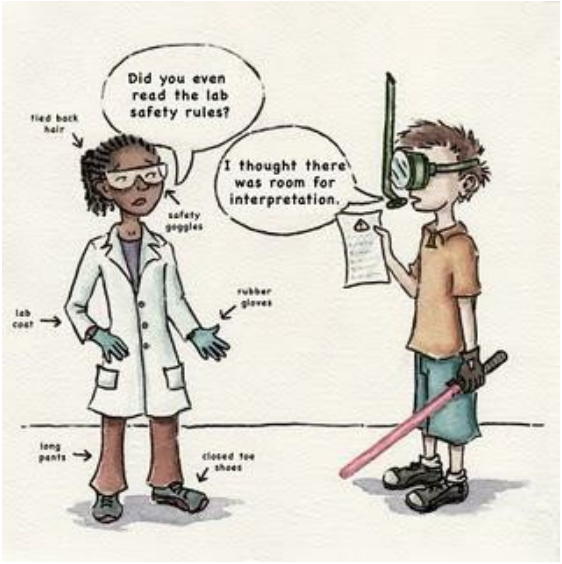
_____

4. While fires can be very useful, they also have their drawbacks:

a. W h a t should a person do if they are on fire? (1mark)

b. W h a t are three ways to safely extinguish a chemical fire? (3 marks)

YOU SHOULD COMPLETE THE ONLINE *SAFETY RULE MATCHING* ACTIVITY BEFORE YOU PROCEED ANY FURTHER!



PRACTICE: HHPS AND WHMIS

1. What does HHPS and WHMIS stand for? (2 marks)

2. Please match the symbol on the left with the appropriate description on the right. (6 marks)

i. _____ 

ii. _____ 

iii. _____ 

iv. _____ 

v. _____ 

vi. 

a. Indicates explosive such as aerosol cans.

b. Indicates corrosive, contains materials that will burn skin, eyes, throat and stomach such as oven cleaner.

c. Indicates product is poisonous and will cause illness or death if ingested such as furniture polish.

d. Indicates flammable and will catch fire easily near heat, sparks or flames such as gasoline and hair spray.

e. Indicates materials **within the container** are dangerous, this symbol usually has further symbols within it such as the corrosive, flammable or poisonous symbol.

f. Indicates the container itself is dangerous, it can explode if heated or punctured leading to flying bits of metal or plastic that can cause serious injury.

3. Please match the symbol on the left with the appropriate description on the right. (8 marks)

i. 

ii. 

iii. 

iv. 

v. 

vi. 

vii. 

viii. _____ 

a. Oxidizing material.

b. Dangerously reactive material.

c. Compressed gas.

d. Poisonous and infectious material causing other toxic effects.

e. Corrosive material.

f. Biohazardous infectious material.

g. Flammable and combustible material.

h. Poisonous and infectious material causing immediate and serious toxic effects.

4. Please find and list at least two products that display the following symbols; either from your cupboards at home or workplace or the aisles of a grocery store or hardware store. (8 marks)

a. 

i. _____
ii. _____

b.  or 

i. _____
ii. _____

c.  or 

i. _____
ii. _____

a.  or 

i. _____
ii. _____

5. Where, other than in a school, might you see the following symbol? (1 mark)

_____

6. Where, other than in a school, might you see the following symbol? (1 mark)

_____

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2.2 NOTES: Conservation of Mass

Chemical reactions result in _____.

- Chemical changes occur when new substances are created.
- The original substance(s), called _____, change into new substance(s) called _____.

Chemical reactions can be written in different ways.

- A _____:
  - Nitrogen monoxide + oxygen --> nitrogen dioxide
- A _____:
  - $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$

Coefficients (big numbers in front of compounds)

- indicate the ratio of compounds in the reaction

- here, there is _____ as much NO and NO_2 than there is O_2.

State of matter

- Letters indicate the state of each compound

(aq) =

(s) =

(l) =

(g) =

Conservation of Mass

Chemical change means _____ are created.

- BUT no new matter is created or destroyed; atoms are just _____.
- _____ =

- John Dalton, 200 years ago, realized that atoms simply rearrange themselves during chemical reactions.
- _____ =

The Law of Conservation of Mass

- In chemical reactions, atoms are

- Developed by Antoine Lavoisier and his wife Marie-Anne in the 1700s
- _____ =

Writing Chemical Equations

The simplest form of chemical equation is a

- Not much information other than the elements/compounds involved
- Potassium metal + oxygen gas → potassium oxide
- reactants appear on the left of the arrow and products appear on the right

A skeleton equation shows the formulas of the elements/compounds

-
- $K(s) + O_2(g) \rightarrow K_2O(s)$

A balanced chemical equation

- Balancing ensures that the number of each atom is the same on both sides of the reaction arrow
- Always use the smallest whole number ratio
- $4K(s) + O_2(g) \rightarrow 2K_2O(s)$

Balancing Chemical Equations

Because of the Law of Conservation of Mass, we can count atoms and use math to balance the number of atoms in chemical equations.

- Word equation: Methane + oxygen → water + carbon dioxide
  - Skeleton equation: $CH_4(g) + O_2(g) \rightarrow H_2O(l) + CO_2(g)$

- To balance the compounds, take note of how many atoms of each element occur on each side of the reaction arrow:

1 Carbon, 4 Hydrogen, 2 Oxygen --> 1 Carbon, 2 Hydrogen, 3 Oxygen

•

1 Carbon, 4 Hydrogen _____ Oxygen --> 1 Carbon, _____ Hydrogen,

_____+2 Oxygen

- Balanced equation: CH_4*(g)* + $2O_2$ *(g)* --> $2H_2O$*(l)* + CO_2*(g)*

Balance chemical equations by following these steps:

- Trial and error will work, but can be very inefficient
- Balance _____, elements last
- Balance one compound at a time
- Only add coefficients; NEVER change subscripts!
- If _____ appear in more than one place, attempt to balance them
- Polyatomic ions (such as SO_4^{2-}) can often be
- Always double-check after you think you are finished!

Balance the following:

$Fe + Br_2 \rightarrow FeBr_3$

$Sn(NO_2)_4 + K_3PO_4 \rightarrow KNO_2 + Sn_3(PO_4)_4$

$C_2H_6 + O_2 \rightarrow CO_2 + H_2O$

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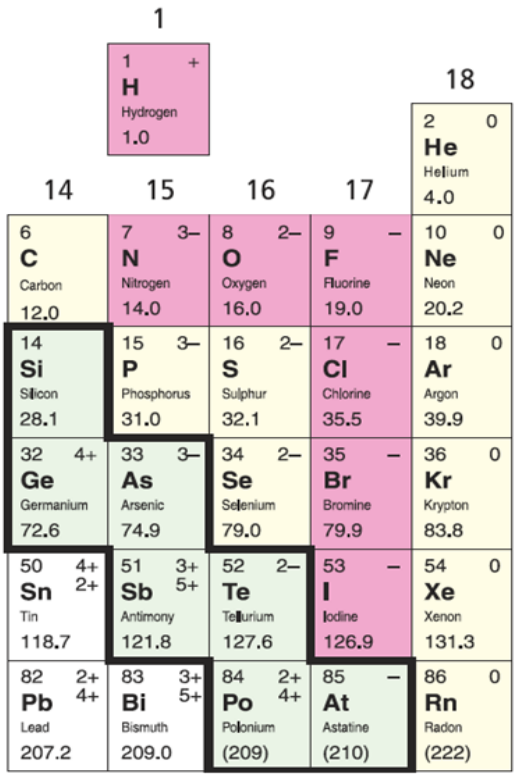
Writing Word Equations

Word equations require careful examination to be written correctly.

- The chemical symbol is used for most elements but not in a compound.
  - Be careful of diatomic and polyatomic elements such as O_2, P_4 and S_8
  - The “special seven” are all diatomic elements
    -

- Several common covalent molecules containing hydrogen have common names that do not help in writing chemical formulas
  - For example, methane = _____, glucose = _____, Ethane = _____, Ammonia =

The pink shaded area in the picture below shows the diatomic atoms.



2.2 PRACTICE: Balancing Chemical Equations

1. Please Complete Check Your Understanding - Balancing.

2. In a chemical reaction, what do we call the original substances?

3. In a chemical reaction, what do we call newly made substances?

4. What are the three common states of matter?

5. If the mass of all the reactants in a chemical reaction is 100g, what will the mass of all the products be?

6. Please balance the following reactions. Use the table to show your work.

___Mg + __HCl ⟶ _____$MgCl_2$ + _____H_2

Reactants	Products

___Mg + __N_2 ⟶ ___Mg_3N_2

Reactants	Products

___Ba + __HBr ⟶ _____$BaBr_2$ + _____H_2

Reactants	Products

___$BiCl_3$ + __H_2S ⟶ _____Bi_2S_3 + _____HCl

Reactants	Products

___Br_2 + __KI ⟶ __I_2 + __KBr

Reactants	Products

___Fe + __O_2 ⟶ _____Fe_3O_4

Reactants	Products

___CaO + __C ⟶ ___CaC_2 + __CO_2

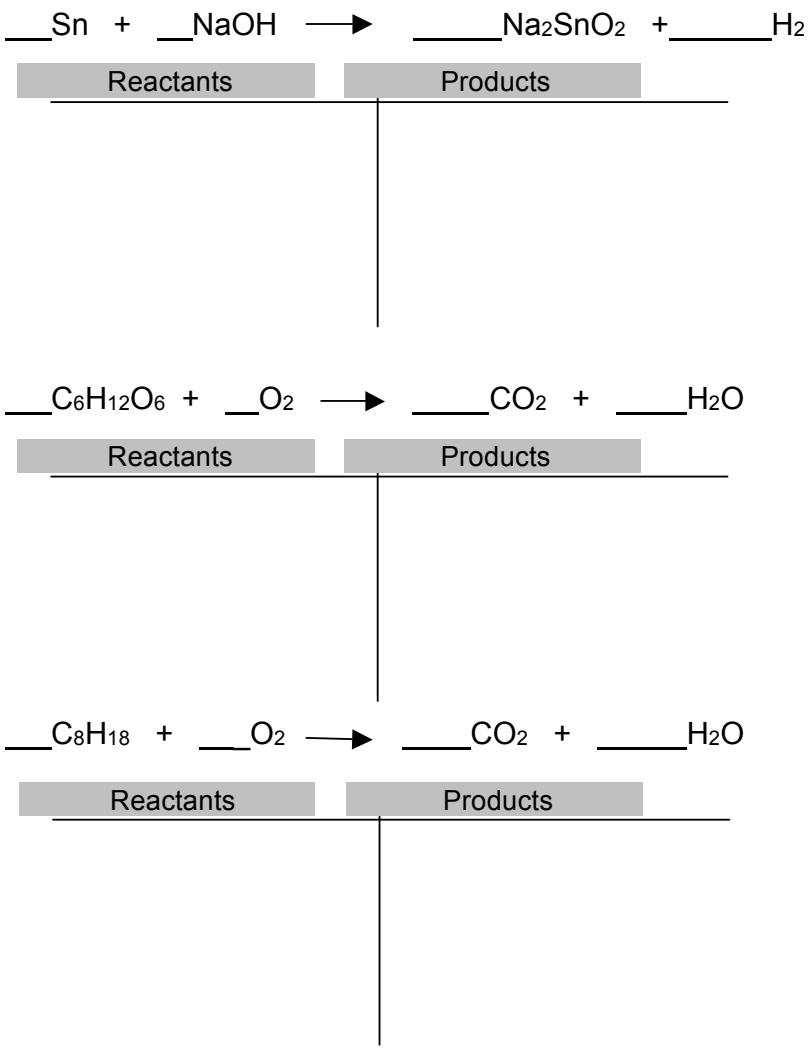
Reactants	Products

___Bi_2O_3 + __H_2 ⟶ _____Bi + ____H_2O

Reactants	Products

___P_4 + __I_2 ⟶ _____PI_3

Reactants	Products



7. What are the seven diatomic molecules? It is strongly recommended you memorize these.

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2.3 NOTES: Energy Changes in Chemical Reactions

Exothermic Reactions

These are reactions which _____energy. Energy in chemical reactions is measured in _____ (kJ). Consider the following hypothetical reaction:

$$x_2 + y_2 \rightarrow 2xy$$

50 kJ of energy are required to _____ that hold the x's and y's together in their respective molecules, but 100 kJ is released when xy forms.

$$50\ kJ + x_2 + y_2 \rightarrow 2xy + 100\ kJ$$

simplified

$$x_2 + y_2 \rightarrow 2xy + 50\ kJ$$

The _____ is that 50 kJ of energy are released.

Reactions of this sort which produce energy are called _____ reactions. "Exo" means "out" and "therm" refers to _____. So, "exothermic" means that heat is coming out, or being produced.

Reactants → Products + _____

An example of an exothermic reaction occurs during _____ in animals and plants. The reaction involves "burning" sugar (glucose $C_6H_{12}O_6$ (s)) to produce energy. Oxygen from the air is required.

$$C_6H_{12}O_6(s) + 6\ O_2(g) \rightarrow 6\ CO_2(g) + 6\ H_2O(l) + 2803\ kJ$$

Endothermic Reactions

There is a net requirement or _____ in some chemical reactions. The bond breaking process in the reactants requires more energy than is released in total. Energy from an external source must be absorbed.

_____ + Reactants → Products

Such reactions which absorb energy are called _____ reactions. ("Endo" means "into.")

Plants have the ability to use the sun's energy to convert carbon dioxide and water into glucose and oxygen. This is the opposite process of cellular respiration and is called _____:

$$6\ CO_2(g) + 6\ H_2O(l) + 2803\ kJ\ (\text{from the sun}) \rightarrow C_6H_{12}O_6(s) + 6\ O_2(g)$$

2.3 PRACTICE: Energy in Chemical Reactions

Before you complete the practice below read Energy Changes During Chemical Reactions.

1. State whether each of the following are exothermic or endothermic.

Reaction or Event	Exo or Endo
$2\ C_8H_{18} + 25\ O_2 \rightarrow 16\ CO_2 + 16\ H_2O + 10110\ kJ$	
$Ba(OH)_2 + 2\ NH_4Cl + 430\ kJ \rightarrow BaCl_2 + 2\ NH_4OH$	
$6\ SOCl_2 + CoCl_2 \bullet 6H_2O \rightarrow CoCl_2 + 12HCl + 6\ SO_2 \quad \Delta H = +360\ kJ$	
$Mn(s) + 2\ HCl(aq) \rightarrow MnCl_2(aq) + H_2(g) \quad \Delta H = -221\ kJ$	
Boiling Water	
Metabolizing Food	
The energy possessed by the products is greater than the energy possessed by the reactants.	

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2.4 NOTES: Types of Chemical Reactions

Synthesis - Synthesis reactions are also known as _____.

Definition: A synthesis reaction is when
(usually elements) join to form a _____.

_____where A and B represent _____.
The elements may form _____, like these:

- Sodium metal and chlorine gas combine to form sodium chloride.
  $2Na + Cl_2 \rightarrow 2NaCl$
- Magnesium metal reacts with oxygen gas to form magnesium oxide.
  $2Mg + O_2 \rightarrow 2MgO$

Or the elements may form _____, like this:

- Nitrogen gas and oxygen gas join to form dinitrogen monoxide.
  $2N_2 + O_2 \rightarrow 2N_2O$

Decomposition - Decomposition reactions are the _____.

Definition: A decomposition reaction is when _____into two or more products (often elements).

- where A and B represent elements
  Ionic compounds may decompose to produce elements, like this:
- Table salt, sodium chloride, can be broken down into sodium metal and chlorine gas by melting salt at 800ºC and running electricity through it.
  $2NaCl \longrightarrow 2Na + Cl_2$

Covalent compounds may decompose into elements, like this:

- By running electricity through water, the water molecules decompose into hydrogen and oxygen gases.
  $2H_2O \longrightarrow 2H_2 + O_2$

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Single Replacement - Single replacement reactions replace _____with a _____ added as a reactant.

Definition: A single replacement reaction is when a compound and an element react, and the element switches places with part of the original compound. Positive ions will only replace a positive ion and negative ions will only replace a negative ion.

- _____ where A is a metal, or
- _____ where A is a non-metal

When A is a metal:

- Aluminum foil in a solution of copper (II) chloride produces solid copper and aluminum chloride.

  $Al + CuCl_2 \longrightarrow Cu + AlCl_3$

When A is a non-metal:

- When fluorine is bubbled through a sodium iodide solution, iodine and sodium fluoride are produced.

  $F_2 + NaI \longrightarrow I_2 + NaF$

Double Replacement - Double replacement reactions

_____ **reacting together to form two new compounds.**

Definition: Double Replacement is when

_____, with elements switching places between the original compounds.

- Two elements switch partners.

- When potassium chromate and silver nitrate react, they switch partners to form silver chromate and potassium nitrate.

  $K_2CrO_4 + AgNO_3 \longrightarrow Ag_2CrO_4 + KNO_3$

Neutralization - Neutralization reactions occur when an

_____.

Definition: Neutralization is when an_____ (most compounds starting with H) and a

_____(most compounds ending in OH, or beginning with NH4) react.

-
- $HX + MOH \rightarrow MX + H_2O$ where X and M are elements

- Sulphuric acid is used to neutralize calcium hydroxide:
  $H_2SO_4 + Ca(OH)_2 \rightarrow CaSO_4 + 2H_2O$
- Phosphoric acid helps to neutralize the compounds that cause rust, such as iron (II) hydroxide.
  $H_3PO_4 + 3Fe(OH)_2 \rightarrow Fe_3(PO_4)_2 + 6H_2O$

Combustion - Combustion reactions occur when a

_____with _____to release

_____ and produce an

Also sometimes referred to as hydrocarbon combustion
Definition: A combustion reaction is when a hydrocarbon reacts with Oxygen to produce Water and Carbon Dioxide

-

  where X and Y represent integers
  - Natural gas (methane) is burned in furnaces to heat homes.
    $CH_4 + O_2 \rightarrow CO_2 + 2H_2O$
  - An acetylene torch is used to weld metals together
    $2C_2H_2 + 5O_2 \rightarrow 4CO_2 + 2H_2O$
  - Carbohydrates like glucose combine with oxygen in our body to release energy.
    $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

2.4 PRACTICE: Types of Chemical Reactions

1. For each of the 6 types of reactions provide a definition, a general reaction involving letters and an example. The first one is done for you.

Synthesis	
Definition	A synthesis reaction is when two or more reactants (usually elements) join to form a compound.
General Equation	$A + B \rightarrow AB$
Example	$2Na + Cl_2 \quad 2NaCl$

Decomposition	
Definition	
General Equation	
Example	

Single Replacement	
Definition	
General Equation	
Example	

Double Replacement	
Definition	
General Equation	
Example	

Neutralization	
Definition	
General Equation	
Example	

Combustion	
Definition	
General Equation	
Example	

2. Classify the following reactions as synthesis (SYN), decomposition (DEC), single replacement (SR), double replacement (DR), neutralization (NEU) or combustion (COMB). IF you want extra balancing practice then also balance the reactions.

a. _____ __H_2O_2 → __ H_2O + __O_2

b. _____ __HCl + __NaOH → __NaCl + __H_2O

c. _____ __Al + __$NiBr_2$ → __$AlBr_3$ + __Ni

d. _____ __N_2 + __H_2 → __NH_3

e. _____ __$AgNO_3$ + __KCl → __AgCl + __KNO_3

f. _____ __C_6H_6 + __O_2 → __CO_2 + __H_2O

g. _____ $\_\_Mg + \_\_HCl \rightarrow \_\_MgCl_2 + \_\_H_2$

h. _____ $\_\_Mg + \_\_N_2 \rightarrow \_\_Mg_3N$

i. _____ $\_\_Ba + \_\_HBr \rightarrow \_\_BaBr_2 + \_\_H_2$

j. _____ $\_\_BiCl_3 + \_\_H_2S \rightarrow \_\_Bi_2S_3 + \_\_HCl$

k. _____ $\_\_Br_2 + \_\_KI \rightarrow \_\_I_2 + \_\_KBr$

l. _____ $\_\_Fe + \_\_O_2 \rightarrow \_\_Fe_3O_4$

m. _____ $\_\_C_4H_{10} + \_\_O_2 \rightarrow \_\_CO_2 + \_\_H_2O$

n. _____ $\_\_CaO + \_\_C \rightarrow \_\_CaC_2 + \_\_O_2$

o. _____ $\_\_ LiOH + \_\_ HBr \rightarrow \_\_ LiBr + \_\_H_2O$

p. _____ $\_\_Bi_2O_3 + \_\_H_2 \rightarrow \_\_Bi + \_\_H_2O$

q. _____ $\_\_P_4 + \_\_I_2 \rightarrow \_\_PI_3$

r. _____ $\_\_H_2O_2 \rightarrow \_\_H_2O + \_\_O_2$

s. _____ $\_\_C_6H_{12}O_6 + \_\_O_2 \rightarrow \_\_CO_2 + \_\_H_2O$

t. _____ $\_\_NH_4NO_3 \rightarrow \_\_N_2O + \_\_H_2O$

u. _____ $\_\_Al_4C_3 + \_\_H_2O \rightarrow \_\_CH_4 + \_\_Al(OH)_3$

v. _____ $\_\_Ca(OH)_2 + \_\_CO_2 \rightarrow \_\_Ca(HCO_3)_2$

w. _____ $\_\_Pb(NO_3)_2 \rightarrow \_\_PbO + \_\_NO_2 + \_\_O_2$

x. _____ $\_\_C_8H_{18} + \_\_O_2 \rightarrow \_\_CO_2 + \_\_H_2O$

y. _____ $\_\ H_3SO_4 + \_\ Be(OH)_2 \rightarrow \_\_\_\ H_2O + \_\_Be_3(SO_4)_2$

Table 6.1 Summary of Chemical Reactions

Reaction Type	Reactants and Products	Notes on the Reactants
Synthesis (combination)	A + B → AB	• Two elements combine (Figure 6.9).
Decomposition	AB → A + B	• One reactant only (Figure 6.9)
Single replacement If A is a metal If A is a non-metal	 A + BC → B + AC A + BC → C + BA	• One element and one compound
Double replacement	AB + CD → AD + CB	• Two compounds react.
Neutralization (acid-base)	HX + MOH → MX + H_2O	• Acid plus base
Combustion	$C_xH_y + O_2 \rightarrow CO_2 + H_2O$	• Organic compound with oxygen

NOTES: Acids and Bases

General Information

Acids and bases are _____.

- Many familiar compounds are acids or bases.
- Classification as acids or bases is based on _____.

Acids and bases can be very _____!

- Both can be very corrosive.
  - _____ try to identify an acid or base by _____!

The strength of acids and bases in measured on the pH scale

- pH below 7 = acidic, pH above 7 = basic, pH 7 = neutral
  0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

- Each _____ on the pH scale indicates _____ more acidic
  - For example, pH 4 is ten times more acidic than pH 5
  -

pH Indicators

The pH of acids and bases cannot be determined by sight.

- Instead, pH is _____other chemicals called _____, or by a pH meter that measures the electrical conductivity of the solution.

pH indicators _____ based on the solution they are placed in.

- _____ is the most common indicator, used on litmus paper.
- Two colours of litmus paper: Blue = basic and Red = acidic.
- Blue = pH above 7, Red = pH below 7
- _____ contains many indicators that turn different colours at different pH values (can be in liquid form, or on paper strips like litmus)

- A _____ uses _____to measure how solutions conduct electricity
- Indicators change colour at different pH values, so indicators are used to identify _____ values
- Bromothymol blue for pH 6 - 7.6, phenolphthalein for pH 8.2 - 10
- Many natural sources, such as beets and cabbage, are also indicators

Acids

If you know a _____, you may be able to identify it as an acid.

- Acids often behave like acids only when dissolved in water
- Therefore, acids are often written with subscript (aq) = aquatic = water

The chemical formula of an acid usually starts with

- Acids with a carbon usually have the C written first.
  - _____ = hydrochloric acid, _____ = nitric acid, _____ = acetic acid

Naming acids

- For Acids formed from the periodic table:

  Hydrogen + …*-ide* = Hydro…*ic* acid
  - HF*(aq)* = hydrogen fluor**ide** =

- For Acids formed from _____.

  Hydrogen + …*-ate* = …*ic* acid
  - H2CO3*(aq)* = hydrogen carbon**ate** =

- For Acids formed from _____.
  Hydrogen + …*-ite* = …*ous* acid
  - H2SO3*(aq)* = hydrogen sulph**ite** =

Bases

If you know a compound's chemical formula, you may be able to identify it as a base.

- Bases, like acids, often behave like bases only when dissolved in water
- Therefore, bases are often written with subscript (aq) = aquatic = water

The chemical formula of a base usually ends with _____.

•Examples of common bases

- $NaOH(aq)$
- $Mg(OH)_2(aq)$
- $Ca(OH)_2(aq)$
- $NH_4OH(aq)$

Naming Bases

- To name a base you simply name
  - NaOH (aq) - Sodium hydroxide
  - $Mg(OH)_2$ (aq) - Magnesium hydroxide

Production of Ions

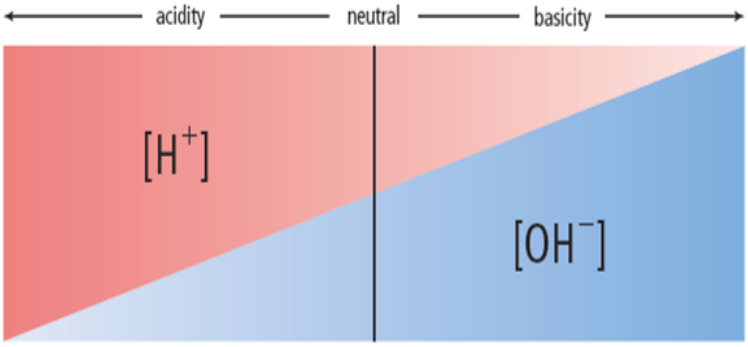
Acids and bases _____ because they release ions in solution.

- Acids release
- Bases release

The pH of a solution refers to the concentration of (H+/OH-) ions it has.

- Square brackets are used to signify concentration, $[H^+(aq)]$, $[OH^-(aq)]$
  - High $[H^+(aq)]$ = _____, very acidic
  - High $[OH^-(aq)]$ = _____, very basic

- A solution cannot have BOTH high $[H^+(aq)]$ and $[OH^-(aq)]$; they cancel each other out and _____. This process is called _____.
- $H^+(aq) + OH^-(aq) \longrightarrow H_2O(l)$



Properties of Acids & Bases

Table 5.6 Properties of Acids and Bases

Property	Acid	Base
Taste CAUTION: Never taste chemicals in the laboratory.	• Acids taste sour. Lemons, limes, and vinegar are common examples.	• Bases taste bitter. The quinine in tonic water is one example.
Touch CAUTION: Never touch chemicals in the laboratory with your bare skin.	• Many acids will burn your skin. Sulphuric acid (battery acid) is one example.	• Bases feel slippery. • Many bases will burn your skin. Sodium hydroxide (lye) is one example.
Indicator tests	• Acids turn blue litmus paper red. • Phenolphthalein is colourless in an acidic solution.	• Bases turn red litmus blue. • Phenolphthalein is pink in a basic solution.
Reaction with some metals, such as magnesium or zinc	• Acids corrode metals.	• no reaction
Electrical conductivity	• conductive	• conductive
pH	• less than 7	• more than 7
Production of ions	• Acids form hydrogen (H^+) ions when dissolved in solution.	• Bases form hydroxide (OH^-) ions when dissolved in solution.

2.4 PRACTICE: Acids and Bases

1. Please Complete Check Your Understanding – Acids and Bases.
2. Water is a neutral compound. What is the pH of water?
3. How many times more acidic is pH 2 than pH 4?
4. Name two methods used to measure pH.
5. What is the most common indicator? Describe it's color in acid and base.
6. What does it mean when you see (aq)?
7. What letter do most acids start with?
8. What is different about the position of that letter if an acid starts with a C?

9. Name the following acids:

Formula	Name
HBr	
H_2S	
HNO_2	
HNO_3	
$HClO_4$	
H_2CO_3	
CH_3COOH	

10. How can you recognize that a given formula is a base?

11. Name the following bases:

Formula	Name
KOH	
$Al(OH)_3$	
NH_4OH	

12. Why do acids and bases make good electrical conductors when dissolved in water?

13. What ion does an acid release? What ion does a base release?

14. Why is it not possible to have a solution that is both highly acidic AND highly basic? What is the process called that prevents this from happening?

15. Fill in the table below with the most important information. Do not simply copy everything from the website.

Property	Acid	Base
Taste		
Touch		
Color in Litmus		
Reaction with metal		
pH		

NOTES: Salts

General Information

Salts are _____formed when
.

- Salts are also produced when oxides or carbonates react with acids, or when metals react with acids.

Table salt, _____, is found in seawater, salt lakes or rock deposits.

- Salt was once very valuable as a commodity.
- Iodine is now added to salt to minimize goiter (a disease of the thyroid)

NaCl is only one kind of salt

- A salt is made up of a _____ from a base and
- Salts are found in many things
  -
  -
  -

Neutralization & Oxides

Neutralization reactions occur when an
react to produce a _____.

- $HCl(aq) + NaOH(aq) \longrightarrow NaCl(s) + H2O(aq)$

Metal oxides react with water to form bases.

- $Na_2O(s) + H_2O(l) \longrightarrow$

Non-metal oxides react with water to form acids

- $SO_2(g) + H_2O(l) \longrightarrow$
- Non-metal oxides are formed from the burning of fossil fuels
  - Add water in the atmosphere =

Acids with Metals & Carbonates

Acids and Metals

- The most reactive metals
  , react vigorously with water and acids.
- All other metals are _____ than those in groups 1 and 2.
- When metals do react with acids _____ is usually released
- $2HCl(aq) + Mg(s) \longrightarrow MgCl_2(s)$ +

Acids and Carbonates

- _____ ($-CO_3$) _____, protecting locations with natural carbonate supplies from acid precipitation.
- $H_2SO_4(aq) + CaCO_3(s) \longrightarrow CaCO_4(s) + H_2O(aq) + CO_2(g)$

sulphuric acid + calcium carbonate --> calcium carbonite + water + carbon dioxide

PRACTICE: Salts

1. Please Complete Check Your Understanding – Salts.
2. What type of compounds are salts?

3. What are the three types of reactions that produce salts?

4. What is the formula of table salt?

5. Name 5 things that may contain a salt?

6. Predict the products of each of the following reactions using the examples in the notes as a guide:

Reactants	Products
$H_2S_{(aq)}$ + $Ca(OH)_{2(aq)}$ → (Acid) (base)	
$CaO_{(s)}$ + $H_2O_{(l)}$ → (metal oxide) (water)	
$NO_{2(g)}$ + $H_2O_{(l)}$ → (non-metal oxide) (water)	

7. What non-metal oxide is the main cause of acid rain?