

**HONORS CHEMISTRY – 2009 SUMMER ASSIGNMENT**

In chemistry, you will be learning the scientific names of elements and compounds, as well as completing many mathematical calculations of chemical quantities. Your summer assignment begins with learning some of these facts.

You will be quizzed on the names and symbols of the elements and polyatomic ions in this packet throughout the year (given the chemical symbol provide the properly spelled name or given the name provide the proper chemical symbol). You must know the spelling and symbol. All elements are to be written *as shown on this list* with a capital letter as the first letter and lowercase letter as the second letter. *Do not write in all caps, or in cursive.* You will also be quizzed on the metric prefixes, their meanings and the ability to convert between them.

**Assignment :**

1. Make flash cards (on index cards not cut strips of paper) of the metric system prefixes at the bottom of this page, as well as the elements and the polyatomic ions listed on the next page.
  - a. For the metric system, put the prefix on one side and the numerical meaning on the other.
  - b. For elements and ions, put the symbol on one side and the name on the other. Please put only one element or ion per card.
  - c. *You will be given a homework grade for the flash cards.*
2. Complete the attached worksheet packet, to be handed in the first day of school *as a second homework grade*. You have been given a periodic table in case there are elements in the worksheet that are not on your list to memorize.

**Assume you have Chemistry the first day of school, do not wait to find out your schedule! Bring your cards and packet to school!**

**Metric Prefixes**

<b>Prefix</b>	<b>Numerical Meaning</b>
Kilo- (K__)	1000 base unit = 1 K__ (There are 1000 meters in a <b>kilometer</b> .)
<b>BASE UNIT</b>	<b>The main metric unit (meter (m), liter (l), gram (g), etc.)</b>
deci- (d__)	10 d__ = 1 base unit (There are 10 <b>decimeters</b> in a meter.)
centi- (c__)	100 c__ = 1 base unit (There are 100 <b>centimeters</b> in a meter.)
milli- (m__)	1000 m__ = 1 base unit (There are 1000 <b>millimeters</b> in a meter.)
micro (μ__)	$10^6$ μ__ = 1 base unit (There are $10^6$ <b>micrometers</b> in a meter.)
pico (p__)	$10^9$ p__ = 1 base unit (There are $10^9$ <b>picometers</b> in a meter.)

## ELEMENTS

Aluminum	Al
Argon	Ar
Barium	Ba
Beryllium	Be
Bismuth	Bi
Boron	B
Bromine	Br
Calcium	Ca
Carbon	C
Cesium	Cs
Chlorine	Cl
Chromium	Cr
Cobalt	Co
Copper	Cu
Fluorine	F
Gold	Au
Helium	He

Gallium	Ga
Germanium	Ge
Hydrogen	H
Iodine	I
Iron	Fe
Lead	Pb
Lithium	Li
Magnesium	Mg
Manganese	Mn
Mercury	Hg
Neon	Ne
Nickel	Ni
Nitrogen	N
Oxygen	O
Phosphorus	P
Platinum	Pt
Potassium	K

Radon	Rn
Rubidium	Rb
Scandium	Sc
Silicon	Si
Silver	Ag
Sodium	Na
Strontium	Sr
Sulfur	S
Titanium	Ti
Tin	Sn
Uranium	U
Xenon	Xe
Zinc	Zn

## POLYATOMIC IONS



Polyatomic ions are groups of multiple atoms that have a charge (positive or negative). The symbols shown below tell you what elements are in the ion, how many atoms of each, and the charge. For example:  $\text{NH}_4^{+1}$  contains a nitrogen atom, four hydrogen atoms and the entire group has a charge of +1.

**Memory Hint:** If you have two ions with similar names and the only difference is the number of oxygen atoms in your ion:

-ite means smaller number of O

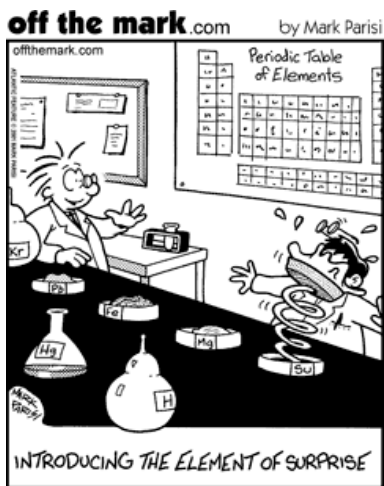
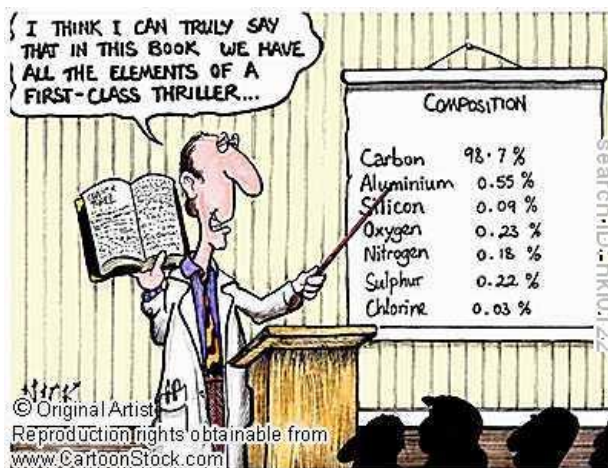
-ate means larger number of O

Hypo- (smallest) and Per- (largest) are used if there are four ions with similar names and different numbers of oxygen.

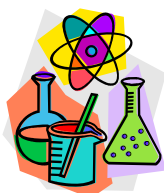
ION	NAME
$\text{NH}_4^{1+}$	ammonium
$\text{ClO}^{1-}$	hypochlorite
$\text{ClO}_2^{1-}$	chlorite
$\text{ClO}_3^{1-}$	chlorate
$\text{ClO}_4^{1-}$	perchlorate
$\text{CN}^{1-}$	cyanide
$\text{OH}^{1-}$	hydroxide
$\text{IO}_3^{1-}$	iodate
$\text{NO}_3^{1-}$	nitrate

ION	NAME
$\text{NO}_2^{1-}$	nitrite
$\text{MnO}_4^{1-}$	permanganate
$\text{CO}_3^{2-}$	carbonate
$\text{O}_2^{2-}$	peroxide
$\text{SO}_4^{2-}$	sulfate
$\text{SO}_3^{2-}$	sulfite
$\text{PO}_4^{3-}$	phosphate
$\text{CH}_3\text{COO}^{1-}$	acetate

# HONORS CHEMISTRY - SUMMER ASSIGNMENT WORKSHEET PACKET



TO BE TURNED IN ON THE FIRST DAY OF CLASS WITH YOUR FLASHCARDS.

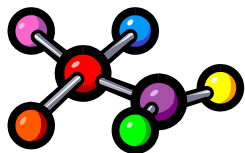


❖ There are memorization tips and a periodic table at the back of the packet for your reference. You are only responsible for making flash cards of the elements, ions and prefixes given to you on the pink paper (do not make cards of the entire periodic table!!!).

**Memorization Tips: Elements/Symbols**

Over the years, my students and I have developed several unique ways to help us remember the symbols for the elements. Be warned - some are a little out there!

Silver	Ag	If a person who is expecting a present of a gold necklace receives a silver one. He might say, " <b>Ag</b> , I didn't want silver!"
Gold	Au	"Hey you, I want that gold necklace!" Said with "Hey you" sounding like <b>Au</b> .
Bromine	Br	That brother of mine - <b>Bro</b> of mine!
Calcium	Ca	" <b>Caws</b> give milk!" Pronounced with an accent to make cows sound like it's spelled with an A.
Chlorine	Cl	"You <b>Clean</b> with chlorine!"
Iron	Fe	" <b>Fe</b> , Fi, Fo, Fum, I'm an iron man!"
Helium	He	If you breathe in helium, you will laugh! <b>He</b> , He, He!
Mercury	Hg	Greek mythology - Hg stands for <b>Helmet guy</b> !
Potassium	K	You will get <b>Kicked</b> out of school for the double nasty! You can't do the first three letters and cannot say the next three!
Sodium	Na	" <b>Naw</b> , I don't want any sodium!"
Nickel	Ni	" <b>Nick</b> owes me a nickel!"
Oxygen	O	" <b>O</b> pen your mouth wide to take in oxygen!"
Lead	Pb	<b>Pencil broke</b> !
Silicon	Si	<b>Silly con</b> !
Tin	Sn	A tin roof gets hot in the <b>Sun</b> .
Manganese	Mn	Take first three letters - <b>Man</b>
Magnesium	Mg	Take first three letters - <b>Mag</b>



Fill in the missing symbol/name of the element. The date of discovery and the origin of the name are included for your information only. You will only be responsible for the names and symbols.

Symbol	Name	Date	Origin of Name
	aluminum	1825	Latin, alumen = astringent taste
Ar		1894	Greek, argos = neutral or inactive
	barium	1808	Greek, baryos = heavy
Bi		~1450	German, wismut = white mass
	boron	1808	Arabic, bawraq
Br		1826	Greek, bromos = stench
C		B.C.	Latin, carbo = coal
Cs		1860	Latin, caesius = blue
	chlorine	1808	Greek, chloros = green gas
Cr		1797	Greek, chroma = color
	cobalt	1735	Greek, cobolos = goblin
Cu		B.C.	Latin, cuprum
	fluorine	1886	Latin, fluere = to flow
Ga		1875	Latin name, Gaul, of France
	germanium	1886	country, Germany
Au		B.C.	Latin, aurum
He		1895	Greek, helios = the sun
H		1766	Greek, hydro genes = water former
I		1811	Greek, iodos = violet color
Fe		B.C.	Latin, ferrum
	lead	B.C.	Latin, plumbum
	magnesium	1803	Latin, magnesia = a place in Asia Minor
Mn		1774	Latin, magnes = magnet
Hg		B.C.	Latin, hydragyrum = god and planet
	neon	1898	Greek, neo = new
	nickel	1750	German, goblin
	nitrogen	1772	Latin, nitro = native soda and gen = born
O		1771	Greek, oxys = sharp and gen =

			born
P		1669	Greek, phosphoros = light bringer
	platinum	1735	Spanish, plata = silver
K		1807	Latin, kalium
	radon	1900	originates from radium
Rb		1860	Latin, rubidius = red
	scandium	1879	Scandanavian peninsula by its discoverer
	silicon	1823	Latin, silex = flint
Ag		B.C.	Latin, argentum
	sodium	1807	Latin, natrium
Sr		1808	town of Strontian, Scotland
	sulfur	B.C.	Latin, sulphur
	tin	B.C.	Latin, stannum
Ti		1791	Greek mythology, first sons of earth
U		1789	planet Uranus
Xe		1808	Greek, xenos = strange
	zinc	B.C.	German, zink = like tin

Write your answers in the blanks below

- Mg is \_\_\_\_\_
- Magnesium is \_\_\_\_\_
- Aluminum is \_\_\_\_\_
- Silicon is \_\_\_\_\_
- Fe is \_\_\_\_\_
- H is \_\_\_\_\_
- Cu is \_\_\_\_\_
- N is \_\_\_\_\_
- C is \_\_\_\_\_
- Helium is \_\_\_\_\_
- Oxygen is \_\_\_\_\_
- Copper is \_\_\_\_\_
- Calcium is \_\_\_\_\_
- Iron is \_\_\_\_\_
- Potassium is \_\_\_\_\_
- Hydrogen is \_\_\_\_\_
- Carbon is \_\_\_\_\_
- Nitrogen is \_\_\_\_\_
- O is \_\_\_\_\_
- F is \_\_\_\_\_
- Fluorine is \_\_\_\_\_
- Na is \_\_\_\_\_
- Sodium is \_\_\_\_\_

Name \_\_\_\_\_ Honors Summer Assignment

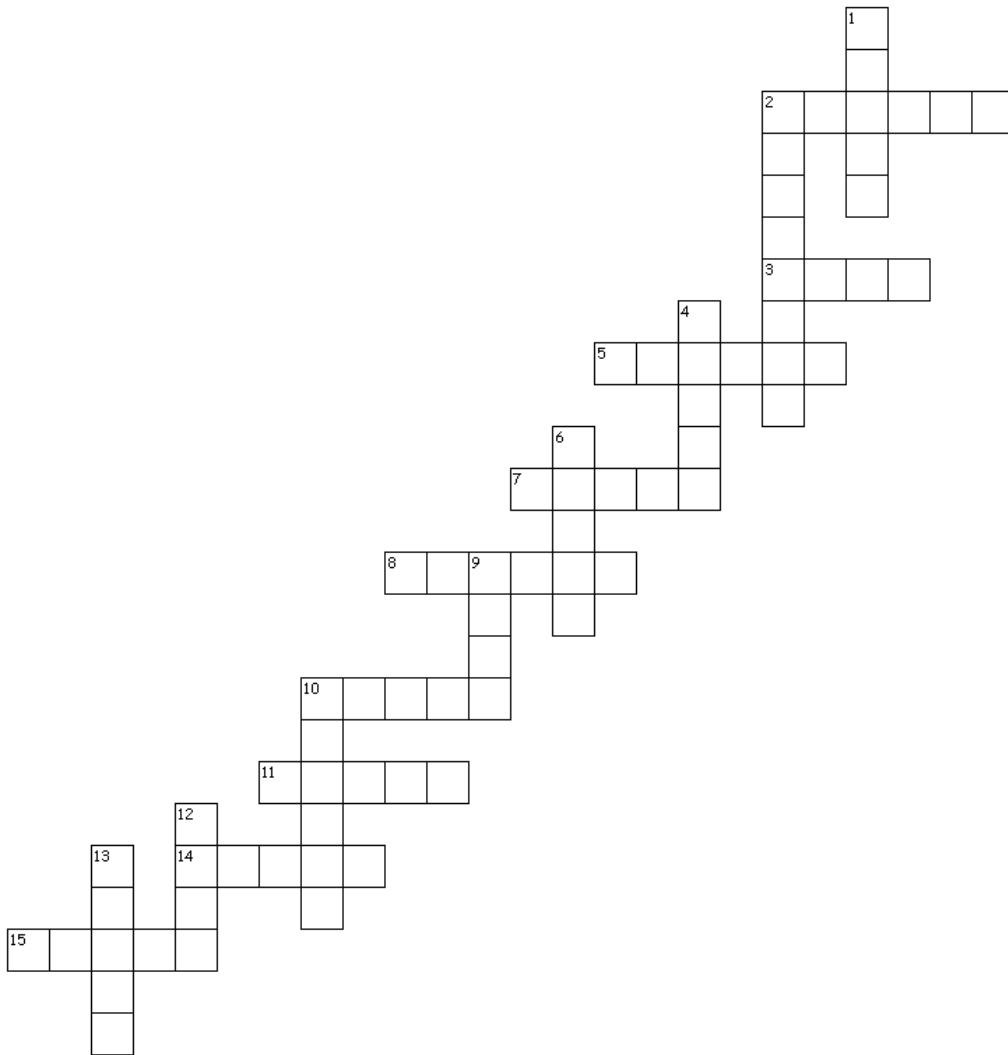
Spell the name of the following ions correctly:

1.  $\text{NO}_2^{1-}$  \_\_\_\_\_
2.  $\text{CO}_3^{2-}$  \_\_\_\_\_
3.  $\text{ClO}_3^{1-}$  \_\_\_\_\_
4.  $\text{OH}^{1-}$  \_\_\_\_\_
5.  $\text{PO}_4^{3-}$  \_\_\_\_\_
6.  $\text{NH}_4^{1+}$  \_\_\_\_\_
7.  $\text{SO}_4^{2-}$  \_\_\_\_\_
8.  $\text{CN}^{1-}$  \_\_\_\_\_
9.  $\text{CH}_3\text{COO}^{1-}$  \_\_\_\_\_
10.  $\text{O}_2^{2-}$  \_\_\_\_\_
11.  $\text{NO}_3^{1-}$  \_\_\_\_\_
12.  $\text{IO}_3^{1-}$  \_\_\_\_\_
13.  $\text{MnO}_4^{1-}$  \_\_\_\_\_
14.  $\text{ClO}_2^{1-}$  \_\_\_\_\_
15.  $\text{O}_2^{2-}$  \_\_\_\_\_

Write the symbol and charge of the following ions.

1. phosphate \_\_\_\_\_
2. sulfate \_\_\_\_\_
3. cyanide \_\_\_\_\_
4. hydroxide \_\_\_\_\_
5. carbonate \_\_\_\_\_
6. nitrate \_\_\_\_\_
7. acetate \_\_\_\_\_
8. chlorate \_\_\_\_\_
9. perchlorate \_\_\_\_\_
10. hypochlorate \_\_\_\_\_
11. iodate \_\_\_\_\_
12. nitrite \_\_\_\_\_
13. sulfite \_\_\_\_\_
14. peroxide \_\_\_\_\_
15. permanganate \_\_\_\_\_

# Polyatomic Ion Puzzle



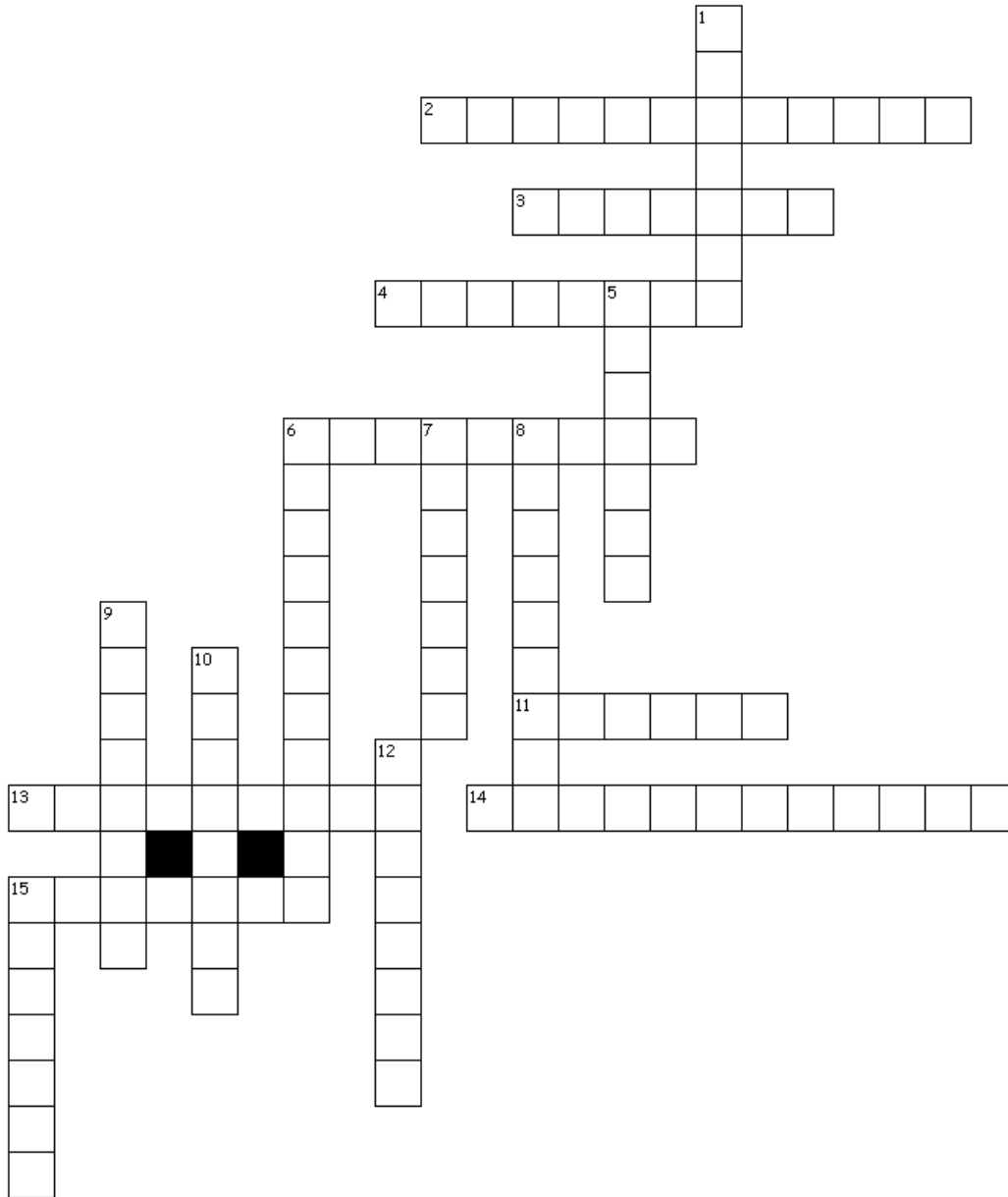
Across

- 2. chlorite
- 3. peroxide
- 5. chlorate
- 7. sulfite
- 8. permanganate
- 10. carbonate
- 11. nitrite
- 14. nitrate
- 15. sulfate

Down

- 1. hypochlorite
- 2. acetate
- 4. phosphate
- 6. iodate
- 9. hydroxide
- 10. perchlorate
- 12. cyanide
- 13. ammonium

# Polyatomic Ion Puzzle



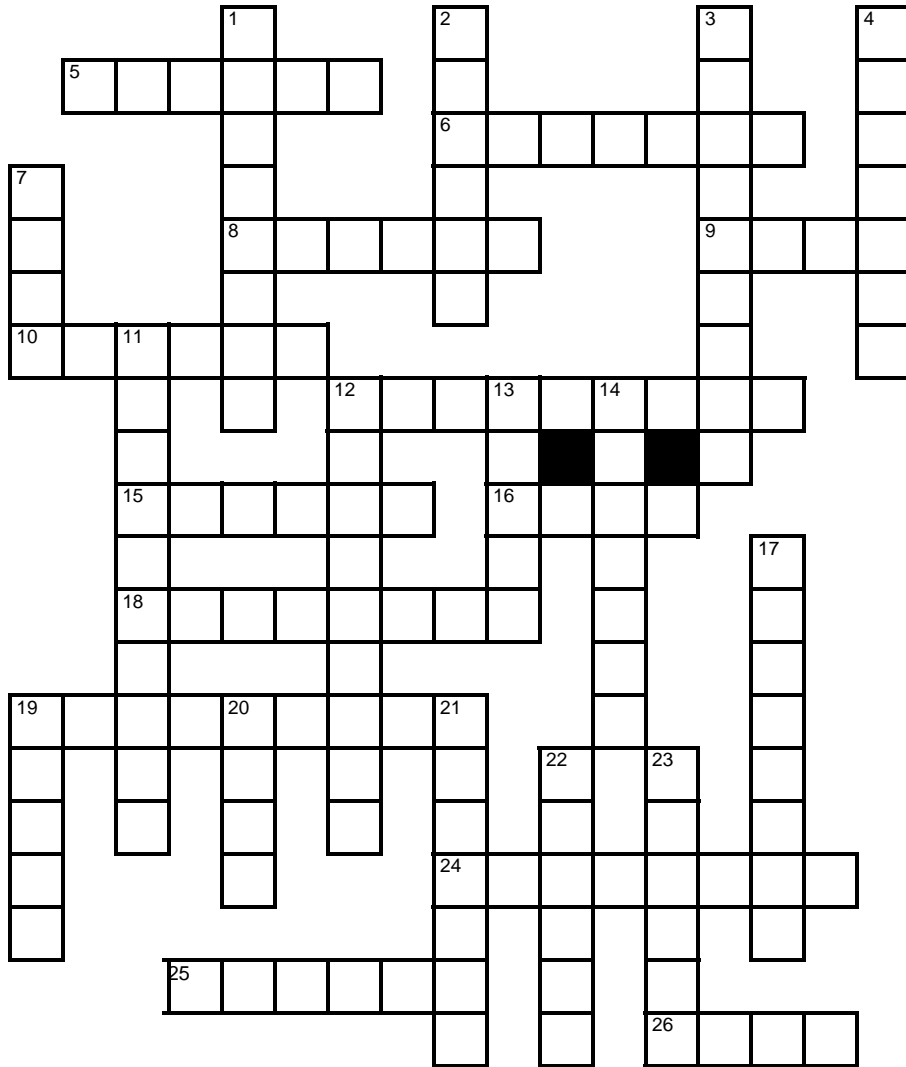
**Across**

- 2. ClO1-
- 3. CN1-
- 4. ClO31-
- 6. PO43-
- 11. IO31-
- 13. CO32-

- 14. MnO41-
  - 15. NO21-
- Down**
- 1. SO32-
  - 5. CH3COO1-
  - 6. ClO41-
  - 7. SO42-

- 8. OH1-
- 9. ClO21-
- 10. NH41+
- 12. O22-
- 15. NO31-

# Elements of the Periodic Table

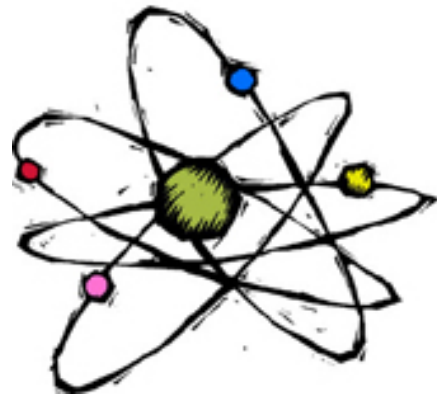


**Across**

- 5 He (6)
- 6 Ca (7)
- 8 O (6)
- 9 Fe (4)
- 10 Cu (6)
- 12 K (9)
- 15 Na (6)
- 16 Au (4)
- 18 H (8)
- 19 Be (9)
- 24 Cl (8)
- 25 S (7)
- 26 Ne (4)

**Down**

- 1 N (8)
- 2 Ni (6)
- 3 Al (9)
- 4 As (7)
- 7 Zn (4)
- 11 P (10)
- 12 Pu (9)
- 13 Ar (5)
- 14 Si (7)
- 17 F (8)
- 19 B (5)
- 20 Pb (4)
- 21 Hg (7)
- 22 Ag (6)
- 23 C (6)



## Periodic Table of the Elements Quiz

Fill in the blanks with the atomic symbols of the first 20 elements. (You do not need to add the atomic number, weight or name.) Write the element names in the blanks below.

Key:
element name
atomic number
<b>symbol</b>
atomic weight

		scandium 21	titanium 22	vanadium 23	chromium 24	manganese 25	iron 26	cobalt 27	nickel 28	copper 29	zinc 30	gallium 31	germanium 32	arsenic 33	selenium 34	bromine 35	krypton 36
		<b>Sc</b>	<b>Ti</b>	<b>V</b>	<b>Cr</b>	<b>Mn</b>	<b>Fe</b>	<b>Co</b>	<b>Ni</b>	<b>Cu</b>	<b>Zn</b>	<b>Ga</b>	<b>Ge</b>	<b>As</b>	<b>Se</b>	<b>Br</b>	<b>Kr</b>
		44.95591	47.867	50.9415	51.9961	54.93805	55.845	58.9332	58.6934	63.546	65.409	69.723	72.64	74.9216	78.96	79.904	83.798
rubidium 37	strontium 38	yttrium 39	zirconium 40	niobium 41	molybdenum 42	technetium 43	ruthenium 44	rhodium 45	palladium 46	silver 47	cadmium 48	indium 49	tin 50	antimony 51	tellurium 52	iodine 53	xenon 54
<b>Rb</b>	<b>Sr</b>	<b>Y</b>	<b>Zr</b>	<b>Nb</b>	<b>Mo</b>	<b>Tc</b>	<b>Ru</b>	<b>Rh</b>	<b>Pd</b>	<b>Ag</b>	<b>Cd</b>	<b>In</b>	<b>Sn</b>	<b>Sb</b>	<b>Te</b>	<b>I</b>	<b>Xe</b>
85.4678	87.62	88.90585	91.225	92.90638	95.94	[98]	101.07	102.9055	106.42	107.8682	112.411	114.818	118.710	121.760	127.60	126.9045	131.293

- |           |            |            |            |
|-----------|------------|------------|------------|
| (1) _____ | (6) _____  | (11) _____ | (16) _____ |
| (2) _____ | (7) _____  | (12) _____ | (17) _____ |
| (3) _____ | (8) _____  | (13) _____ | (18) _____ |
| (4) _____ | (9) _____  | (14) _____ | (19) _____ |
| (5) _____ | (10) _____ | (15) _____ | (20) _____ |

## Metric System Conversions

**Fill in the blanks with the appropriate number:**

1. 1 liter = \_\_\_\_\_ deciliters
2. 1 gram = \_\_\_\_\_ milligrams
3. 1000 millimeters = \_\_\_\_\_ meters
4. 1 kilogram = \_\_\_\_\_ grams
5.  $10^9$  picometers = \_\_\_\_\_ meter
6. 1 liter = \_\_\_\_\_ microliters

### **Metric Conversions:**

You should have learned how to convert between metric prefixes in middle school. You can use ratios, or simply “move the decimal” the right number of places in the correct direction. Complete the following conversions using any method that you know.

1. How many liters are there in 145,000,000 picoliters?
2. How many grams are there in 123 kg?
3. How many centimeters are there in 921 mm?
4. What is the mass in kilograms of something that has a mass of 1926532 dg?
5. An atom of has a diameter of approximately 0.10 pm. How many meters is this?
6. A 3.45 microgram sample of Uranium has a mass of how many grams?
7. What volume in kiloliters will a sample of Bay water occupy if it has a volume of 125 ml?
8. A sample of a chemical has a volume of 145 ml. How many liters is this?
9. A piece of metal has a mass of 27.9 grams.
  - a. How many kg is this?
  - b. dg?
  - c. cg?
  - d. mg?
  - e.  $\mu\text{g}$ ?
  - f. pg?