

¹Periodic Table of the Elements (PTOE) Review

Can You Explain How to Use the PTOE?

- 1) To find the number of **protons**, you look for the a _____ n _____ above the element symbol because this number identifies each element.
- 2) To find the number of **electrons**, you look for the a _____ n _____ inside a box on the PTOE because the electrons' negative charge will balance and cancel out the positive charge of the protons in the nucleus.
- 3) More than 99% of the mass of an atom is the protons and neutrons inside the nucleus, so if you want to find the **atomic mass**, you look inside the element's PTOE box for the larger number with decimals called the w _____ a _____ m _____, which is the average of the masses of all the isotopes of that element occurring in nature. This is also called the atomic weight.
- 4) To find the number of **neutrons**, you first calculate the a _____ m _____ n _____ by rounding the weighted atomic mass, because the nucleus contains only whole numbers of protons and neutrons. Next you subtract from that the number of protons, which is the a _____ n _____.
- 5) To find the **period**, you look at the numbers for each row along the far l _____ of the PTOE.
- 6) To find the **number of energy levels** for an atom, you look for the p _____.
- 7) To find the **maximum number of electrons** in each energy level, you look at the far r _____ column for Noble Gas Element.
- 8) To find the number of **valence electrons**, you must **memorize** the pattern for each family group of elements listed in a vertical column on the PTOE. Sing the patter with hand motions! The pattern goes like this:

9) To find the **type of ion** an atom will form, you must **memorize** the pattern for each family group of elements listed in a vertical column of the PTOE. Sing the patter with hand motions! The pattern goes like this:
Atoms on the left side of the PTOE form p _____ ions because they g _____ away electrons in order to drop an incomplete energy level and reveal the complete energy level below.

Atoms on the right side of the PTOE form n _____ ions because they t _____ away electrons in order to the complete the outside energy level.
- 10) To find the **Group number** for each Family of Elements, you look at the number above each c _____.

¹

Source: Julie Schultz and Hope Oliver, Science Department, Bret Harte Middle School, San Jose, California 95120.

- 11) To find the **Family Name** for all the atoms of the same **Group Number**, you must **memorize** a song:

Group Number	Family
1	_____
2	_____
3-12	_____
13	_____
14	_____
15	_____
16	_____
17	_____
18	_____
Other	_____

- 12) To find the **state or phase of matter** for any element at room temperature, you **memorize**:

2 Liquids *symbol* _____ *name* _____ *symbol* _____ *name* _____

11 Gases (*top left*) *symbol* _____ *name* _____

 (*right side*) 4 *symbols* _____

 (*far right*) N _____ G _____ Family

symbols _____

- 13) Elements that **occur naturally** on Earth in useful amounts have atomic numbers from _____ (H) to _____ (U), with 2 exceptions: #43 _____ and #61 _____.
- 14) **Synthetic elements** that must be made in a lab to get useful amounts are after atomic number: _____.
- 15) **Naturally occurring radioactive elements** are un _____ and have atomic numbers starting with # _____ (Po) with 2 exceptions: #43 _____ and #61 _____.

16) To know if an element is a Metal, a Nonmetal, or a Semimetal Metalloid, you must **memorize** the locations of the zig-zag “metalloid line”:

Left of the line: _____

Touching the line: _____

Right of the line: _____

17) The **mass** and **density** of atoms increases as you go d _____ and to the c _____ of the PTOE.

18) To know which 7 elements are **diatomic**, you must memorize “***I Bring Clay For Our New Home***”

The 7 diatomic elements are: _____

19) To now the **6 organic elements** found in all living things, you must memorize “***C H N O P S***”

The 6 organic elements are: _____

20) To find the **inert** and **non-reactive** elements, look at the far right column for the elements that have complete valence electron levels. These are the N _____ G _____.

21) To find the most **reactive nonmetals**, look next to the Noble Gas Family for the H _____, the elements that are missing only 1 electron to complete their valence electron energy levels.

22) To find the most **reactive metals**, look at the 2 far left columns:

A _____ M _____

A _____ M _____

23) To recognize **metal elements**, you must **memorize 5 physical properties**:

1. L _____

2. D _____

3. M _____

4. C _____

5. H _____

24) To recognize **nonmetal elements**, you must **memorize 5 physical properties** that are different from those of metals:

1. No L _____ (not shiny)

2. Non-D _____ (not soft and breaks if you try to make it thin like wire)

3. B _____ (not malleable)

4. Non-C _____

5. L _____

25) On the chart on the next page, fill in the **period number**, the **Family Names**, the **number of members of each family**, and the **number of energy levels**.

²Periodic Table of the Elements (PTOE) Review - Answer Key

Can You Explain How to Use the PTOE?

- 1) To find the number of **protons**, you look for the ATOMIC NUMBER above the element symbol because this number identifies each element.
- 2) To find the number of **electrons**, you look for the ATOMIC NUMBER inside a box on the PTOE because the electrons' negative charge will balance and cancel out the positive charge of the protons in the nucleus.
- 3) More than 99% of the mass of an atom is the protons and neutrons inside the nucleus, so if you want to find the **atomic mass**, you look inside the element's PTOE box for the larger number with decimals called the WEIGHTED ATOMIC MASS, which is the average of the masses of all the isotopes of that element occurring in nature. This is also called the atomic weight.
- 4) To find the number of **neutrons**, you first calculate the ATOMIC MASS NUMBER by rounding the weighted atomic mass, because the nucleus contains only whole numbers of protons and neutrons. Next you subtract from that the number of protons, which is the ATOMIC NUMBER.
- 5) To find the **period**, you look at the numbers for each row along the far LEFT of the PTOE.
- 6) To find the **number of energy levels** for an atom, you look for the PERIOD.
- 7) To find the **maximum number of electrons** in each energy level, you look at the far RIGHT column for Noble Gas Element.
- 8) To find the number of **valence electrons**, you must **memorize** the pattern for each family group of elements listed in a vertical column on the PTOE. Sing the patten with hand motions! The pattern goes like this:

1, 2, 1, 2, 3, 4, 5, 6, 7, 8
- 9) To find the **type of ion** an atom will form, you must **memorize** the pattern for each family group of elements listed in a vertical column of the PTOE. Sing the patten with hand motions! The pattern goes like this:
Atoms on the left side of the PTOE form POSITIVE ions because they GIVE away electrons in order to drop an incomplete energy level and reveal the complete energy level below.

Atoms on the right side of the PTOE form NEGATIVE ions because they TAKE away electrons in order to the complete the outside energy level.
- 10) To find the **Group number** for each Family of Elements, you look at the number above each

² Source: Mrs. Hope Oliver, Science Department Head, Bret Harte Middle School, San Jose, California.

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- 11) To find the **Family Name** for all the atoms of the same **Group Number**, you must **memorize** a song:

Group Number	Family
1	<u>ALKALI METALS</u>
2	<u>ALKALINE EARTH METALS</u>
3-12	<u>TRANSITION METALS</u>
13	<u>BORON FAMILY</u>
14	<u>CARBON FAMILY</u>
15	<u>NITROGEN FAMILY</u>
16	<u>OXYGEN FAMILY</u>
17	<u>HALOGEN FAMILY</u>
18	<u>NOBLE GASES</u>
Other	<u>SEMI-METALS, METALLOIDS</u>

- 12) To find the **state or phase of matter** for any element at room temperature, you **memorize**:

2 Liquids	symbol <u>Hg</u> name <u>Mercury</u>	symbol <u>Br</u> name <u>Bromine</u>
11 Gases	(top left) symbol <u>H</u> name <u>Hydrogen</u>	(right side) 4 symbols <u>O, N, F, Cl</u>
	(far right) <u>Noble Gas</u> Family	symbols <u>He, Ne, Ar, Kr, Xe, Rn</u>

- 13) Elements that **occur naturally** on Earth in useful amounts have atomic numbers from **1** (H) to **92** (U), with 2 exceptions: #43 **Tc** and #61 **Pm**.
- 14) **Synthetic elements** that must be made in a lab to get useful amounts are after atomic number: **92**.
- 15) **Naturally occurring radioactive elements** are **UNSTABLE** and have atomic numbers starting with # **84** (Po) with 2 exceptions: #43 **Tc** and #61 **Pm**.

16) To know if an element is a Metal, a Nonmetal, or a Semimetal Metalloid, you must **memorize** the locations of the zig-zag “metalloid line”:

Left of the line: **METALS**

Touching the line: **METALLOIDS**

Right of the line: **NON-METALS**

17) The **mass** and **density** of atoms increases as you go **DOWN** and to the **CENTER** of the PTOE.

18) To know which 7 elements are **diatomic**, you must memorize “*I Bring Clay For Our New Home*”

The 7 diatomic elements are: **H, I, Br, Cl, F, O, N**

19) To know the 6 **organic elements** found in all living things, you must memorize “*C H N O P S*”

The 6 organic elements are: **Carbon, Hydrogen, Nitrogen, Oxygen, Phosphorous, Sulfur**

20) To find the **inert** and **non-reactive** elements, look at the far right column for the elements that have complete valence electron levels. These are the **NOBLE GASES**.

21) To find the most **reactive nonmetals**, look next to the Noble Gas Family for the **HALOGENS**, the elements that are missing only 1 electron to complete their valence electron energy levels.

22) To find the most **reactive metals**, look at the 2 far left columns:

ALKALI METALS

ALKALINE EARTH METALS

23) To recognize **metal elements**, you must **memorize 5 physical properties**:

1. L **LUSTER**
2. D **DUCTILITY**
3. M **MALLEABILITY**
4. C **CONDUCTIVITY (Heat/Electricity)**
5. H **HIGH MELTING AND BOILING POINT**

24) To recognize **nonmetal elements**, you must **memorize 5 physical properties** that are different from those of metals:

1. No L **NO LUSTER** (not shiny)
2. Non-D **NON-DUCTILE** (not soft and breaks if you try to make it thin like wire)
3. B **BRITTLE** (not malleable)
4. Non-C **NON-CONDUCTIVE** (insulator)
5. L **LOW MELTING AND BOILING POINT**

25) On the chart on the next page, fill in the **period number**, the **Family Names**, the **number of**

members of each family, and the number of energy levels.

Periodic Table Review

		Family Name										Noble Gases	Number of Energy Levels																																																																																																																				
		Alkali Metals		Alkaline Metals		Transition Metals	Boron Family	Carbon Family	Nitrogen Family	Oxygen Family	Halogen Family	Noble Gases	Number of Energy Levels																																																																																																																				
1		H												He	1																																																																																																																		
2		Li	Be											Ne	2																																																																																																																		
3		Na	Mg											Ar	3																																																																																																																		
4		K	Ca											Kr	4																																																																																																																		
5		Rb	Sr											Xe	5																																																																																																																		
6		Cs	Ba											Rn	6																																																																																																																		
7		Fr	Ra											118	7																																																																																																																		
8		119	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	1	2	3	4	5	6	7	8

