

The Material World

Name: SOLUTIONS

Classification of Elements and The Periodic Table: PRACTICE ASSIGNMENT

1) What does this staircase (zig-zag line) represent?
Separates Metals + Non-Metals

2) What do these Roman numerals represent?
Valence Electrons

PERIODIC TABLE OF THE ELEMENTS

1	IA	IIA	IIIA	IVA	VA	VIA	VIIA	VIIIA
2								
3								
4								
5								
6								
7								

3) What do these numbers represent?

of Shells

4) State 3 characteristics of METALS

See Notes

5) State 3 characteristics of NON-METALS

See Notes

6) Define the terms:

Ductility:

Ability to be drawn into a wire.

Malleability:

Ability to be bend

7) Fill in the names of the families:

PERIODIC TABLE OF THE ELEMENTS

Legend:
 Element symbol: \square
 Atomic number: \square
 Atomic mass: \square

1 Alkali Metals
 2 Alkali Earth Metals
 3 Boron Group
 4 Carbon Group
 5 Nitrogen Group
 6 Oxygen Group
 7 Halogens
 8 Inert Gases

8) What are the valence values for the following families/groups ?

- a) Alkali Earth Metals: 2
 b) Boron Group: 3
 c) Halogens: 7
 d) Nitrogen Group: 5
 e) Oxygen Group: 6
 f) Inert Gases: 8
 g) Alkali metals: 1
 h) Carbon family: 4

9) You are given a sample of each of the first 20 elements of the periodic table. Each element is identified by a characteristic that is written on its label. Using the following information, fill-in the name of each element.

LABEL	CHARACTERISTIC	ELEMENT
a)	Has five protons and six neutrons	Boron
b)	Is the <i>lightest</i> gas	Hydrogen
c)	Is a <i>halogen</i> having three energy levels	Chlorine
d)	Has <i>four</i> valence electrons and fourteen protons	Silicon
e)	Has an <i>atomic number</i> of eight	Oxygen
f)	Is an <i>alkali</i> metal and has one electron in its third shell	Sodium
g)	Is an <i>inert</i> gas having two valence electrons	Helium
h)	Is the most reactive <i>non-metallic</i> element	Fluorine
i)	It is an <i>alkaline-earth</i> element in the third row	Magnesium
j)	It is a <i>non-metal</i> in row-3 with five valence electrons	Phosphorus

10) Fill in the missing data.

////////////////////////////////////	Element - A	Element - B	Element - C	Element - D
Element Name	Argon	Calcium	Potassium	Bromine
Element Symbol	Ar	Ca	K	Br
Family Name	Noble Gases	Alkaline Earth	Alkali Metals	Halogens
Atomic number	18	20	19	35
Atomic mass	40	40	39	80
# of protons	18	20	19	35
# of electrons	18	20	19	35
# of neutrons	22	20	20	45
Group number	8A	2A	1A	7A
Valence electrons	8	2	1	7
Period number	3	4	4	4
Number of Shells	3	4	4	4
Isotope Notation	$^{40}_{18}\text{Ar}$	$^{40}_{20}\text{Ca}$	$^{39}_{19}\text{K}$	$^{80}_{35}\text{Br}$
Lewis Dot Notation	$\cdot\ddot{\text{A}}\text{r}\cdot$	$\text{Ca}\cdot$	$\text{K}\cdot$	$\cdot\ddot{\text{B}}\text{r}\cdot$

////////////////////////////////////	Element - E	Element - F	Element - G	Element - H
Element Name	Hydrogen	Sulfur	Carbon	Phosphorus
Element Symbol	H	S	C	P
Family Name	-----	Oxygen Group	Carbon Group	Nitrogen Group
Atomic number	1	16	6	15
Atomic mass	1	32	12	31
# of protons	1	16	6	15
# of electrons	1	16	6	15
# of neutrons	0	16	6	16
Group number	1A	6A	4A	5A
Valence electrons	1	6	4	5
Period number	1	3	2	3
Number of Shells	1	3	2	3
Isotope Notation	^1_1H	$^{32}_{16}\text{S}$	$^{12}_6\text{C}$	$^{31}_{15}\text{P}$
Lewis Dot Notation	$\text{H}\cdot$	$\cdot\ddot{\text{S}}\cdot$	$\cdot\ddot{\text{C}}\cdot$	$\cdot\ddot{\text{P}}\cdot$

11) Draw the Lewis Dot structures for the following:

a) Bromine



b) Neon



c) Aluminium



d) Cesium



e) Tellurium



f) Sulfur



12) Using different sized and colored spheres draw the following compounds:

a) CO₂



b) CH₄



c) AlCl₃



d) CF₄



13) Two isotopes of carbon are Carbon-12 and Carbon-14. These two isotopes differ by:

a) two protons

b) two neutrons

c) a charge of 2+

d) two electrons

14) What is the *mass number* of an element that has 26 protons, 26 electrons, and 30 neutrons?

a) 30

b) 52

c) 56

d) 82

15) The isotope Oxygen-18 contains:

a) 8 protons, 8 electrons and 15 neutrons

b) 8 protons, 8 electrons and 10 neutrons

c) 15 protons, 8 electrons and 8 neutrons

d) 15 protons, 15 electrons and 8 neutrons

16) An atom consists of 23 protons, 23 electrons and 28 neutrons. What is its mass number?

a) 23

b) 28

c) 46

d) 51

17) What is the maximum number of electrons which can fit on the second energy level (or shell)?

a) 2

b) 8

c) 18

d) 32

18) The number of valence electrons contained in an atom of beryllium is:

- a) 1 **b) 2** c) 3 d) 4
-

19) To which family of the periodic table does Cesium (Cs), belong?

- a) The inert gases b) The halogens
c) The alkali metals d) The alkaline-earth metals
-

20) The atomic number of magnesium is 12. How many protons and valence electrons respectively does magnesium have?

- a) 12 and 12 b) 12 and 0
c) 12 and 2 d) 2 and 12
-

21) Atomic number as well as atomic mass increase from

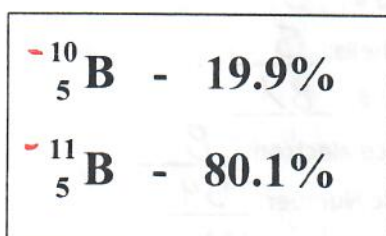
- a) from left to right and bottom to top
b) from left to right and top to bottom
c) from right to left and top to bottom
d) from right to left and bottom to top
-

Atomic radii increase from

- 22) a) from left to right and bottom to top
b) from left to right and top to bottom
c) from right to left and top to bottom
d) from right to left and bottom to top
-

23) Boron has 2 isotopes. The abundances of each isotope are given below.

Calculate the relative atomic mass of Boron (as seen on Periodic Table):



$$\frac{(10 \cdot 19.9) + (11 \cdot 80.1)}{100} = \underline{\underline{10.8 \text{ amu}}}$$

24) Why is it that some natural as well as synthetic isotopes release radiation ?

Unstable nucleus breaks apart releasing radiation

25) What atomic property allow the noble gases to be inactive ?

Full outermost shell!!!

26) List 3 Properties that each of the following have:

Alkali Metals

See Notes

Alkaline Earth Metals

See Notes

Halogens

See Notes

Rare Gases

See Notes

27) Fill in the following information and DRAW the atomic/electron configuration using a Simplified Bohr-Rutherford diagram:

POTASSIUM ATOM

Atomic Symbol: K

Period #: 4

of shells: 4

Group #: 1A

Valence electrons: 1

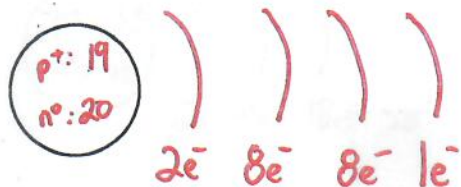
Atomic Number: 19

Atomic Mass: 39

of p⁺: 19

of e⁻: 19

of n⁰: 20 (39-19)



XENON ATOM

Atomic Symbol: Xe

Period #: 5

of shells: 5

Group #: 8A

Valence electrons: 8

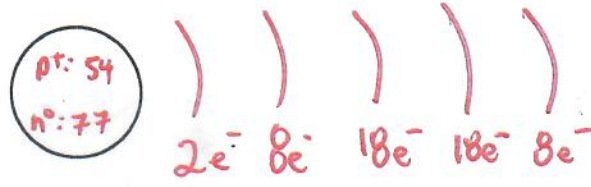
Atomic Number: 54

Atomic Mass: 131

of p⁺: 54

of e⁻: 54

of n⁰: 77 (131-54)



ARSENIC ATOM

Atomic Symbol: **As**

Period #: 4

of shells: 4

Group #: 5A

Valence electrons: 5

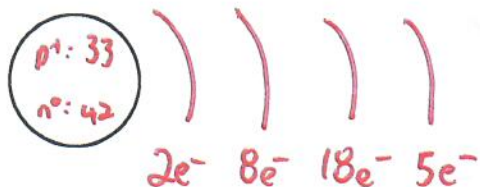
Atomic Number: 33

Atomic Mass: 75

of p⁺: 33

of e⁻: 33

of n^o: 42 (75-33)



TIN ATOM

Atomic Symbol: **Sn**

Period #: 5

of shells: 5

Group #: 4A

Valence electrons: 4

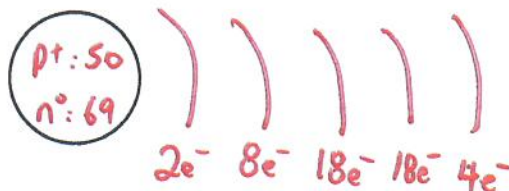
Atomic Number: 50

Atomic Mass: 119

of p⁺: 50

of e⁻: 50

of n^o: 69 (119-50)



ASTATINE ATOM

Atomic Symbol: **At**

Period #: 6

of shells: 6

Group #: 7A

Valence electrons: 7

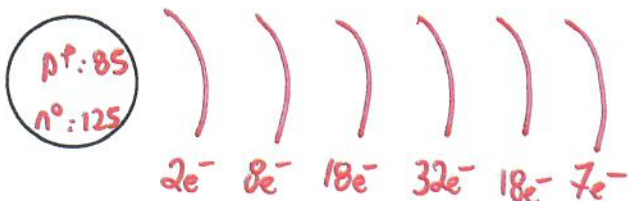
Atomic Number: 85

Atomic Mass: 210

of p⁺: 85

of e⁻: 85

of n^o: 125 (210-85)



GALLIUM ATOM

Atomic Symbol: **Ga**

Period #: 4

of shells: 4

Group #: 3A

Valence electrons: 3

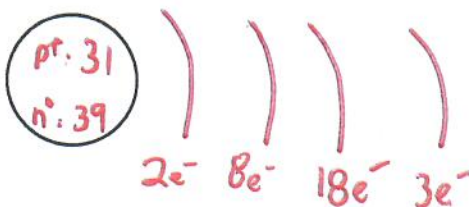
Atomic Number: 31

Atomic Mass: 70

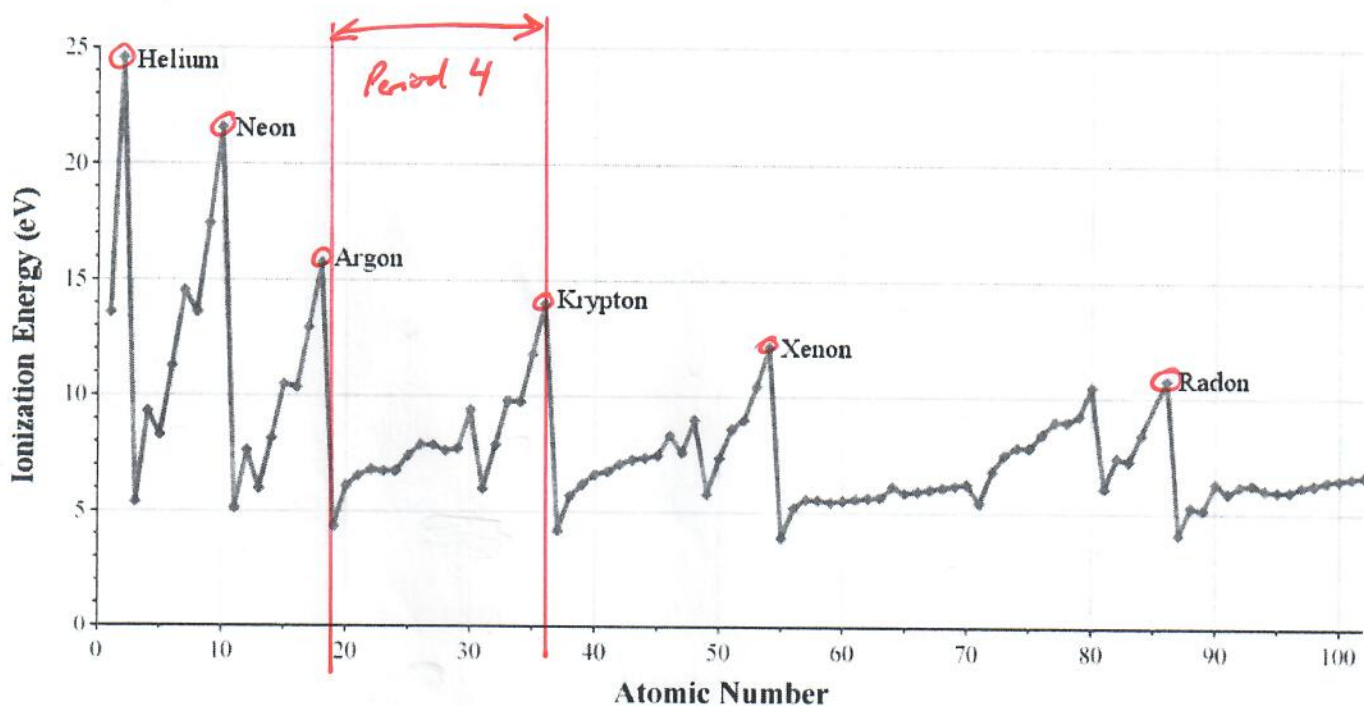
of p⁺: 31

of e⁻: 31

of n^o: 39 (70-31)



28) Study the following ionization energy trend.



a) What conclusion can be drawn about the ionization energy within the 4th period ?

Ionization energy increases from left to right within period 4 of the periodic table

b) What pattern(s) can be seen for the ionization energies of the noble gases ?

*- Very high ionization energies compared to other elements.
- Decreases as we go down the family of inert gases.*

29) For the following nuclear reactions, fill in the missing element information in the boxes. State whether it is FISSION or FUSION (circle correct choice)

