

Grade 9 Science  
Unit 1: Atoms, Elements, and Compounds

Chapter 2: *Elements are the  
building blocks of matter.*

# Elements

- A pure substance that cannot be broken down or separated into simpler substances.
- Made up of one kind of atom.
- More than 115 elements known.

# Chemical Symbols

- Consists of one or two letters.
- Examples:

O = Oxygen

Au = Gold

Na = Sodium

Elements can be metals, non-metals, or metalloids

## Metals

- Shiny
- Malleable
- Ductile
- Usually solid
- Good conductors of heat and electricity

# Non-metals

- Tend to be gases or brittle solids
- Dull
- Non-malleable and non-ductile
- Poor conductors of heat and electricity

# Metalloids

- Solids
- Shiny or dull
- May conduct electricity
- Poor conductors of heat
- Non-malleable and non-ductile

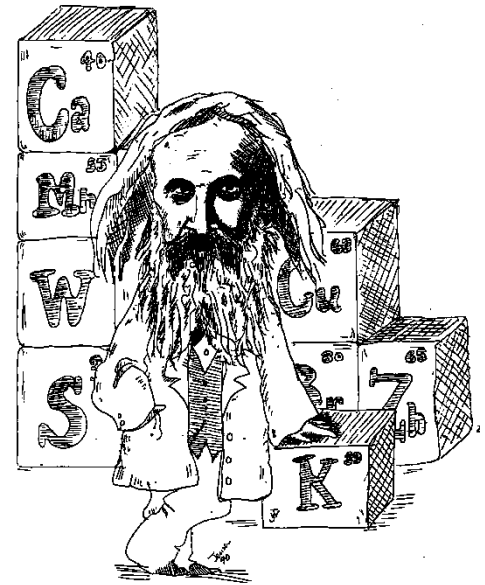
*Properties of both metals and non-metals.*

# Example of Common Elements *pg. 41-3*

- Hydrogen
- Iron
- Oxygen
- Sodium
- Chlorine
- Mercury
- Silver
- Silicon

# The Periodic Table

- Organizes elements according to their physical and chemical properties.
- Developed by Dmitri Mendeleev in 1867.

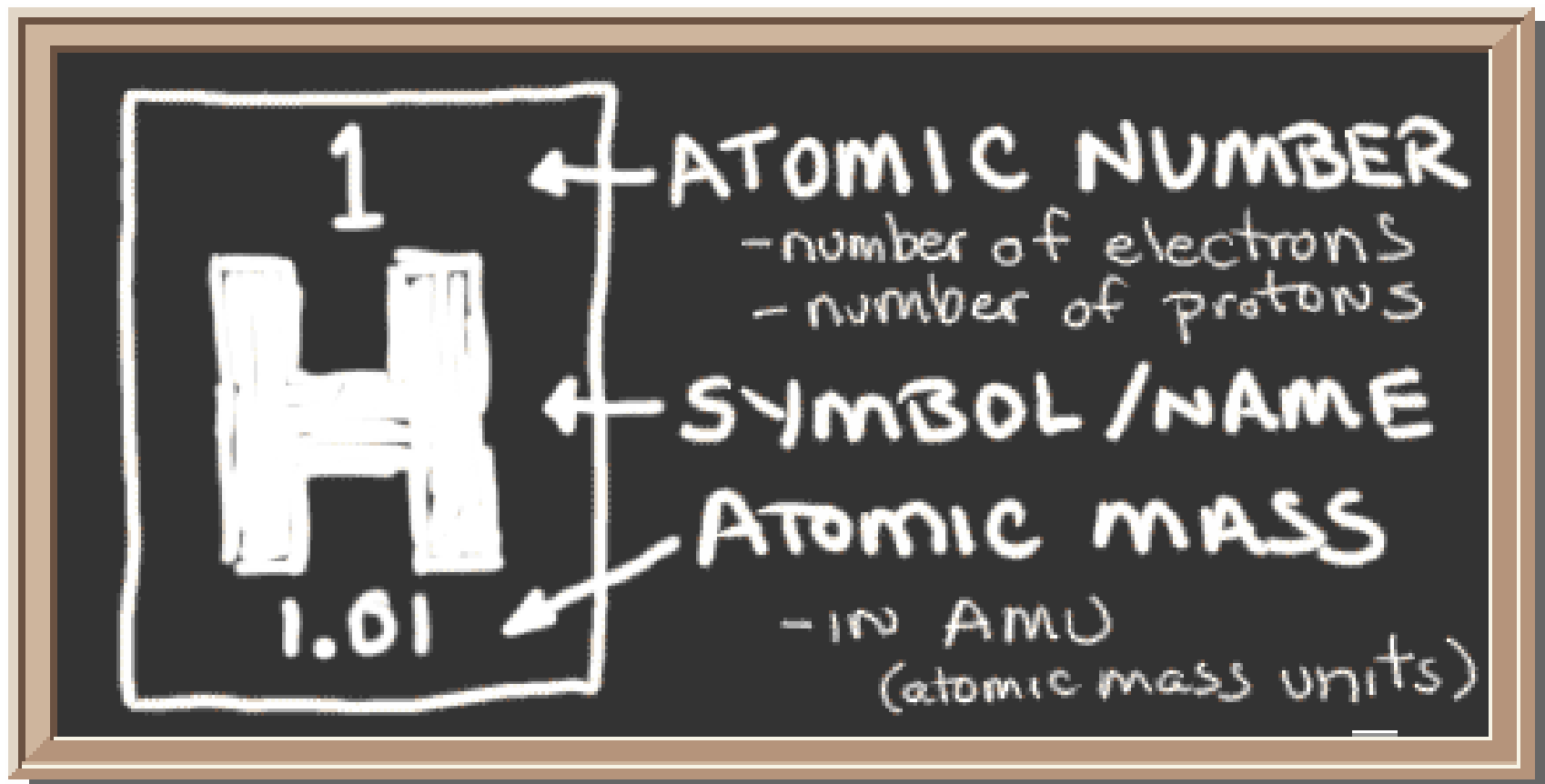




# Mendeleev's two main contributions:

- 1. organizing known elements according to properties and characteristics
- 2. recognizing the need to leave spaces for elements not yet discovered

- Includes the element's name, symbol, atomic number and atomic mass.



# Complete Activity 2-2A pg. 49

Remember the following...

- $\#p^+ = \text{atomic \#}$
- $\#e^- = \#p^+$
- $\#n = \text{atomic mass} - \#p^+$

- The periodic table is organized into periods and chemical families.

**Periods:** the horizontal rows

**Families:** the vertical columns

- Elements in the same family have similar physical and chemical properties.

# Chemical Families

## Alkali Metals: Family 1

- Highly reactive with halogens
- Reactive with oxygen and water
- Low melting points
- Soft

# Alkaline Earth Metals: Family 2

- Less reactive than the alkali metals
- Burn in air if heated
- Produce bright flames
- React with water

# Halogens: Family 17

- Non-metals
- Highly reactive

<http://www.teachers.tv/video/3518>

# Nobel Gases: Family 18

- Very stable
- Un-reactive
- All gases



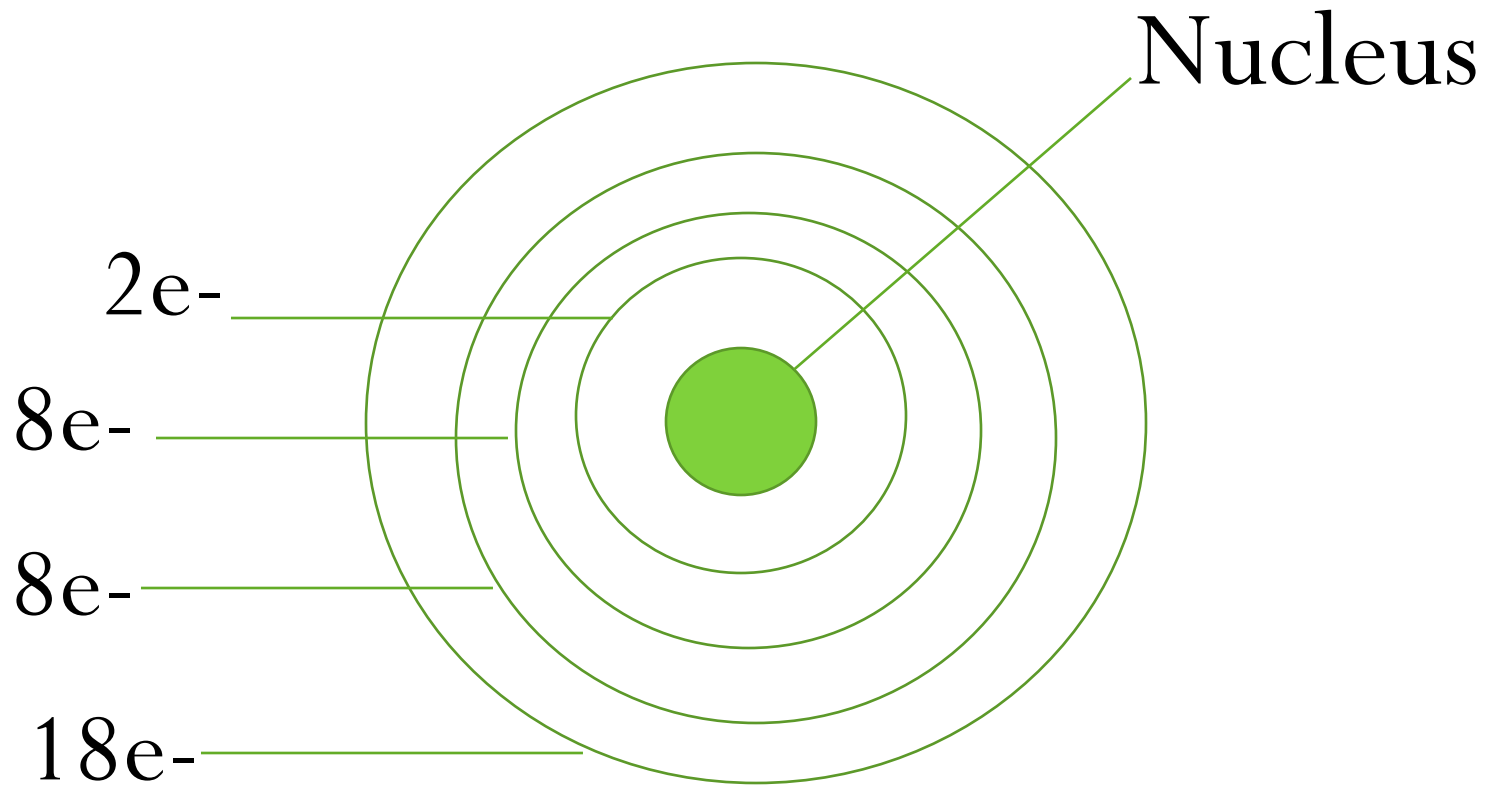
# Transition Metals

- Found at the centre of the periodic table
- Complex arrangement of electrons
- Three are magnetic; Fe, Co and Ni

# Families of the Periodic Table

IA 1	IIA 2	IIIB 3	IVB 4	VB 5	VIB 6	VII B 7	VIII 8	VIII 9	VIII 10	IB 11	IIB 12	IIIA 13	IVA 14	VA 15	VIA 16	VIIA 17	VIIA 18	
H	Li	Be	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	B	C	N	O	F	He
Na	Mg	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	Ga	Ge	As	Se	Br	Kr	Ne
K	Ca	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	In	Sn	Sb	Te	I	Xe	Ar
Cs	Sr	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds			Tl	Pb	Bi	Po	At	Rn	Al
Rb	Ba																	
Fr	Ra																	
		lanthanides																
		actinides																

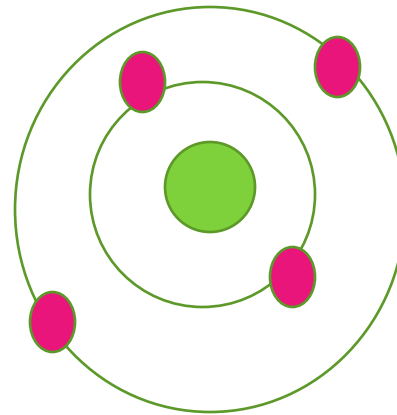
# The Periodic Table and the Atomic Theory



Energy levels = 2

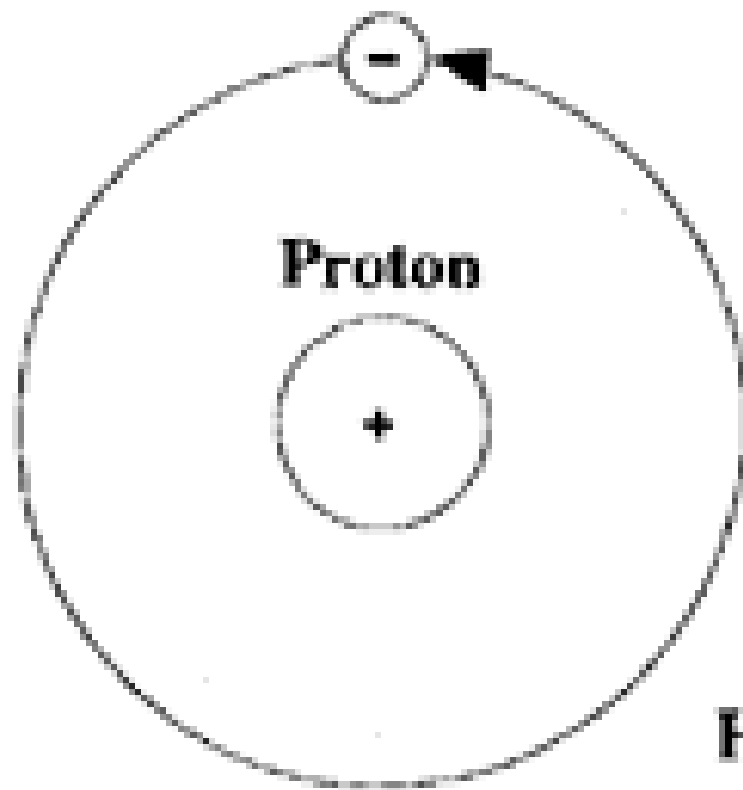
Valence energy level = 2

Valence electron = 2



Beryllium

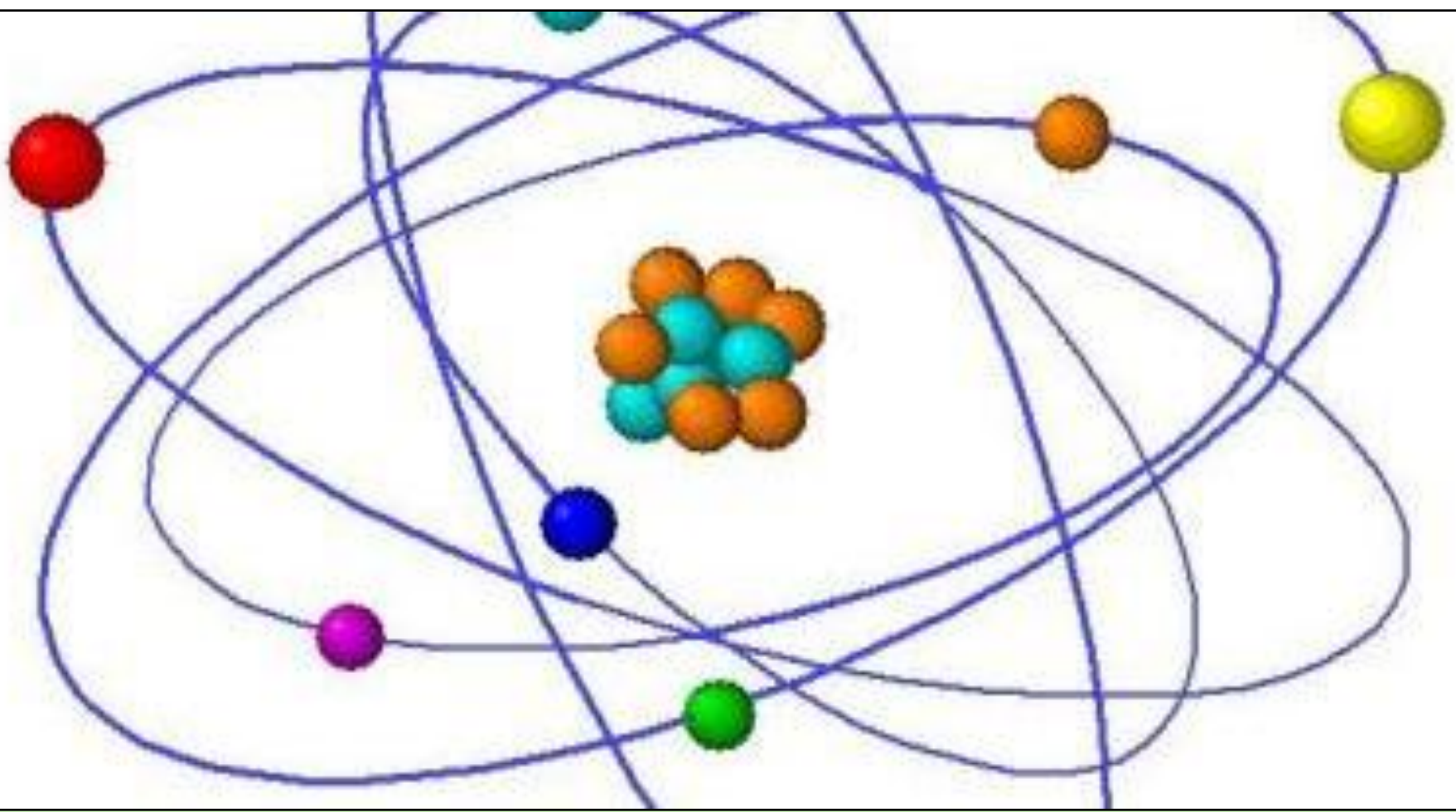
**Electron**



**Proton**

${}^1_1\text{H}$

**Hydrogen**



# Drawing Atomic Diagrams...

## Assignment

- Most elements in the same family have the same # of valence electrons (# of electrons in the outermost energy level).
- The period # = the # of energy levels.
- The valence shell of the noble gases is FULL; therefore stable.

- Gaining or losing electrons will allow atoms to achieve a kind of stability. Metals will lose electrons while non-metals will gain them.