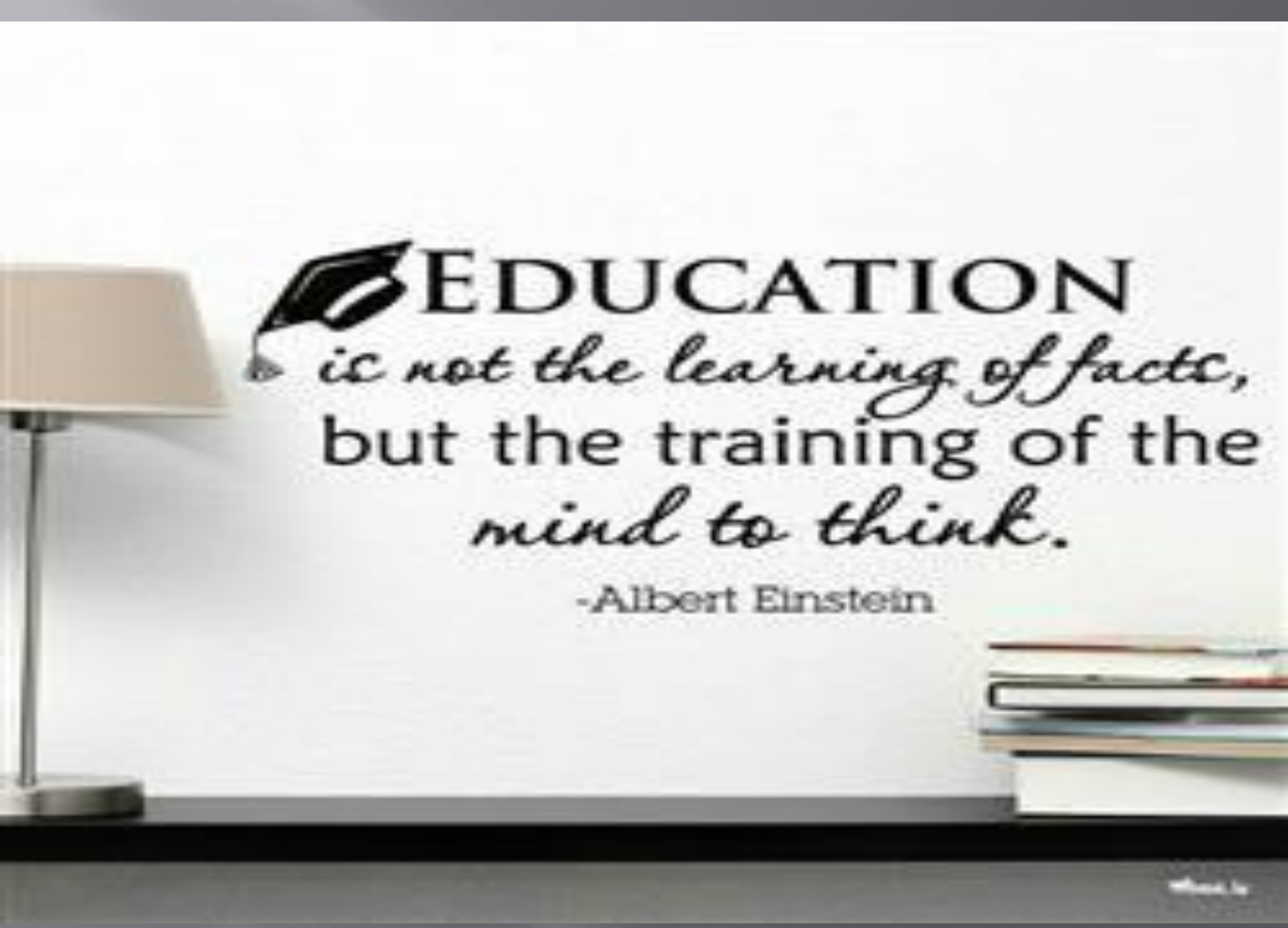
Pakistan School
Kingdom of Bahrain

MESSAGE OF THE DAY:

When you wish good for others, good things come back to you. This is the LAW OF NATURE.


EDUCATION
is not the learning of facts,
but the training of the
mind to think.
-Albert Einstein

>> Ready for Anything

WELCOME BACK TO VIRTUAL CLASSES!

#WEAREALWAYSTOGETHER

AMERICAN

A WARM WELCOME TO ALL THE STUDENTS IN THE ONLINE CLASSES.
THIS IS D.CHARLES.
TEACHER SENIOR SECTION(BOYS)

We are going to start our online CHEMISTRY lesson today. I hope u will learn and enjoy.

RULES OF THE CLASS:

1)Be on time for all your classes.(2)Respect all participants of the class.(3)Do not create any disturbances (4)Raise your hand if you have any question.

LESSON OBJECTIVES:

- BY THE END OF THIS PART OF LESSON,STUDENTS WILL BE ABLE TO:
- HOW TO CALCULATE NO.OF MOLES,NO.OF ATOMS , NO.OF MOLECULES.
- HOW TO FORMULATE EMPRICAL AND MOLECULAR FORMULA.

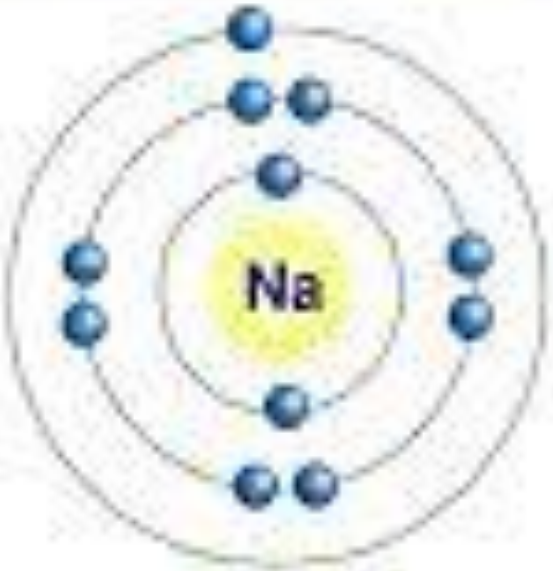
CHEMICAL SPECIES:

- CATIONS:WHEN EVER AN ATOM LOSES AN ELECTRON OR ELECTRONS,IT CONVERTS INTO POSTIVELY CHARGED SPECIES CALLED CATIONS. METAL USUALLY LOSES AN ELECTRON/ELECTRONS AND FORMS CATIONS.FOR EXAMPLE Na FORMS Na+1 BY LOSING ONE ELECTRON. Ca forms Ca+2 by losing 2 ELECTRONS.
- ANION:WHENEVER AN GAIN AN ELECTRON OR ELECTRONS,IT CONVERTS INTO NEGATIVELY CHARGED SPECIES CALLED ANIONS.NON-METAL USUALLY GAIN AN ELECTRON/ELECTRONS TO FORM ANIONS.FOR EXAMPLE:A CHLORINE ATOM GAIN ONE ELECTRON AND FORMS Cl-1 ION.AN O-ATOM GAINS 2 ELECTRONS TO FORM O-2 ION.

How is a sodium ion formed?

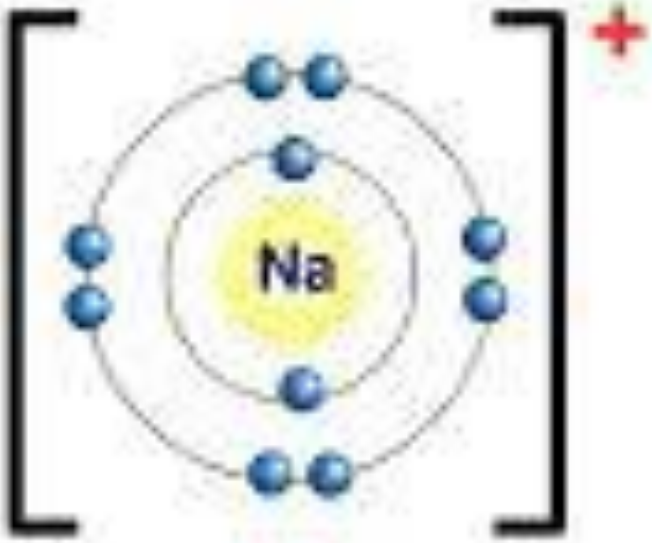
Sodium atom:		
11 protons	=	+11
11 electrons	=	-11
Total charge	=	**0**

Sodium ion:		
11 protons	=	+11
10 electrons	=	-10
Total charge	=	**+1**

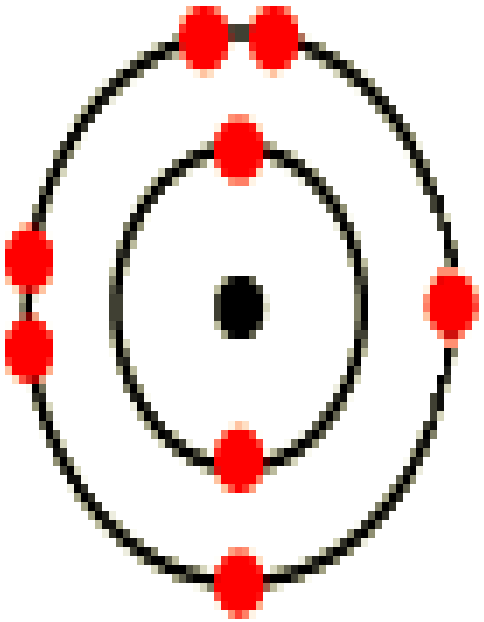


2.8.1
(partially full outer shell)

loses
1 electron

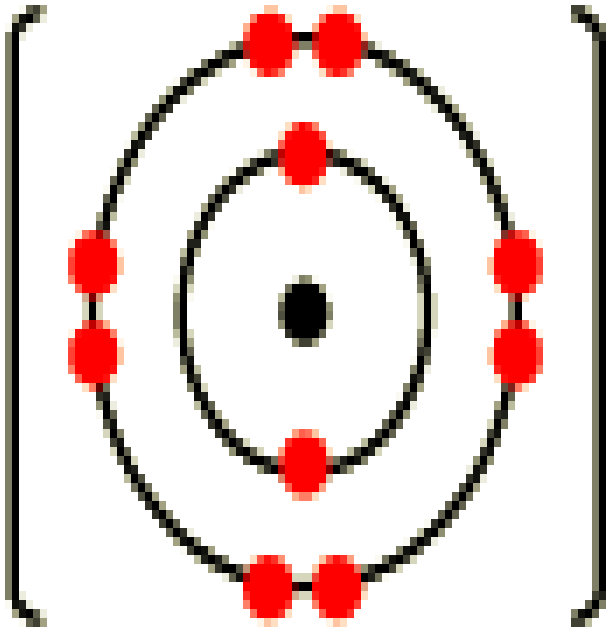


[2.8]
(full outer shell)



oxygen atom,

O 2,6



oxide ion,

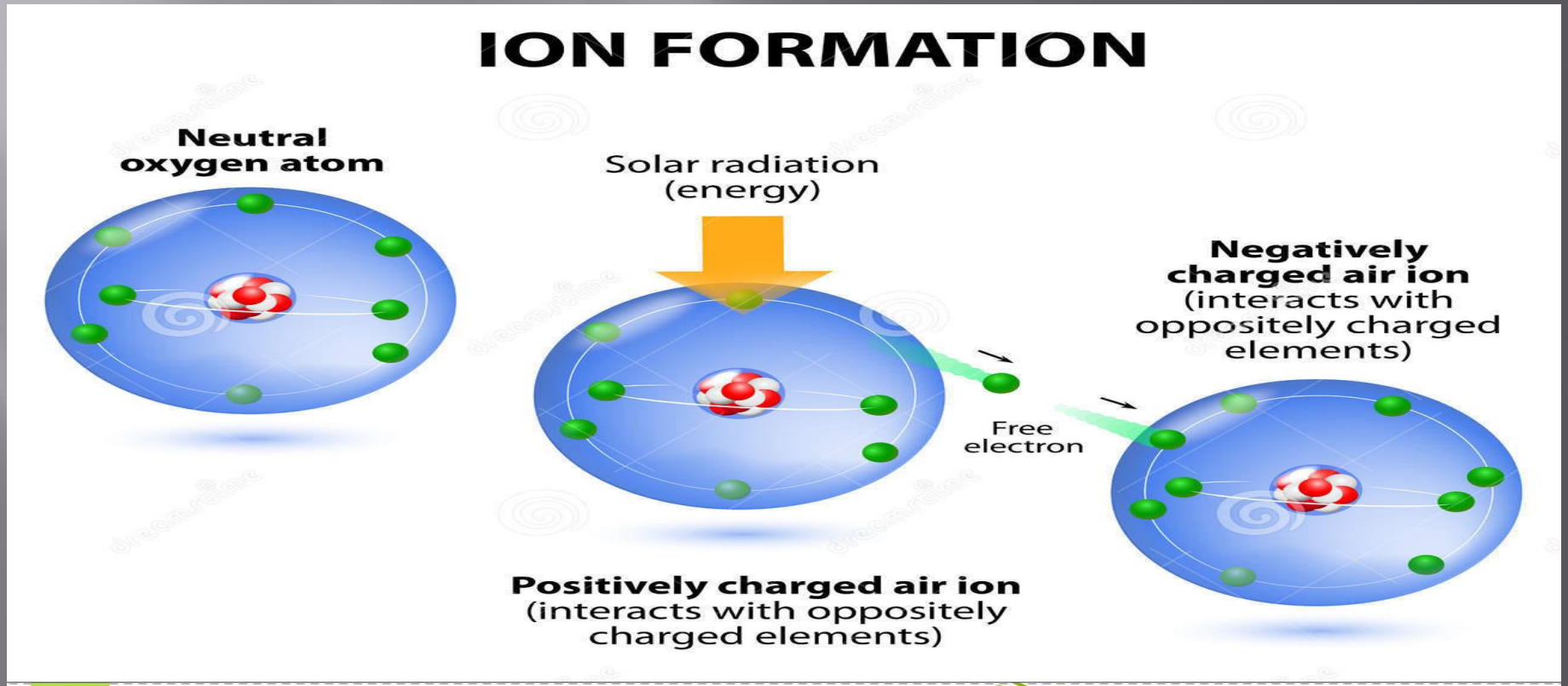
O^{2-} $[2,8]^{2-}$

POINTS TO PONDER:

- WHY METAL FORMS CATION AND NON-METALS FORMS AN IONS?
- WHY AN ATOM IS ELECTRICALLY NEUTRAL ?
- EXPLAIN WHY AN OXIDE ION O-2 HAS -2 CHARGE?
- MAGNESIUM ION,Mg+2 HAS +2 CHARGE?
- SULPHIDEION, S-2 HAS -2 CHARGE?

MOLECULAR ION:

- WHEN A MOLECULE LOSES OR GAINS ELECTRONS, THE RESULTING SPECIES IS CALLED A MOLECULAR ION.FOR EXAMPLE O2 WHEN LOSES ONE ELECTRON IT FORMS O2+ ION,BUT WHEN IT ABSORBS AN ELECTRON IT

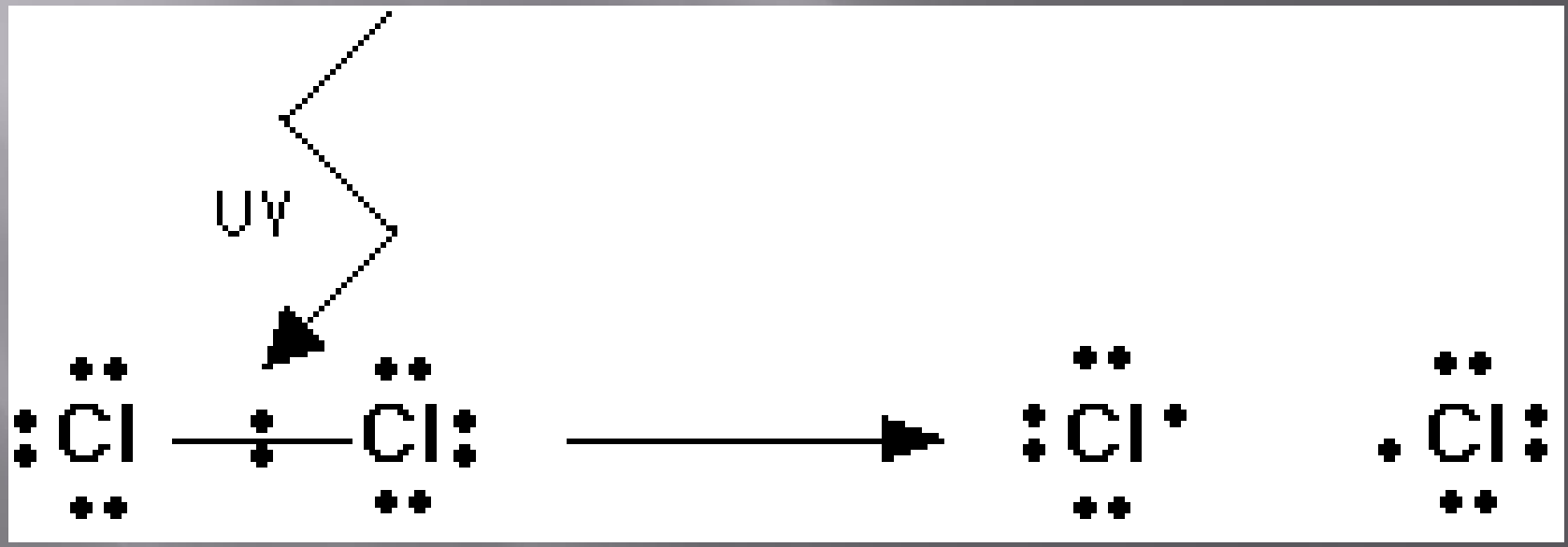


Free radicals

- Radicals are atoms, molecules, or ions with unpaired electrons in outer shell configuration.
- Free radicals may have positive, negative or zero charge.
  - Even though have unpaired electrons, by convention, metals and their ions or complexes with unpaired electrons are not radicals.
- Unpaired electrons cause radicals to be highly reactive.

FREE RADICLE :

- IT IS AN ATOM WHICH HAS UNPAIRED ELECTRON AND BEARS NO ELECTRICAL CHARGE. ITMEANS IT HAS AN ODD NUMBER OF ELECTRONS.FOR EXAMPLE:CHLORINE .



DIFFERENCES:

Differentiate between Ions and Free radicals

Unit-1

	Ions	Free Radicals
i	These are the atoms which bear some charge.	These are the atoms that have odd number of electrons.
ii	They exist in solution or in crystal lattice.	They can exist in solution as well in air.
iii	Their formation is not affected by the presence of light.	They may form in the presence of light.

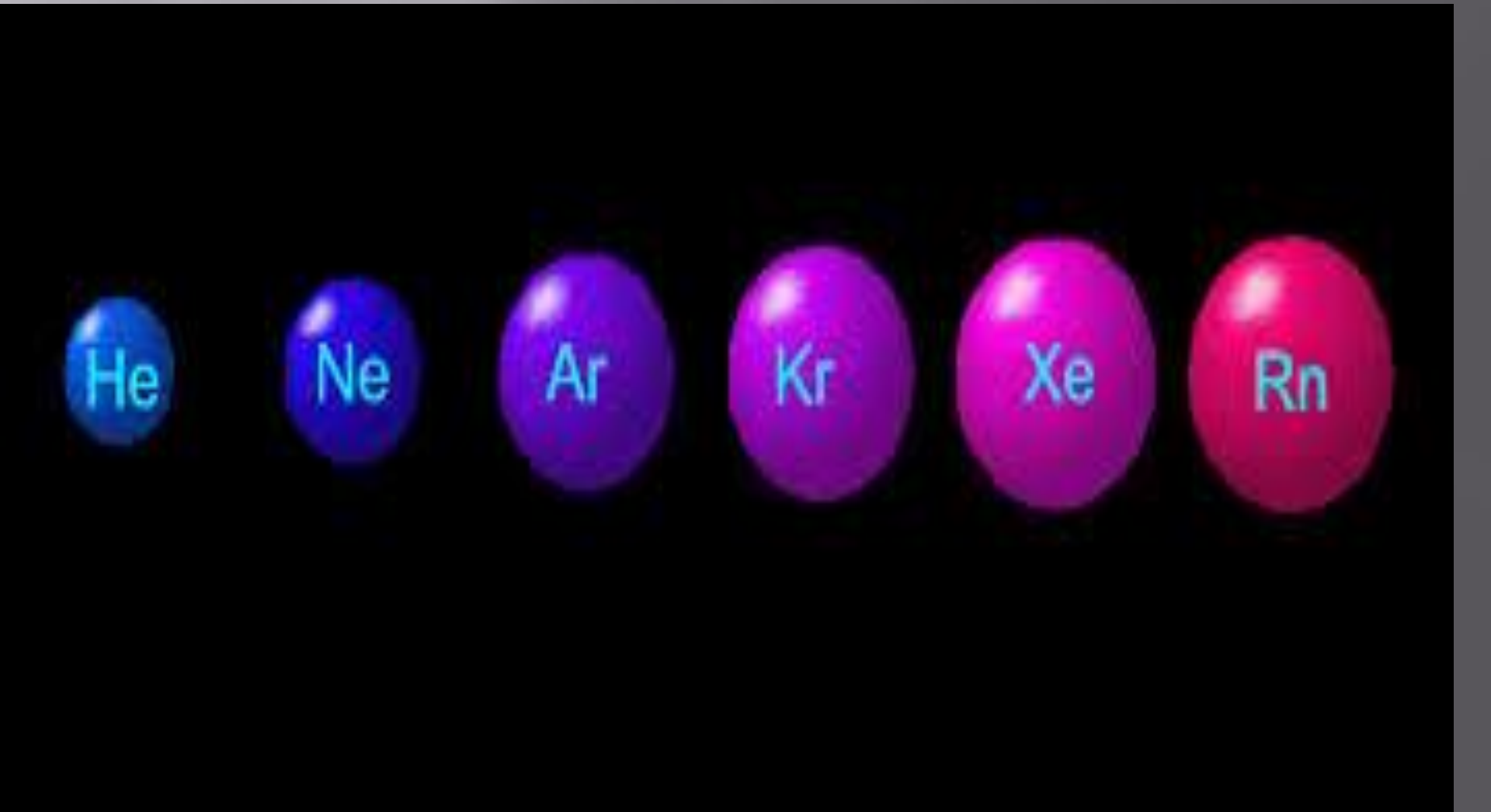
SELF-ASSESSMENT:1.6

- IDENTIFY IONS,MOLECULAR IONS AND FREE RADICALS FROM THE FOLLOWING:
- CN-,CN• He+2,N-3 CH+4,H·

MONO AND POLYATOMIC MOLECULES:

- MONOATOMIC MOLECULES:WHICH ONLY CONTAINS ONE ATOM.INERT GASES CONSIST OF MONOATOMIC MOLECULES SUCH AS He , Ne Ar etc.
- POLYATOMIC MOLECULES:WHICH CONTAINS TWO OR MORE SIMILAR OR DIFFERENT ATOMS.FOR E.g.H2/O2/Hcl/NH3 etc.

POINT TO PONDER:



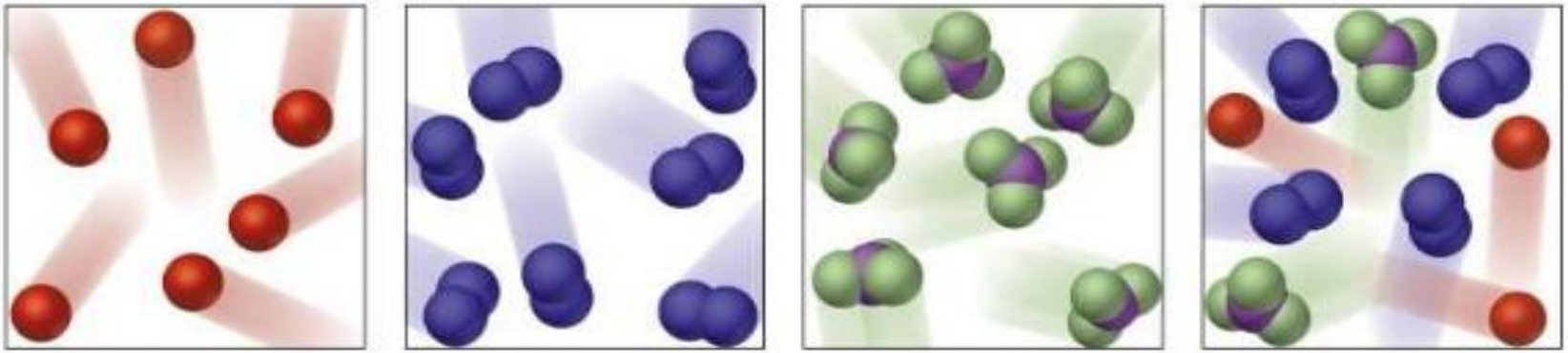
POINT TO PONDER:

- A ***Diatomic molecule*** contains only two atoms

  H_2, N_2, O_2, Br_2, HCl, CO

- A ***Polyatomic molecule*** contains more than two atoms.

  O_3, H_2O, NH_3, CH_4

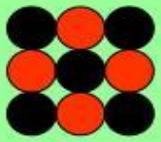


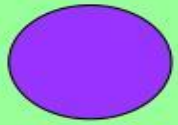
(a) Atoms of an element | (b) Molecules of an element | (c) Molecules of a compound | (d) Mixture of elements and a compound

REPRESENTATIVE PARTICLES:

Representative Particles

- Representative particles =
- Molecules = molecular compounds
- Atoms = elements
- Formula units = ionic compounds
- Ions = element/compound with a charge

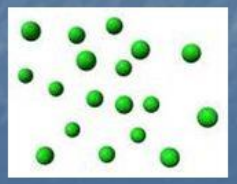
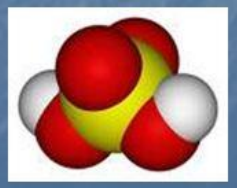
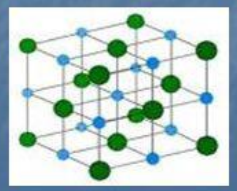




REPRESENTATIVE PARTICLES:

What are representative particles?

- The fundamental types of particles that make up pure substances (elements and compounds)
- Some pure substances are made of **atoms** (for examples, all metals and noble gases)
- Some pure substances are made of **molecules** (for example, all covalent compounds, like water)
- Some pure substances are made of **formula units** (for example, all ionic compounds, like table salt)

Representative particles

- The smallest pieces of a substance.
- For an element it is an atom. (Ex: Na)
- For a covalent compound it is a molecule. (Ex: CO_2 , H_2)
- For an ionic compound it is a formula unit. (Ex: NaCl)

IDENTIFICATION:

Identify the Representative Particle

Aluminum

hydrogen sulfide

Sodium chloride

Aluminum sulfate

Sulfur dioxide

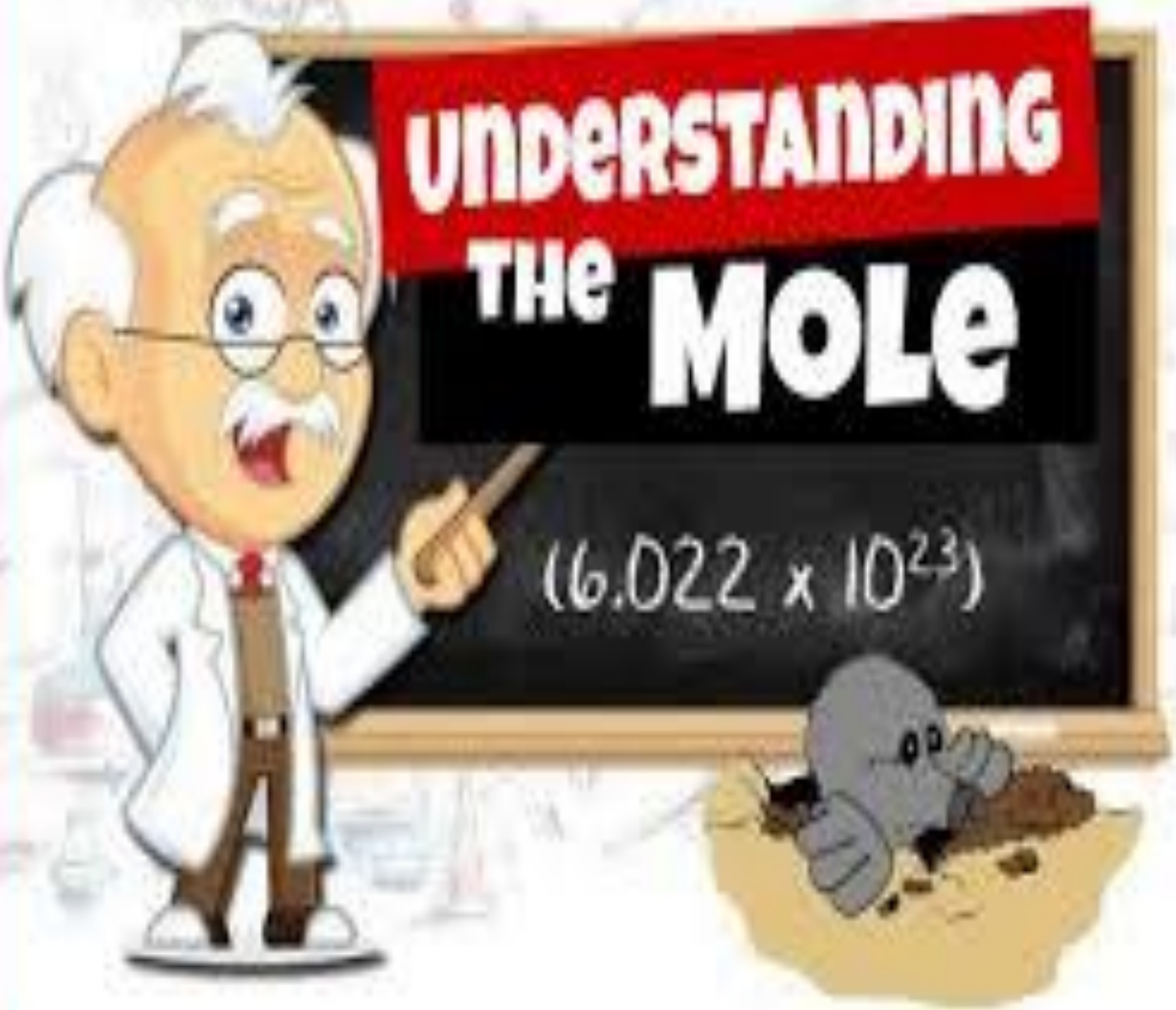
sodium

Hydrogen

ACS Outreach

Meet Professor Molekium!

YourChemCoach



Mole Concept

In chemistry the mole is a fundamental (SI) unit used to measure the amount of substance. This quantity is sometimes referred to as the chemical amount. In Latin mole means a "massive heap" of material. It is convenient to think of a chemical mole as such.

The Mole

What's a mole?

In chemistry, a **mole** is a counting unit.
What does that mean?

- 1 dozen = 12 units(ie eggs,donuts)
- **1 mole = 6.02×10^{23} particles.**
- That's 602,000,000,000,000,000,000,000 particles!
- **6.02×10^{23} is Avogadro's Number**

A mole is used to represent lots of particles

- atoms
- molecules(covalent compounds)
- ions
- Ionic compounds

The mole

What's the mass of one mole of calcium carbonate?

M_r of $CaCO_3$ =
40 + 12 + 48 = 100

So one mole of $CaCO_3$ = 100g

Definition of Mole

- The amount of atoms in 12.0 grams of Carbon 12 (6.02×10^{23} atoms known as **Avogadro's number**).

- A sample of any element with a mass equal to that element's atomic weight (in grams) will contain precisely **one mole** of atoms (6.02×10^{23} atoms).

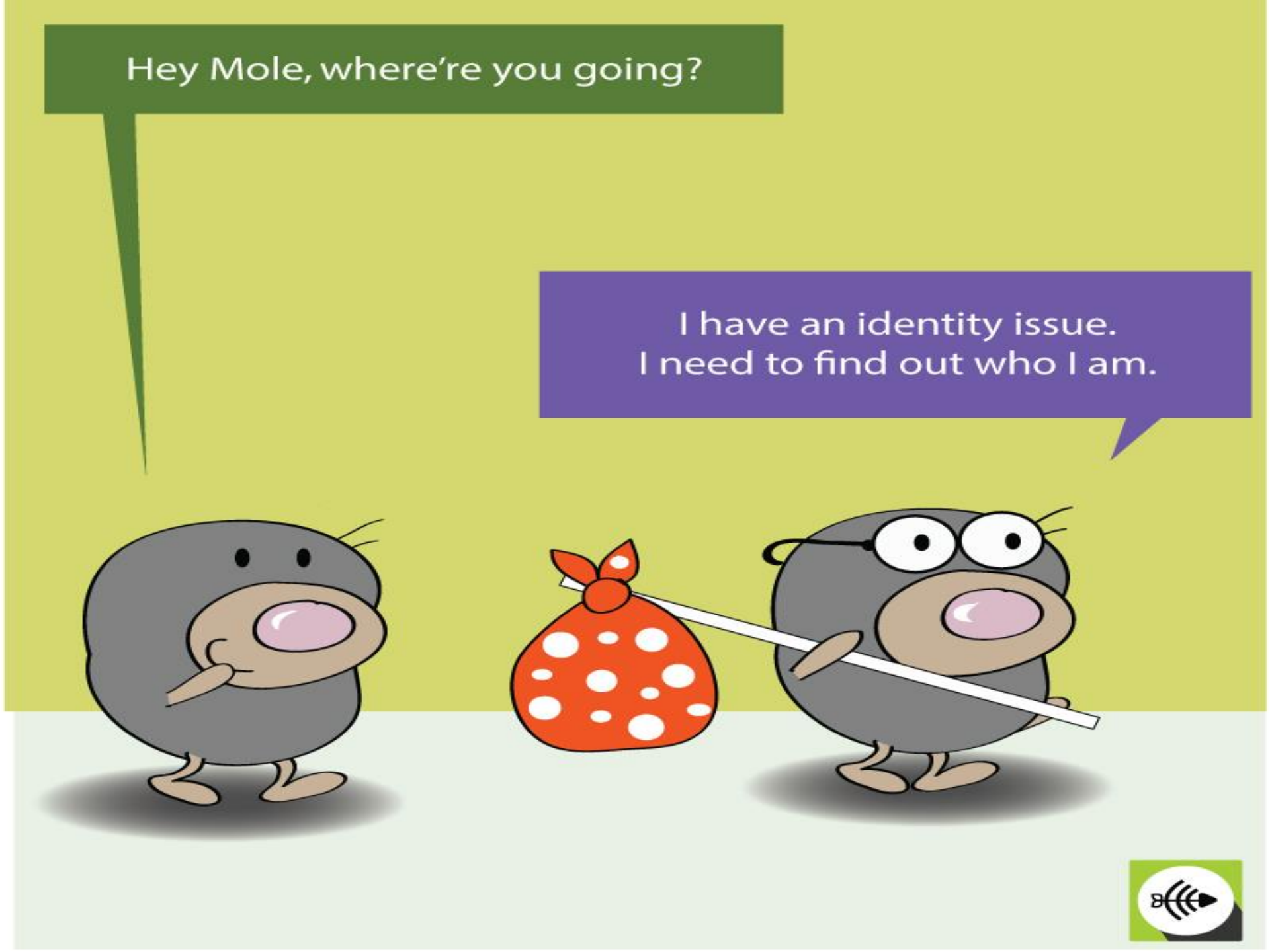
Chemistry
Grades 10 - 12

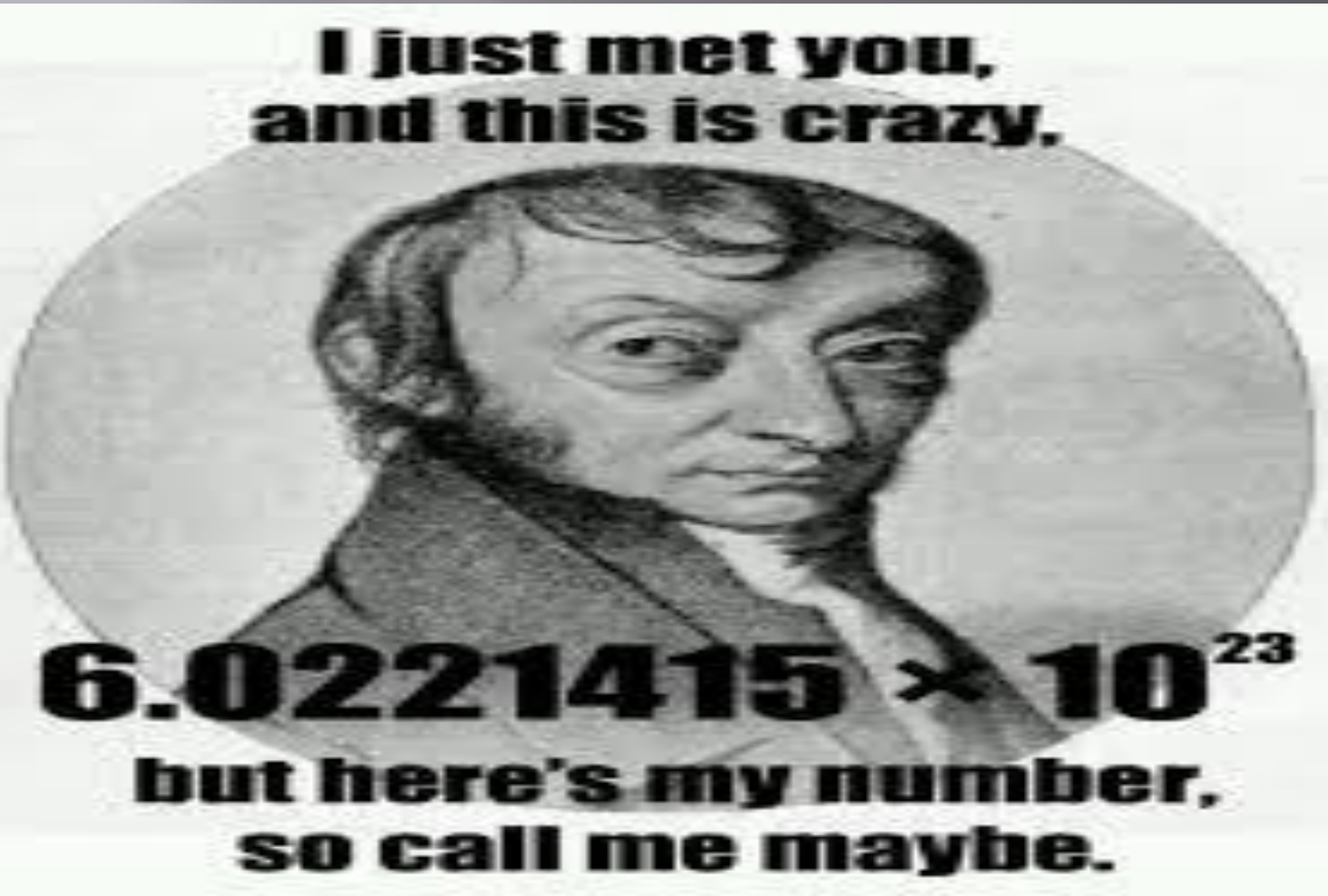
Lab: The Concept of a "Mole"

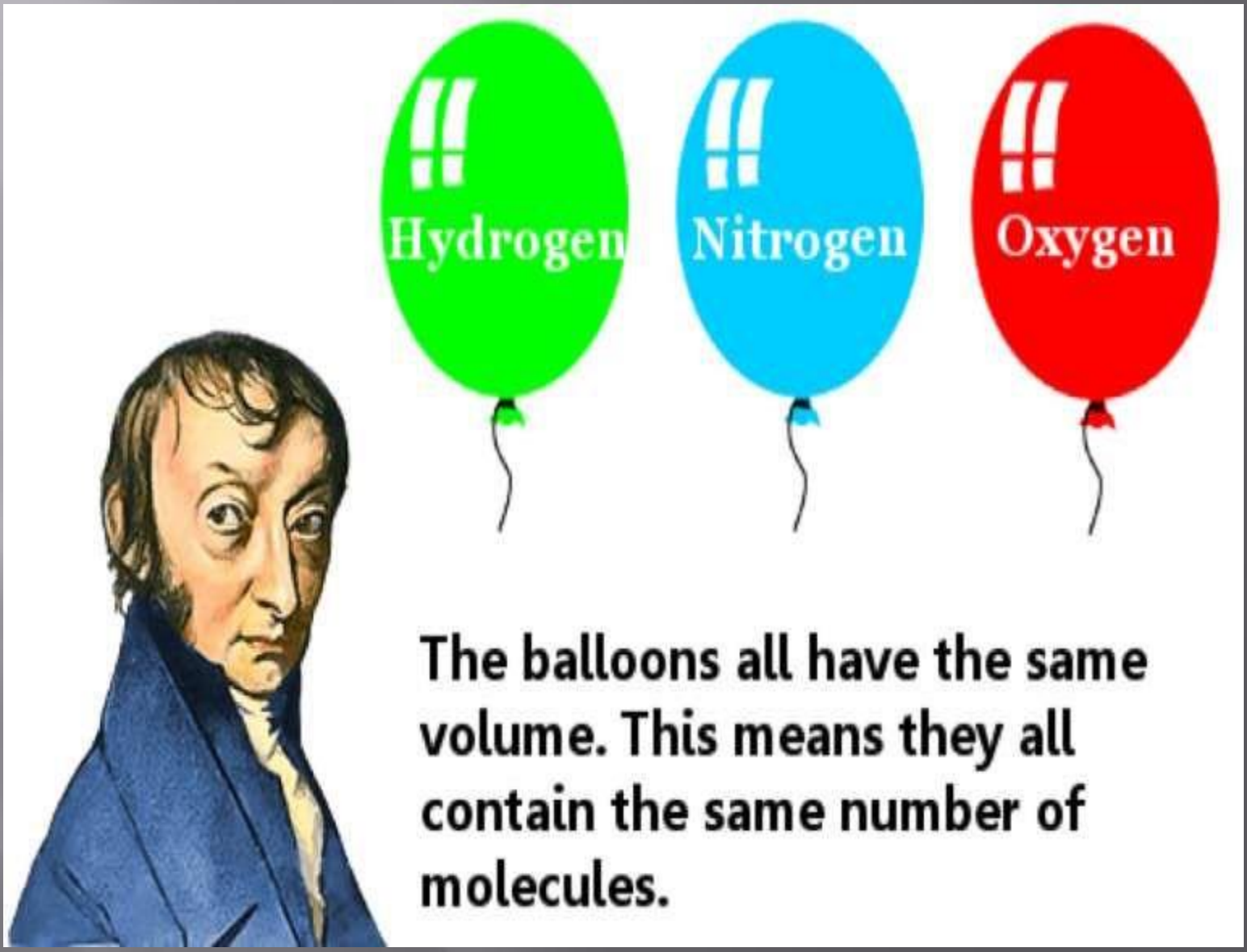
This lab will help your students understand the meaning of the term "mole" and to be able to better understand the size of a mole.

- Stoichiometry.
- Practice mole/mass calculations.
- Easy set-up and easy clean up.
- Reinforces good lab techniques.

By:
Amy Brown
Science Stuff


Hey Mole, where're you going?
I have an identity issue.
I need to find out who I am.


I just met you,
and this is crazy,
6.0221415×10^{23}
but here's my number,
so call me maybe.


Hydrogen
Nitrogen
Oxygen
The balloons all have the same volume. This means they all contain the same number of molecules.

Experimentally it has been shown that a *mole* is 6.022×10^{23} atoms

AVOGADRO'S NUMBER – 6.022×10^{23}

For shoes: 1 pair = 2 shoes

For eggs: 1 dozen = 12 eggs

For atoms: 1 mole = 6.022×10^{23} atoms

= The number of atoms in 20.18 g Ne

= The number of atoms in 40.08 g Ca

MOLE – The number of atoms contained in 12 g of carbon-12

AVOGADRO'S NUMBER

- **Definition:** Avogadro's number is the number of particles found in one mole of a substance. It is the number of atoms in exactly 12 grams of carbon-12. This experimentally determined value is approximately 6.022×10^{23} particles per mole.

Avogadro's Number

- defined as the ratio of the number of constituent particles in a sample to the amount of substance.
- 6.022×10^{23} particles / 1 mole of entity

Particles= atoms/molecules/ions

CALCULATIONS:

- Q13.IDENTIFY THE SUBSTANCE THAT HAS THE FORMULA MASS OF 133.5amu. (Mg=24,Cl=35.5,S=32,B=11,Al=27)
- FORMULA MASS OF MgCl2=24x1+2x35.5=24+71=95amu.
- Q14)CALCULATE THE NO.ATOMS IN EACH OF THE FOLLOWING SAMPLES.(a)3.4moles of nitrogen atoms(b)23g of Na (c)5g of H atoms .
- NO.OF ATOMS=NO.OF MOLES X NA.
- Q15)CALCULATE THE MASS OF:

POINTS TO PONDER:

Q9.DECIDE WHETHER OR NOT EACH OF THE FOLLOWING IS AN EXAMPLE OF EMPIRICAL FORMULA:(a)Al_2Cl_6 (b)Hg_2Cl_2 (c)NaCl (d)C_2H_6O

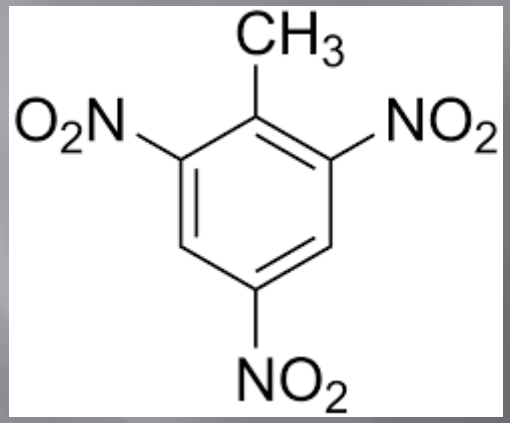
SOLUTION:Al_2Cl_6.NO,SINCE 2:6 IS NOT THE SIMPLEST WHOLE NUMBER RATIO, THEREFORE Al_2Cl_6 IS NOT AN Empirical FORMULA. Hence it is a molecular formula.

Hg_2Cl_2:No,since 2:2 is not the simplest whole number ratio,therefore Hg_2Cl_2 is not empirical formula.Hence it is a molecular formula.

NaCl:Yes,since 1:1 is the simplest number ratio, therefore NaCl is empirical formula.C_2H_6O. Yes,since 2:6:1 is the simplest whole number ratio,therefore C_2H_6O is Empirical formula.

POINTS TO PONDER:

- C7H6N5O6
- Trinitrotoluene



POINTS TO PONDER

- Q11)Ans. Molecular formula=P_4O_{10}. Empirical formula=P_2O_5
- Molecular mass ofP_4O_{10} =4x31+10x16=124+160=284g.
- Q16.1)BIOCHEMISTRY.2INORGANIC CHEMISTRY.3.ANALYTICAL CHEMISTRY.4.ORGANIC CHEMISTRY.5.ENVIRONMENTAL CHEMISTRY.6.PHYSICAL CHEMISTRY.7.ENVIRONMENTAL CHEMISTRY.8.ENVIRONMENTAL.9.INDUSTRIAL CHEMISTRY.10.NUCLEAR CHEMISTRY.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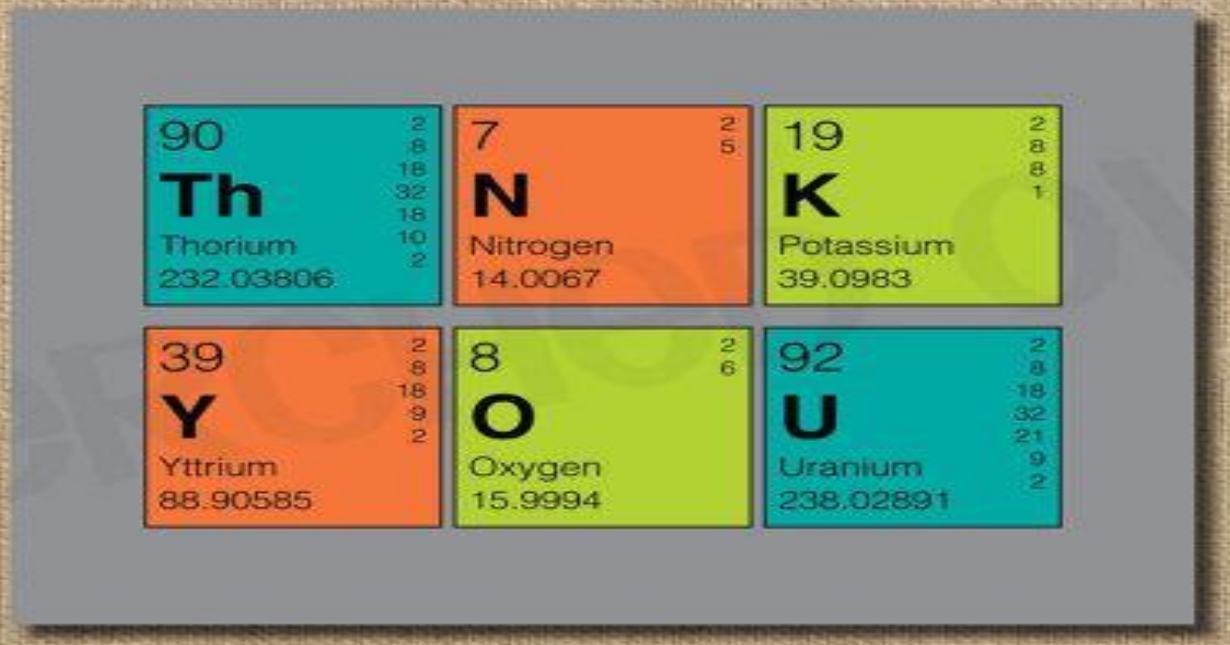
90
Th
Thorium
232.03806
2 8 18 32 18 10 2
7
N
Nitrogen
14.0067
2 5
19
K
Potassium
39.0983
2 8 8 1
39
Y
Yttrium
88.90585
2 8 18 9 2
8
O
Oxygen
15.9994
2 6
92
U
Uranium
238.02891
2 8 18 32 21 9 2


Thank
You


TAKE CARE