Bell Ringer #11:

Isotopes

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Agenda

Bell Ringer
Error Analysis Video
Chemical Conversion Problems
Isotopes
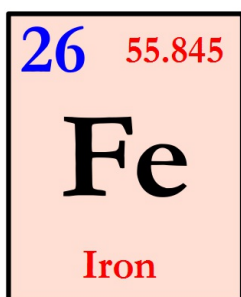**Isotope Lab**
Chemical Conversion Homework
Exit Ticket

Error Analysis Video

Mole to gram conversion

45.4 moles of iron (Fe) just fell out the window. How many kilograms does this object weigh?
(Should you worry?)

26 **55.845**

Fe

Iron

$$\frac{45.4 \, mol}{1} \times \frac{1 \, mol}{55.845 \, g} \times \frac{1000 \, g}{1 \, kg}$$

$$= 2535363 \, kg$$

Mole to gram conversion

45.4 moles of iron (Fe) just fell out the window. How many grams does this object weigh in kg?
(Should you worry?)

26	55.845
Fe	
Iron	

$$\frac{45.4 \, \text{mol Fe}}{1} \times \frac{55.845 \, g}{1 \, \text{mol}} \times \frac{1 \, \text{kg}}{1000 \, g} = 2.54 \, \text{kg}$$

Diatomics

- Di = two
- Atomic = atoms
- Diatomics are atoms that are paired under normal conditions

H_2

N_2

O_2
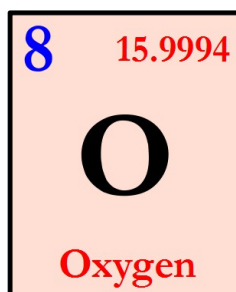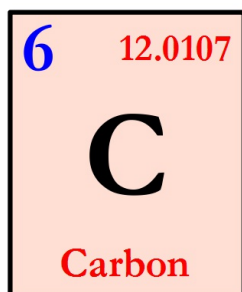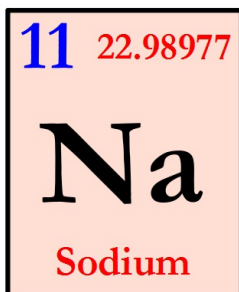
F_2

Cl_2

Br_2

I_2

Molecular Mass

11 22.98977	6 12.0107	8 15.9994
Na	**C**	**O**
Sodium	Carbon	Oxygen

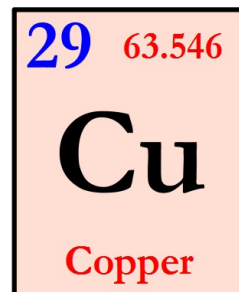**Find the molecular mass of Na_2CO_3.**

$$(2 \times 22.98977) + (1 \times 12.0107) + (3 \times 15.9994)$$
$$= 105.98844 \, g / mol$$

Chemical Conversion Problems

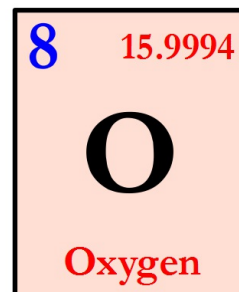| 29   63.546 |
|:---:|
| **Cu** |
| Copper |

12 moles of copper is equal to _____ grams of copper

$$\frac{12 \, mol \, Cu}{1} \times \frac{63.546 \, g}{mol} = 762.552 \, g \text{ of } Cu$$

Chemical Conversion Problems

How many moles of oxygen are in a 76 gram sample of oxygen?

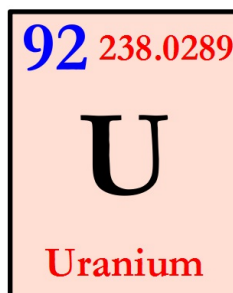| 8	15.9994
O	
Oxygen	

$$(2 \times 15.9994) = 31.9988 \, g \, / \, mol$$

$$\frac{76 \, g \, O_2}{1} \times \frac{mol}{31.9988 \, g} = 2.3751 \, mol \, O_2$$

Chemical Conversion Problems

0.0045 moles of U_3O_5 is equal to _____ grams

92	238.0289	8	15.9994
U		**O**	
Uranium		Oxygen	

$$(3 \times 238.0289) + (5 \times 15.9994)$$
$$= 794.0837 \, g \, / \, mol$$

$$\frac{0.0045 \, mol \, U_3O_5}{1} \times \frac{794.0837 \, g}{mol} = 3.5734 \, g \, of \, U_3O_5$$

Chemical Conversion Problems

Convert 24 grams of CH_4 into molecules of CH_4.

1	1.00794	6	12.0107
H		**C**	
Hydrogen		Carbon	

$$(1 \times 12.0107) + (4 \times 1.00794)$$
$$= 16.04246 \, g \, / \, mol$$

$$\frac{24 \, g \, CH_4}{1} \times \frac{mol}{16.04246 \, g} \times \frac{6.022 \times 10^{23}}{mol}$$

$$= 9.009 \, molecules \, of \, CH_4$$

Isotopes (notes)

- **An isotope is an atom with differing number of neutrons than a typical atom of a particular element.**
- **Isotopes can have more neutrons than a normal atom or it can have fewer.**

Chemical Behavior

- Isotopes are like "normal" elements, and do not behave any different chemically
- Some isotopes are stable, but others are radioactive
- Isotopes force us to use a weighted average for the atomic mass of an element

Isotopes of Hydrogen

Name	Common Name	Protons	Neutrons	Electrons	Mass	Abundance
Hydrogen 1	Protium	1	0	1	1	99.98%
Hydrogen 2	Deuterium	1	1	1	2	.018%
Hydrogen 3	Tritium	1	2	1	3	.002%

Atomic Mass

Atomic Number

$_1^1H$ protium

$_1^2H$ deuterium
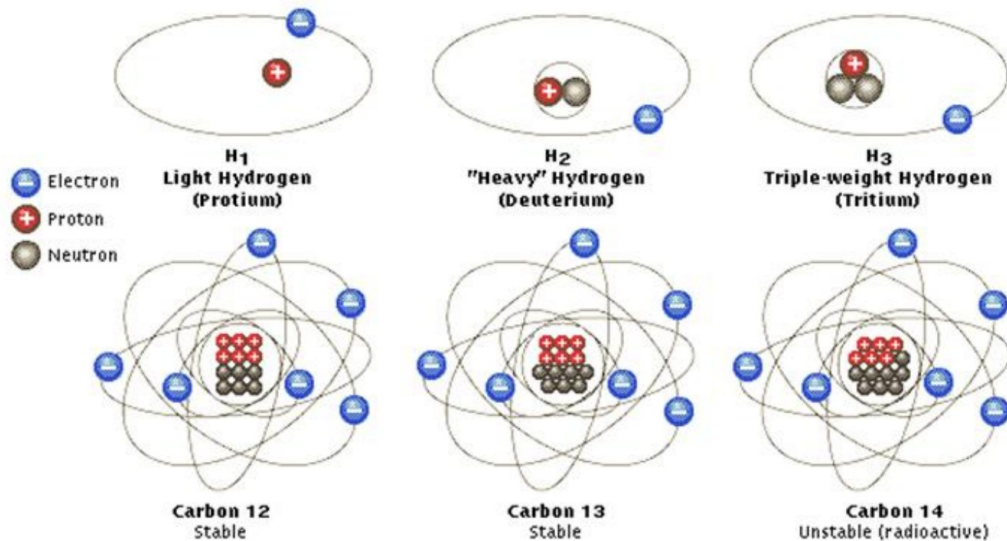
$_1^3H$ tritium

- Protons
- Neutrons
- Electrons
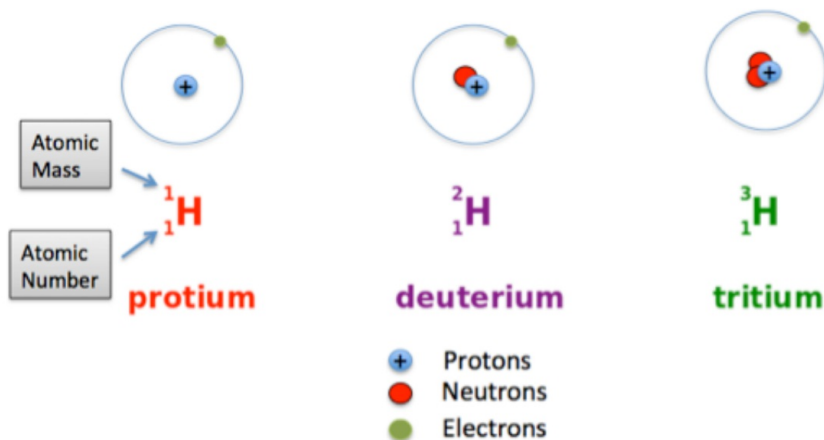
How to write about isotopes

- Carbon 12
  - A carbon atom with an atomic mass of 12
- Carbon 13
  - A carbon atom with an atomic mass of 13
  - It has one more neutron than Carbon 12
- Carbon 14
  - A carbon atom with an atomic mass of 14
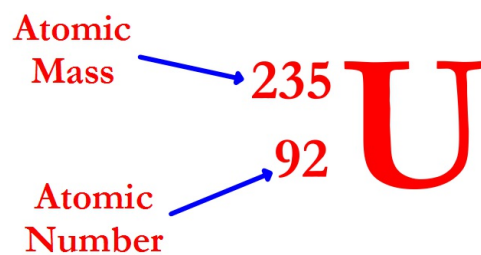 - How many more neutrons does it have?

Isotopes of Hydrogen and Carbon

Naming Isotopes

Uranium 235

Atomic
Mass → 235 **U**

92

Atomic
Number

Isotope Lab

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Chemical Conversion Homework

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Exit Ticket #11:

Socrative Room Name:
LEVEL70WARRIOR

Moles