W-6C General Chemistry Week 12 11/20

Uranium → 238 atomic mass $p^{\oplus} + n^{\circ} = 238$

Hydrogen — 1 $p^{\oplus} + n^{\circ} = 1$

100g Uranium
100g hydrogen

more hydrogen atoms than uranium atoms

Mole → mol → measures amount of a substance.

Carbon

protons → 6
neutrons → 6
electrons → 6

Atomic Number → 6

Atomic Mass → 12.011 (isotopes)

12 subatomic particles

12 atomic mass units → 12 amu

12 amu → carbon molar mass of 12

12 amu → 1 mole of carbon

Sodium → 22.99 g

23 atm → 23g ≈ 1 mol

"atomic mass" → molar mass

Fluorine → atomic mass 18.998

By definition, 18.998 g of F = 1 mol F

How much? molar mass 18.998 g/mol

45 g F =

$$\frac{45\,g\,F}{1} * \frac{1\ mol\ F}{18.998\,g\,F} = \frac{45}{18.998} = 2.36 \quad \boxed{2.4\ mol\ F}$$

100 g carbon $100\,g\,C * \frac{1\ mol\ C}{12.011\ g/mol} = \boxed{8.33\ mol\ C}$

vs

100 g platinum $100\,g\,Pt * \frac{1\ mol\ Pt}{195.08\ g/mol} = \boxed{0.513\ mol\ Pt}$

molar mass C → 12.011 g/mol

Pt → 195.08 g/mol

1 mol of any substance contains an Avagadro's number of atoms/molecules

## Avagadro's Number

180g of sugar/glucose

6 0 2 2 0 0 , 0 0 0 , 0 0 0 , 0 0 0 , 0 0 0 , 0 0 0 , 0 0 0

[ $6.022 * 10^{23}$ atoms/molecules ]

$100\,g\ C \rightarrow$ atoms?

$$100\,g\ C * \frac{1\ mol\ C}{12.011\,g\ C} * \frac{6.022 * 10^{23}\ atom}{1\ mol\ C} = 50.1 * 10^{23+1}\ atoms$$

$$5.01 * 10^{24}\ atoms$$

$100\,g\ Pt \rightarrow$ atms?

$$100\,g\ Pt * \frac{1\ mol\ Pt}{195.08\,g\ Pt} * \frac{6.022 * 10^{23}\ atoms}{1\ mol\ Pt} =$$

$$3.09 * 10^{23}\ atoms$$

How many moles are in 220 grams of Chlorine?

molar mass Cl → 35.45 g/mol

$$220\ g\ Cl * \frac{1\ mol\ Cl}{35.45\ g\ Cl}$$

**6.21 mol Cl**

What is the mass of 3.72 mol of sodium?

molar mass Na → 22.990 g Na / mol

$$3.72\ \cancel{mol} * \frac{22.990\ g\ Na}{1\ \cancel{mol}}$$

**85.5 g Na**

How many atoms in 127.5 g K?

molar mass K → 39.098 g/mol

$$127.5\ g\ K * \frac{1\ mol\ K}{39.098\ g\ K} * \frac{6.022 * 10^{23}\ atoms}{1\ mol\ K}$$

$19.64 * 10^{23}$ atoms

**$1.96 * 10^{24}$ atoms K**

$3.08 * 10^{28}$ atoms of gold → ___ g Au?

Molar Mass

Au → 196.97 g/mol

$$3.08 * 10^{28} \text{ atoms Au} * \frac{1 \text{ mol Au}}{6.022 * 10^{23} \text{ atoms}} * \frac{196.97 \text{ g Au}}{1 \text{ mol Au}}$$

$1.01 * 10^{7}$ gram Au