TH-GC General Chemistry Week 12 12/8

Carbon | protons – 6 | electrons – 6 | neutrons – 6

Atomic Number = 6

Atomic Mass = 12.011

12 (atomic mass) – 6 (atomic number) = 6

Platinum Atomic Number = 78

Atomic Mass = 195

Carbon Standard

6 protons + 6 neutrons

12 atomic mass units

12 amu

12 amu → 12 grams of carbon

12 grams of carbon = 1 mole of carbon

molar mass of element = atomic mass of an element

$$100\text{ g C} \times \frac{1\text{ mol C}}{12.011\text{ g C}} = \frac{100}{12.011} = 8.33\text{ mol}$$

$$100\text{ g Pt} \times \frac{1\text{ mol Pt}}{195.08\text{ g Pt}} = \frac{100}{195.08} = 0.51\text{ mol}$$

1 mol of substance contains $6.022 * 10^{23}$ atoms

602,200,000,000,000,000,000,000

12.011 g carbon → $6.022 * 10^{23}$ atoms of carbon

$$100\ \text{g carbon} * \frac{1\ \text{mole}}{12.011\ \text{g}} * \frac{6.022 * 10^{23}\ \text{atoms}}{1\ \text{mole}}$$

molar mass

$$\frac{6.022 * 10^{23}\ \text{atoms}}{1\ \text{mol}}$$

Avagadro's Number

$50.1 * 10^{23+1}$ atoms

$5.01 * 10^{24}$ atoms

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

$3.04 * 10^{23}$ atoms

How many moles are in 220 g Cl?

Molar Mass of chlorine: 35.45 g/mol

$$220\ g\ Cl * \frac{1\ mol\ Cl}{35.45\ g\ Cl} = \boxed{6.21\ mol\ Cl}$$

What is the mass of 3.72 mol Na? 22.990 g/mol

$$3.72\ \cancel{mol\ Na} * \frac{22.990\ g\ Na}{1\ \cancel{mol\ Na}} = \boxed{85.5\ g}$$

How many atoms in 127.5 g K? Molar mass

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

$19.6 * 10^{23+1}$ atoms

$$\boxed{1.96 * 10^{24}\ atoms}$$

$3.08 * 10^{28}$ atoms of gold = _____ g of Au

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

196.97 g/mol

$100.7 * 10^{5+2}$

$1.01 * 10^{7}$ grams

$\frac{10^{28}}{10^{23}} = 10^{28-23} = 10^{5}$