9/11/2019

6
C
12.01

$1\ \text{atom C} = 12.01\ u\ \text{C}$

$6.022 \times 10^{23}\ \text{atoms C} = 12.01\ \text{g C}$

$1\ \text{mol C} = 12.01\ \text{g C}$

79
Au
197.0

$6.022 \times 10^{23}\ \text{atom Au} = 197.0\ \text{g Au}$

$1\ \text{mol Au} = 197.0\ \text{g Au}$

we can ~~don't~~ do conversions ...

$15.0\ \text{g C} \longrightarrow ?\ \text{mol C}$

(exact)

$$15.0\ \text{g C} \times \frac{1\ \text{mol C}}{12.01\ \text{g C}} = 1.25\ \text{mol C}$$

(3 s.f.) (4 s.f.)

$25.0\ \text{g Au} \longrightarrow ?\ \text{mol Au}$

3 sf ∞ (3 s.f.)

$$25.0\ \text{g Au} \times \frac{1\ \text{mol Au}}{197.0\ \text{g Au}} = 0.130\ \text{mol Au}$$

(4 s.f.)

Q: how many atoms of Au?

$$25.0\ \text{g Au} \times \frac{6.022 \times 10^{23}\ \text{atoms Au}}{197.0\ \text{g Au}} = 7.64 \times 10^{22}\ \text{atoms Au}$$

76,400,000,000,000,000,000,000

Ch3. Molecules + Compounds

Molecules: 2 or more atoms bonded together
- usually non-metals (H too)

hydrogen:  , $H-H$, H_2

element symbol

subscript (#atoms)

space-filling formula

structural formula

chemical formula

- diatomic molecule (2 atoms)

7

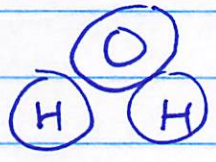
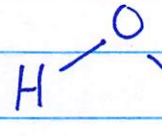
H_2

N_2 O_2 F_2

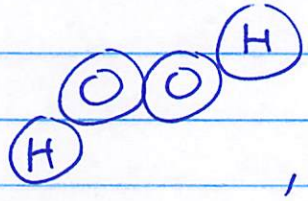
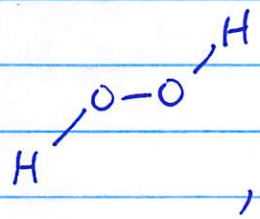
Cl_2

Br_2

I_2

 ,  , H_2O (polyatomic molecule)

water

 ,  , H_2O_2

hydrogen peroxide

Molecular formulas
- count of type + # atoms in the molecule.

Empirical formulas

- give simplest, whole # ratio's!

	molecular	empirical
ex:	H_2O_2	$= HO$
	(molecular)	
	2 : 2	1 : 1
		$\div 2$

H_2O 2:1 $\div 1$ H_2O 2:1

$C_6H_{12}O_6$ 6:12:6 $\div 6$ CH_2O 1:2:1

Molecular compounds: Non-metal elements.

Ionic compounds

- contain cations (+) (often metals) + anions (−) (often non-metals)

golden-rule: charges must cancel

as many ⊕ as ⊖

ex: Na^+ Cl^-

1 : 1 (golden rule)

formula unit: Na^+Cl^- Na^+Cl^- $Cl^-Na^+Cl^-Na^+$ Na^+Cl^-

formula: NaCl

no need to show charges... they've canceled!

Mg^{2+} F^{-}

1 : 2

++ −−

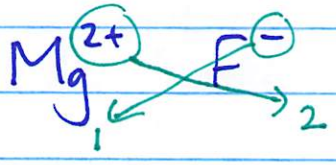
Mg^{2+} F^{-}

F^{-}

'trick'

cross-down

MgF_2



Ca^{2+} O^{2-}