

$D = M/V$

COMBINING RATIOS

ISOTOPIC SYMBOLS

PERIODIC TABLE

CALC. MW

~~X~~ ATOMIC MASS

SIG FIGS

BALANCE EQN

STOICHIOMETRY

NUMBER - MOLES - MASS

ACCURACY VS. PRECISION

12

TOXICITY DATA

LD ₅₀	ASPIRIN	200 mg/kg
	ETHANOL	8,000 × 10 ³ mg/kg
	NICOTINE	50 mg/kg
	RICIN	25 mg/kg

PROBLEM:

ESTIMATE NUMBER OF BUNCES OF ETHANOL THAT WOULD BE LETHAL TO 50% OF HUMANS.

TASKS; UNIT CONVERSIONS/
DENSITY
MASS OF HUMAN
SIG FIGS

ASSUME HUMAN MASS = 100 lbs

$$100 \text{ lbs} \times \frac{1 \text{ kg}}{2.2 \text{ lbs}} \times \frac{8,000 \text{ mg}}{\text{kg}} \times \frac{\text{g}}{1000 \text{ mg}} = 363.64 \text{ g} \quad (364) \text{ g}$$

$$\text{DENSITY ETHANOL} = \frac{0.78 \text{ g}}{\text{ml}}$$

$$(363.64 \text{ g}) \times \frac{1 \text{ ml}}{0.78 \text{ g}} = 466,200 \text{ ml} \\ \downarrow \\ 466 \text{ ml}$$

ACCURACY VS. PRECISION

CHAPTERS 1/2

②

— GIVEN TRUE VALUE = 5.00

EXPERIMENTAL DATA FOR 3 STUDENTS, 3 MEASUREMENTS

	<u>A</u>	<u>B</u>	<u>C</u>
	5.01	3.00	4.00
	5.00	5.00	4.00
	4.99	7.00	4.00
$\bar{x} =$	<u>5.00</u>	<u>5.00</u>	<u>4.00</u>

— REVIEW P.T. AND BASIC ATOMIC STRUCTURE

— ELEMENTAL SYMBOLS



A = MASS # = SUM OF P + N

Z = ATOMIC # = NUMBER OF P

\square = CHARGE, NOT SHOWN IF ZERO

EXAMPLE; HOW MANY P, N, E IN $^{35}\text{Cl}^{-1}$

$$P = 17 \quad N = 18 \quad e = 18$$

— OCTET RULE:

IN CHEMICAL RXNS ELEMENTS TEND TO EITHER

① GAIN e^{-} UNTIL ISOELECTRONIC WITH NOBLE GAS ON SAME ROW OF P.T.

OR

② LOSE e^{-} UNTIL ISOELECTRONIC WITH NOBLE GAS ON PREVIOUS (ABOVE) ROW OF P.T.

OCTET RULE / COMBINING RATIOS

CHAPTERS 1/2 (3)

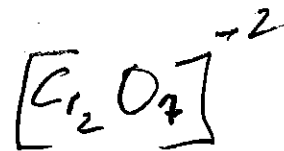
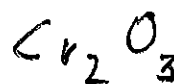
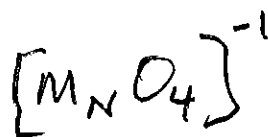
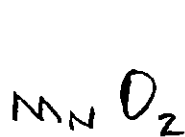


① PREDICT RATIO

② BALANCE EQN

③ CALC. MW OF PRODUCT

SOME METALS HAVE MORE THAN ONE COMMON VALENCE
Fe, Ni, Mn, Cr



How many significant figures? 4

0.0100

0.0001

1.0001

100

1×10^3

123,456

$$D = \frac{M}{V}$$

①

WHAT VOLUME IS
OCCUPIED BY AN ~~105 g~~ ^{25.1 g}
OBJECT WITH A
DENSITY OF $0.85 \frac{g}{cc}$?

②

WILL IT FLOAT IN WATER?

METRIC SYSTEM

10^6 1,000,000 MEGA

10^3 1,000 ~~70~~ KILO

10^0 1

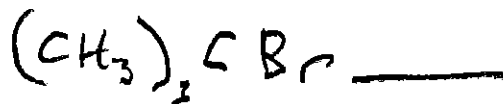
10^{-3} 0.001 milli

10^{-6} 0.000001 MICRO

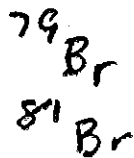
TOPICS

- ATOMIC/MOLECULAR FORMULA
- " " WEIGHTS
- \bar{X} ISOTOPIC WEIGHTS
- THE MOLE
- CALC. EMPIRICAL FORMULAS
- STOICHIOMETRY

WHAT IS MW OF:



ON P.T. AW OF Br = 79.9



	% ABUND.	MASS
53 X	19.61	53.62
56 X	53.91	56.29
58 X	26.48	58.31

WHAT IS \bar{X} ISOTOPIC WT?

53.0, 53.7, 56.1, 59.9

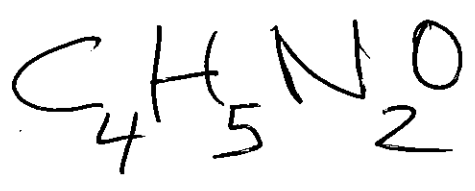
50 \checkmark 0/0 0.25 49.9472

51 \checkmark 99.75 50.9440

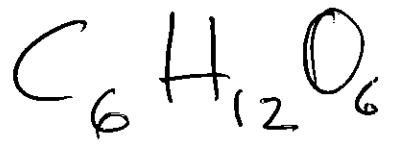
CALC. \bar{x} ISOTOPIC MASS

CALC. EMPIRICAL FORMULA

	<u>0/0</u>	g/100g	moles	<u>moles</u>
C	49.5	49.5g x	$\frac{\text{mole}}{12g} =$	4.125 = 4
N	28.9	28.9 x	$\frac{\text{mole}}{14g} =$	2.064 = 2
O	16.5	16.5 x	$\frac{\text{mole}}{16g} =$	1.031 = 1
H	5.1	5.1 x	$\frac{\text{mole}}{1g} =$	5.1 = 5

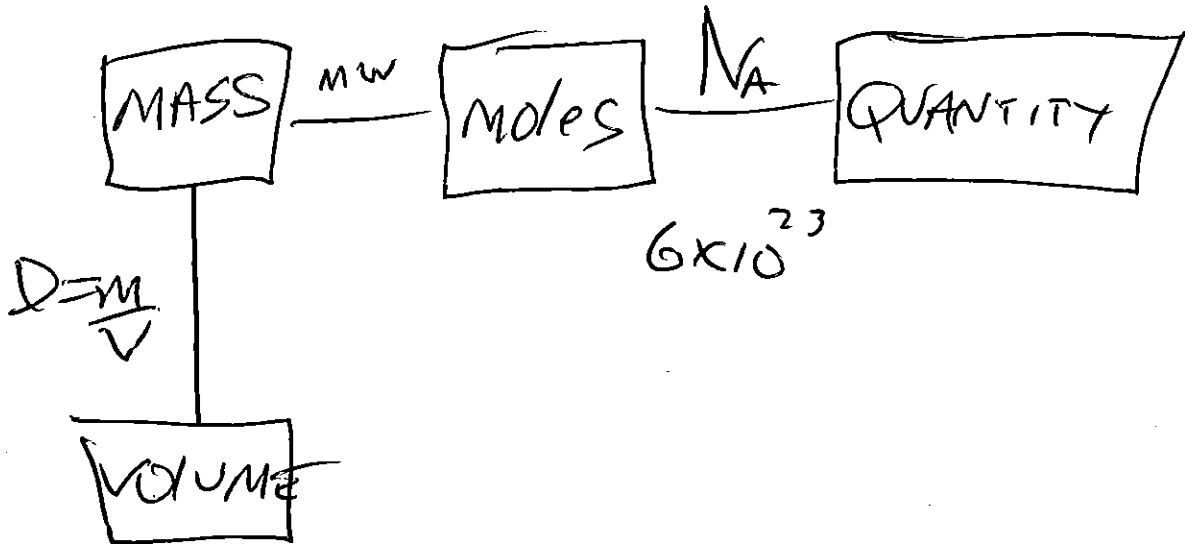


CALC. MW



$MW = 180 \frac{g}{mole}$

IN A BOTTLE OF WATER, CALC. # H ATOMS
(500 ml) O ATOMS



500g H₂O

27.78 moles

1.672 x 10²⁵ molecules

~~3.34~~ 3.34 x 10²⁵ H ATOMS

1.672 x 10²⁵ O ATOMS

(4)

CALC. EMPIRICAL FORMULA
FOR COMPOUND CONTAINING
MOLES

C 6.1225

H 10.20

O 1.021

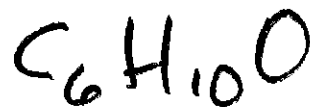
EMPIRICAL IS SIMPLEST WHOLE NUMBER
RATIO

DIVIDE ALL BY LOWEST NUMBER

$$6.1225 / 1.021 = 6$$

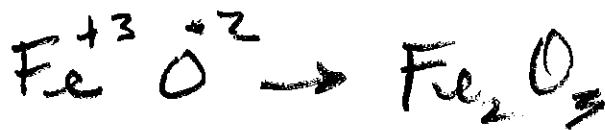
$$10.20 / 1.021 = 10$$

$$1.021 / 1.021 = 1$$



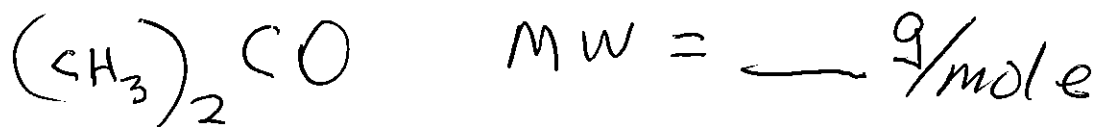
WHAT IS FORMULA FOR

IRON(III) OXIDE



CONVERT $10 \frac{Kg}{m^2}$ TO $\frac{mg}{cm^2}$

$$10 \frac{Kg}{m^2} \times \frac{10^3 g}{Kg} \times \frac{10^3 mg}{g} \times \frac{[1m]^2}{[10^2 cm]^2} = \frac{10^7}{10^4} = 10^3 \frac{mg}{cm^2}$$



5



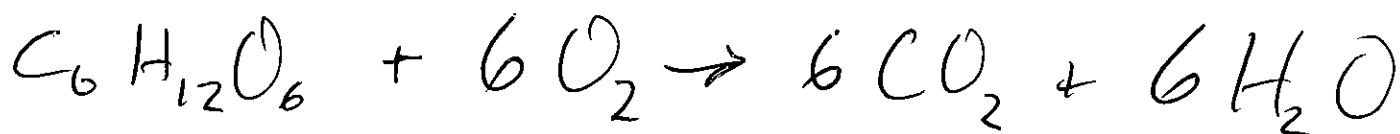
$$P = \text{---}$$

$$n = \text{---}$$

$$e = \text{---}$$



How many moles in 90 g



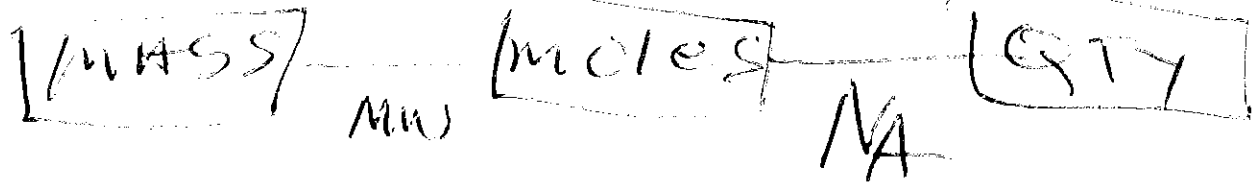
① BALANCE

② HOW MANY MOLES CO_2 PRODUCED FROM 90 g OF $\text{C}_6\text{H}_{12}\text{O}_6$

How many O atoms in

52.06 g of CO_2 ?

$$1.183 \text{ moles} \times \frac{6 \times 10^{23}}{\text{mole}} = 7.122 \times 10^{23}$$
$$1.424 \times 10^{24}$$



100 g
CO₂

2.27
moles
CO₂

1.368 x 10²⁴
~~1.368~~ C ATOMS

g CARBON
27.24

↓
2.27
moles
C

7.735 x 10²⁴ C ATOMS

72.64

↓
4.54
moles
O