

Record

Answer Key

09/17/25

Test Prep

Fill in the blank:

Chemistry is the study of matter, its properties, and the changes it undergoes

Matter is anything that has mass and volume

Solids	Liquids	Gasses
<u>definite</u> shape	<u>indefinite</u> shape	<u>indefinite</u> shape
<u>definite</u> volume	<u>definite</u> volume	<u>indefinite</u> volume
<u>Strong</u> attractive forces between particles	<u>same</u> shape of container	<u>same</u> shape and volume as container
Particles vibrate <u>slowly</u>	Particles move slowly in <u>random</u> directions	Particles are far apart and move at <u>high</u> speeds with little attraction to each other

Which of the following are homogenous and heterogenous mixtures?

Hot fudge sundae, baby shampoo, sugar water, peach pie

Homogenous

- Baby shampoo
- Sugar water

Heterogenous

- Hot fudge sundae
- Peach pie

What are some examples of intensive properties? - Doesn't depend on mass

Temp, density, color, melting point, boiling point

Identify each as a physical or chemical change:

Ice melts in the sun physical change

wick
↑

Burning a candle chemical change

Cutting a pizza physical change

Iron rusting in an old car chemical change

Determine the amount of significant figures:

0.00108

3

5000

1

2.3×10^4

2

6.003

4

$$2.012 + 61.09 + 3.0 = 66.102 \approx 66.1$$

$$2.8 \times 67.40 / 34.8 = 5.4229 \approx 5.4$$

What is the volume (mL) of a 14.7g sample of the liquid given that the density is 1.32g/mL?

$$\text{Density} = 1.32 \text{ g/mL}$$

$$v \cdot D = \frac{m}{v} \cdot v$$

$$\frac{v \cdot D}{D} = \frac{m}{D}$$

$$v = \frac{m}{D}$$

$$\text{Mass} = 14.7 \text{ g}$$

$$v = \frac{14.7 \text{ g}}{1.32 \text{ g/mL}} = 11.1 \text{ mL}$$

Convert:

1053 L to mL

$$\begin{array}{r|l} 1053 \text{ L} & 1000 \text{ mL} \\ \hline & 1 \text{ L} \\ \hline & = 1053000 \\ & \approx 1.053 \times 10^6 \text{ mL} \end{array}$$

35.3 nm to m

$$\begin{array}{r|l} 35.3 \text{ nm} & 1 \text{ m} \\ \hline & 10^9 \text{ nm} \\ \hline & = 3.53 \times 10^{-8} \text{ m} \end{array}$$

Who discovered electrons with the cathode ray, and what model did he use?

J.J. Thomson + the
Plum pudding model

Who discovered neutrons with the gold foil experiment?

Ernest Rutherford + the
nuclear model

Dalton's Postulates

- 1) Elements consist of indivisible small particles (atoms)
- Disproven w/ subatomic particles
- 2) All atoms of the same element are identical
- Disproven w/ isotopes + ions
- 3) Atoms can neither be created nor destroyed

More positive = lost e^-

How many protons, neutrons, and electrons does ^{197}Au have and Ca^{2+} ?

^{197}Au protons = 79
 $197 - 79 = 118$ neutrons = 118
 electrons = 79

Ca^{2+} protons = 20
 neutrons = 20 $40 - 20 = 20$
 electrons = 18 $20 - 2 = 18$

How many protons, neutrons, and electrons does magnesium-25 have and N^{3-} ? more negative = gain e^-

magnesium - 25 protons = 12
 neutrons = 13
 electrons = 12

N^{3-} protons = 7
 neutrons = 7 $14 - 7 = 7$
 electrons = 10 $7 + 3 = 10$

Chlorine-35 has a mass of 34.969 amu and abundance of 75.75%, and chlorine-37 has a mass of 36.966 amu and an abundance of 24.24%. What is the average atomic mass?

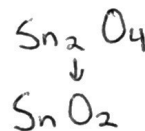
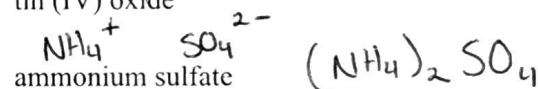
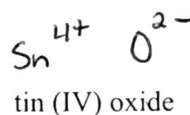
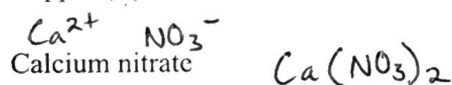
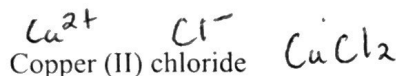
Cl-35 $34.969 \text{ amu} \times 0.7575 = 26.49$

Cl-37 $36.966 \text{ amu} \times 0.2424 = 8.961$
 $\quad \quad \quad +$
 $\quad \quad \quad 35.45 \text{ amu}$

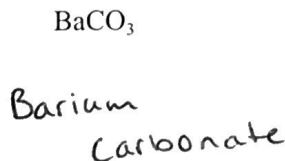
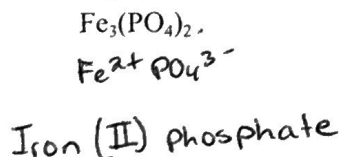
Elements in the same column have similar chemical and physical properties.



Write the formula for the following compounds;



Write the name for the following compounds:



What is a mole? What is Avogadro's number?

Counting term: Amount of particles found in 12g of C-12

1 mole = molar mass of a substance 6.022×10^{23} atoms
 molecules
 formula units

How many He atoms are in 3.5 mol of He?

3.5 mol / He	6.022×10^{23} atoms
1 mol / He	

$= 2.1 \times 10^{24}$ atoms He

Sodium carbonate



How many atoms of O are in 1.50 moles of Na_2CO_3 ?

1.50 moles Na_2CO_3	3 mol O	6.022×10^{23} atoms	= 2.71×10^{24} atoms of O
	1 mol Na_2CO_3	1 mol O	

How many moles of CaCO_3 are in 23.5g of CaCO_3 ? $\text{g CaCO}_3 \Rightarrow \text{moles CaCO}_3$

23.5g CaCO_3	1 mol CaCO_3	= 0.235 moles CaCO_3
	100.086g CaCO_3	

How many grams of Na are in 1.00g of Na_3PO_4 ?

1.00g Na_3PO_4	1 mol Na_3PO_4	3 mol Na	22.990g Na	= 0.421g Na
	163.940g Na_3PO_4	1 mol Na_3PO_4	1 mol Na	

How many grams of glucose is there in 5.23×10^{24} molecules of $\text{C}_6\text{H}_{12}\text{O}_6$?

5.23×10^{24} molecules $\text{C}_6\text{H}_{12}\text{O}_6$	1 mol glucose	180.156g $\text{C}_6\text{H}_{12}\text{O}_6$	= 1.56×10^3 g $\text{C}_6\text{H}_{12}\text{O}_6$
	6.022×10^{23} molecules glucose	1 mol $\text{C}_6\text{H}_{12}\text{O}_6$	

Part
whole

Calculate the percent composition for calcium, nitrogen, and oxygen in $\text{Ca}(\text{NO}_3)_2$

$\% \text{ Ca} = \frac{1 \times 40.078\text{g}}{164.086\text{g}} \times 100 = 24.43\% \text{ Ca}$

$\% \text{ N} = \frac{2 \times 14.007\text{g}}{164.086\text{g}} \times 100 = 17.07\% \text{ N}$

$\% \text{ O} = \frac{6 \times 15.999\text{g}}{164.086\text{g}} \times 100 = 58.50\% \text{ O}$

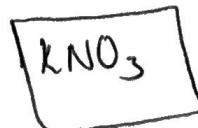
Calculate the empirical formula given a compound contains 38.7% K, 13.9% N, and 47.4% O.

38.7g K	1 mol K	= 0.9892 mol K
	39.098g K	

13.9g N	1 mol N	= 0.9924 mol N
	14.007g N	

47.4g O	1 mol O	= 2.9627 mol O
	15.999g O	

K 0.9892	N 0.9924	O 2.9627
0.9892	0.9892	0.9892

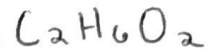


Rules

- 0.0 - 0.2 ✓
- 0.3 - 0.7 X
- 0.8 - 0.9 ✓

What is the molecular formula given the molar mass of CH_3O is 62.1 g/mol ?

$$\frac{62.1 \text{ g}}{31.034 \text{ g}} = 2$$



Convert 29.5 grams of Fe to grams of Fe_2O_3 ?



29.5 g Fe	1 mol Fe	2 mol Fe_2O_3	159.691 g Fe_2O_3	= 42.2 g Fe_2O_3
	55.845 g Fe	4 mol Fe	1 mol Fe_2O_3	

Balance:



$\text{SO}_4 = 13$ or	$\begin{array}{l} \text{Fe} = 12 \\ \text{H} = 26 \\ \text{S} = 13 \\ \text{O} = 412 \end{array}$	$\begin{array}{l} \text{Fe} = 2 \\ \text{H} = 26 \\ \text{S} = 3 \\ \text{O} = 12 \text{ or } \downarrow \end{array}$
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$$\text{SO}_4 = 3$$

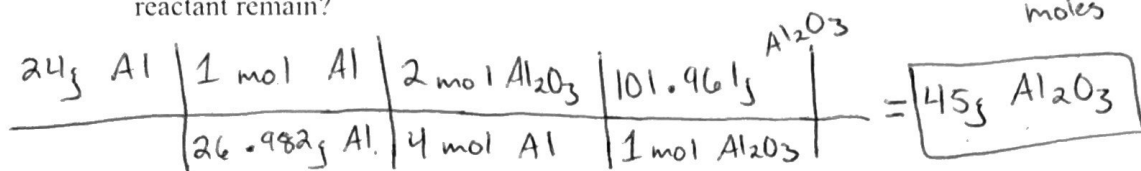
Balance:



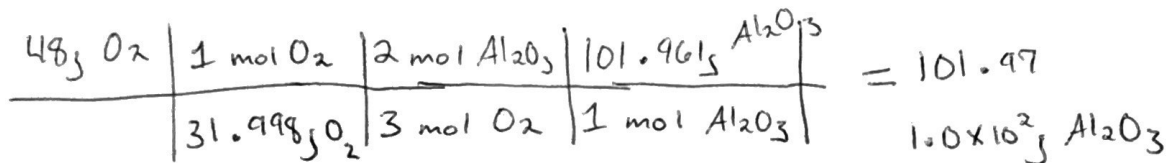
$\begin{array}{l} \text{Al} = 12 \\ \text{H} = 12 \\ \text{Cl} = 12 \end{array}$	$\begin{array}{l} \text{Al} = 12 \\ \text{H} = 24 \\ \text{Cl} = 36 \end{array}$
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24g of Al and 48g of O are combined, and 40.4g of aluminum oxide (Al_2O_3) is produced. What is the limiting reactant and the percent yield of Al_2O_3 in grams? How many ~~grams~~ moles of excess reactant remain?

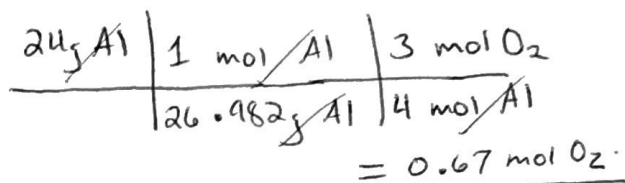


Al = limiting Reactant + theoretical yield is 45g Al_2O_3



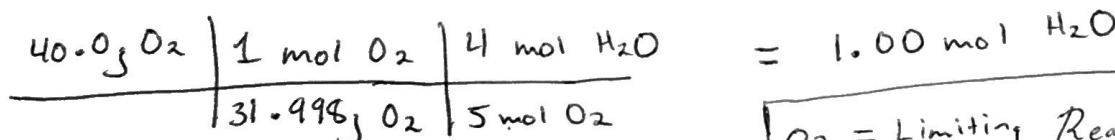
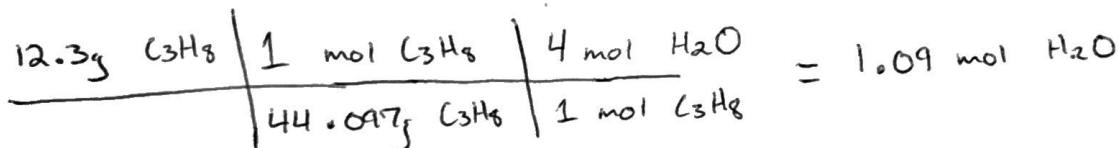
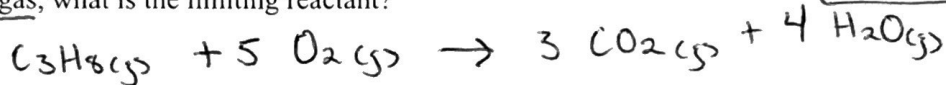
% yield = $\frac{40.4\text{g}}{45\text{g}} \times 100 = 90\% \text{ Al}_2\text{O}_3$

actual / theoretical $\times 100$



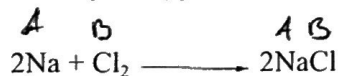
3 mol O_2 - 0.67 mol O_2 = 2.33 mol O_2 excess

Propane (C_3H_8) is used as a fuel, and it undergoes complete combustion. If 12.3g of propane reacts with 40.0g of oxygen gas, what is the limiting reactant?



O_2 = Limiting Reactant

Identify the types of reactions:



Combination / Synthesis



Decomposition / Analysis



Complete Combustion



Br INCIHOF