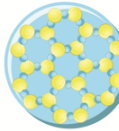


CONCEPT: FORMATION EQUATIONS

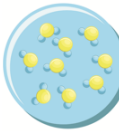
The Natural State (Standard State)

- The elements of the Periodic Table exist in different standard states in the natural world.
 - At room temperature (____ °C) and standard pressure (____ atm), elements exist as **solids**, **liquids** or **gases**.

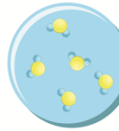
1A (1)	2A (2)											3A (13)	4A (14)	5A (15)	6A (16)	7A (17)	8A (18)
1 Hydrogen																	He Helium
2 Li Lithium	Be Beryllium	3B (3)	4B (4)	5B (5)	6B (6)	7B (7)	8B (8) (9) (10)			1B (11)	2B (12)	B Boron	C Carbon	N Nitrogen	O Oxygen	F Fluorine	Ne Neon
3 Na Sodium	Mg Magnesium											Al Aluminum	Si Silicon	P Phosphorus	S Sulfur	Cl Chlorine	Ar Argon
4 K Potassium	Ca Calcium	Sc Scandium	Ti Titanium	V Vanadium	Cr Chromium	Mn Manganese	Fe Iron	Co Cobalt	Ni Nickel	Cu Copper	Zn Zinc	Ga Gallium	Ge Germanium	As Arsenic	Se Selenium	Br Bromine	Kr Krypton
5 Rb Rubidium	Sr Strontium	Y Yttrium	Zr Zirconium	Nb Niobium	Mo Molybdenum	Tc Technetium	Ru Ruthenium	Rh Rhodium	Pd Palladium	Ag Silver	Cd Cadmium	In Indium	Sn Tin	Sb Antimony	Te Tellurium	I Iodine	Xe Xenon
6 Cs Cesium	Ba Barium	La Lanthanum	Hf Hafnium	Ta Tantalum	W Tungsten	Re Rhenium	Os Osmium	Ir Iridium	Pt Platinum	Au Gold	Hg Mercury	Tl Thallium	Pb Lead	Bi Bismuth	Po Polonium	At Astatine	Rn Radon
7 Fr Francium	Ra Radium	Ac Actinium	Rf Rutherfordium	Db Dubnium	Sg Seaborgium	Bh Bohrium	Hs Hassium	Mt Meitnerium	Ds Darmstadtium	Rg Roentgenium	Cn Copernicium	Nh Nihonium	Fl Flerovium	Mc Moscovium	Lv Livermorium	Ts Tennessine	Og Oganesson



Solid



Liquid



Gas

EXAMPLE: Which of the following elements is found in its standard state?

- a) I_2 (g) b) O_3 (g) c) Ne (g) d) B_2 (g)

Identifying Formation Equations

- In a **Formation Equation** the standard states of elements combine together to form ____ mole(s) of product.

EXAMPLE: Write the formation equation for methanethiol, CH_3SH .

STEP 1: Write the compound as a product.

- In a formation equation, the product will always have a coefficient of ____.

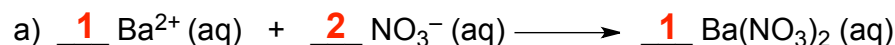
STEP 2: Write the standard states of the elements that make up the compound as the reactants.

STEP 3: Balance the formation equation with the appropriate coefficients for the reactants.

- A formation equation is a rare instance where a coefficient doesn't need to be a whole number.

CONCEPT: FORMATION EQUATIONS

PRACTICE: Which of the following represents the formation equation for barium nitrate, $\text{Ba}(\text{NO}_3)_2$?



PRACTICE: Identify a substance that is not in its standard state.



PRACTICE: Ibuprofen is used as an anti-inflammatory agent used to deal with pain and bring down fevers. If it has a molecular formula of $\text{C}_{13}\text{H}_{18}\text{O}_2$, determine the balanced chemical equation that would give you directly the enthalpy of formation for ibuprofen.