Warm Up:

What are the products and classification of the following reaction:
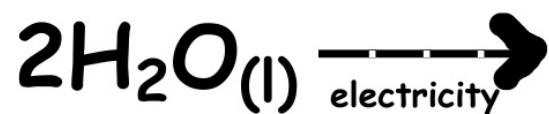
$$2H_2O_{(l)} \xrightarrow{\text{electricity}}$$

$$Mg_{(s)} + HCl \longrightarrow$$

$$Pb(NO_3)_{aq} + KI_{(aq)} \longrightarrow$$

Warm Up

Write the formula for:

Scandium chloride

Ammonium hydroxide

Magnesium sulfate
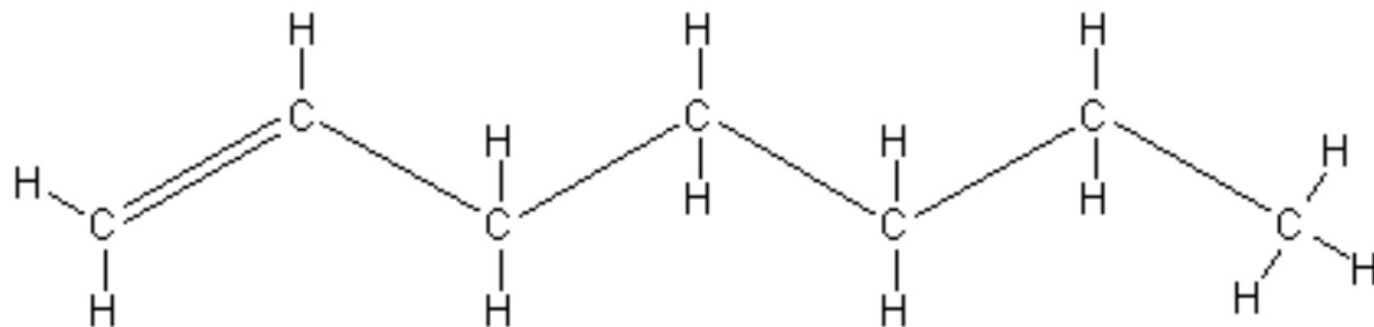
Warm Up

Write the formula for:

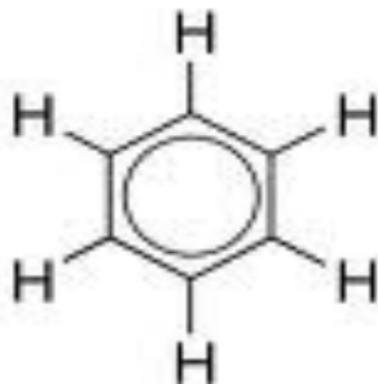Mercury (II) phosphate

Potassium bromide

Diphosphorus pentoxide

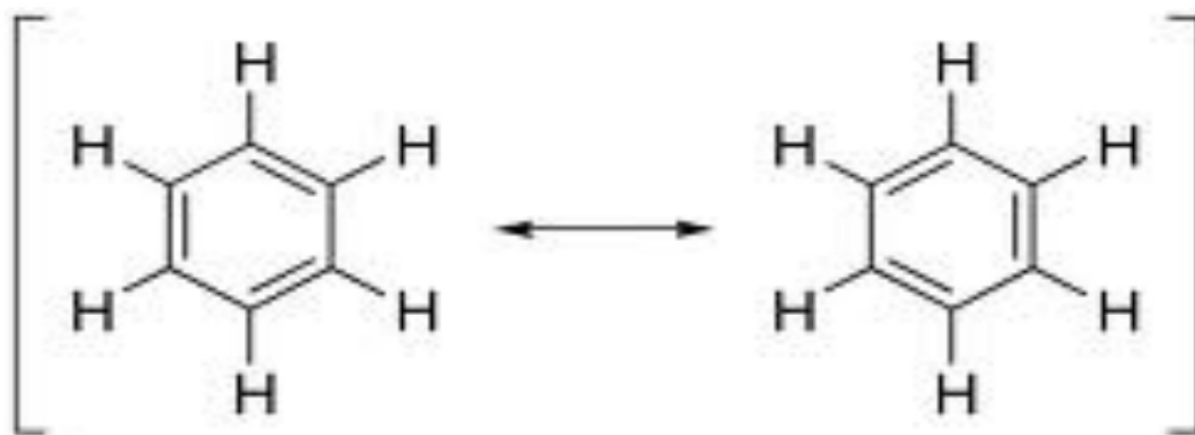# Warm Up
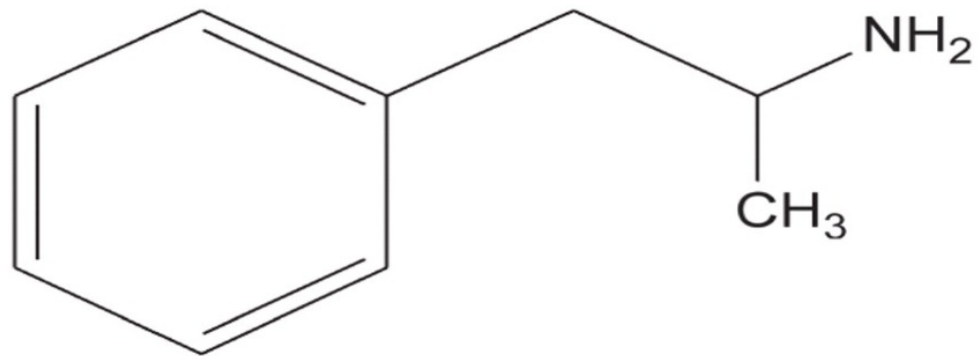
What is the name of the hydrocarbon below?
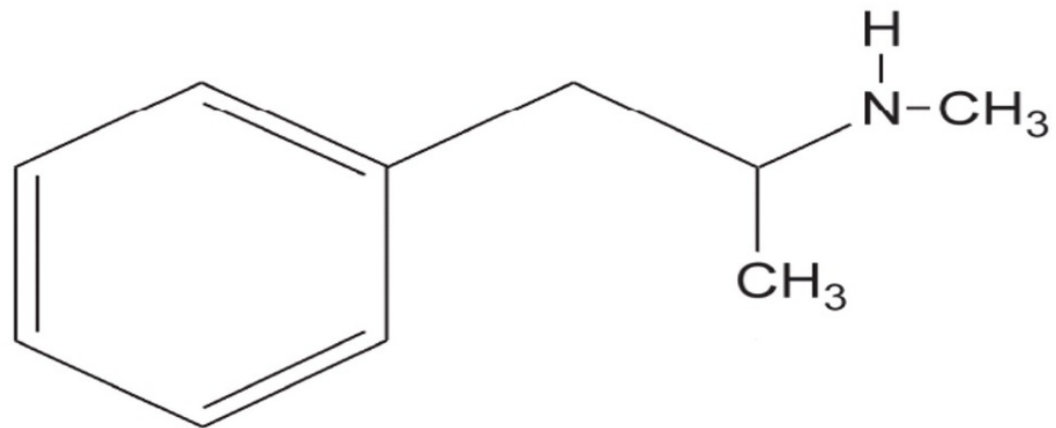

Draw the structure of butyne:

One last hydrocarbon we need to talk about: benzene C_6H_6

Amphetamine

Methamphetamine

Objectives:

TSWBAT:

Apply the concept of moles to determine the number of particles of a substance in a chemical reaction, the percent composition of a representative compound, the mass proportions, and the mole-mass relationships.

New Unit: The Mole

If you had to measure the sand this sculpture would you rather count the grains or weigh it?

You'll discover how chemists measure the amount of a substance using **a unit** called **a mole**, which relates the number of particles to the mass

Measuring Matter

What are three methods for measuring the amount of something?

What is a mole?

A mole is a specific number, 6.02×10^{23}.

It is also called "Avagadro's Number."

The concept is the same as calling the number 12 a "dozen."

When chemists write the term "mole" they sometimes abreviate it as "mol."

In chemistry, we talk about a mole of "representative particles."

The term **representative particle** refers to the species present in a substance: usually atoms, molecules, or formula units.

Table 10.1

Representative Particles and Moles

Substance	Representative particle	Chemical formula	Representative particles in 1.00 mole
Atomic nitrogen	Atom	N	6.02×10^{23}
Nitrogen gas	Molecule	N_2	6.02×10^{23}
Water	Molecule	H_2O	6.02×10^{23}
Calcium ion	Ion	Ca^{2+}	6.02×10^{23}
Calcium fluoride	Formula unit	CaF_2	6.02×10^{23}
Sucrose	Molecule	$C_{12}H_{22}O_{11}$	6.02×10^{23}

Dimensional Analysis used to find moles:

moles = representative x $\underline{\text{1 mole}}$
particles $\qquad$ 6.02×10^{23}

representative particles

Converting Number of Atoms to Moles

Magnesium is a light metal used in the manufacture of aircraft, automobile wheels, tools, and garden furniture. **How many moles of magensium is 1.25 x 10^{23} atoms of magnesium?**

$$\text{moles} = \text{representative particles} \times \frac{1 \text{ mole}}{6.02 \times 10^{23} \text{ representative particles}}$$

Take this opportunity to practice your exponents on YOUR calculator.

Solution:

$$\text{moles} = \text{representative particles} \times \frac{1 \text{ mole}}{6.02 \times 10^{23} \text{ representative particles}}$$

So,

moles = 1.25×10^{23} atoms × $\dfrac{1 \text{ mole}}{6.02 \times 10^{23} \text{ atoms}}$

= 0.208 moles Mg