

## PROBLEMS FOR EMPIRICAL FORMULA:

1. Natural gas is a mixture of several hydrocarbons, but is primarily methane. Find the empirical formula of this important natural resource if its composed of 74.8% carbon and 25.2% hydrogen.
2. Upon decomposing an opal, a chemist found it to contain 4.58 g silicon and 5.21 g oxygen, plus water and minute traces of several metals. Find the empirical formula of the basic component of opals, and give its chemical name.
3. While trace impurities of iron and chromium in natural corundum form the gemstones ruby and sapphire, they are basically a binary compound of aluminum and oxygen, with 52.9% Al. Find the empirical formula and give the chemical name for corundum.
4. Butyric acid gets its name from the Latin "butyrum", meaning butter, and is the compound in rancid butter that gives it its terrible smell. A 2.50 g sample of butyric acid was found to consist of 1.36 g carbon, 0.23 g hydrogen, and 0.91 g oxygen. Find its empirical formula.
5. An even less popular chemical among organic chemistry students than butyric acid (because it smells much, much worse) is pyridine. Find its empirical formula if a 10.00 g sample contains 7.59 g carbon, 0.64 g hydrogen, and the rest nitrogen.
6. A 3.927 g sample of glycerin was found to contain 1.536 g carbon, 0.345 g hydrogen, and the rest oxygen. Find the empirical formula of this important lubricant.
7. A student extracted the citric acid from an orange, and then decomposed the acid. Her sample contained 1.875 g carbon, 2.965 g oxygen, and 0.210 g hydrogen. Find the empirical formula for this tasty organic acid.
8. A team of students took a 47.66 g sample of pure lead and burned it to produce a 51.34 g oxide of lead. Find the empirical formula of this oxide. Can you name it, with the proper Roman numeral for the charge on the lead?

1. CH<sub>4</sub> 2. SiO<sub>2</sub> 3. Al<sub>2</sub>O<sub>3</sub> 4. C<sub>2</sub>H<sub>4</sub>O 5. C<sub>5</sub>H<sub>5</sub>N 6. C<sub>3</sub>H<sub>8</sub>O<sub>3</sub> 7. C<sub>6</sub>O<sub>7</sub>H<sub>8</sub> 8. PbO

**ANSWERS :**