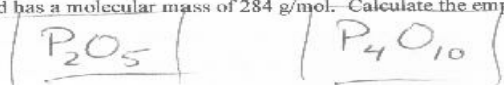


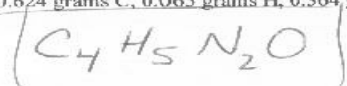
5. A 2.500 gram compound was found that contained only phosphorous and oxygen. The sample contained 1.0918 grams of phosphorous and has a molecular mass of 284 g/mol. Calculate the empirical and molecular formula.



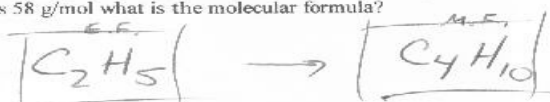
6. A sample of ethylene glycol, antifreeze coolant, was found to contain 99.7 mg of C, 279 mL of  $\text{H}_2$  gas at STP and 93 mL of  $\text{O}_2$  gas at STP. If the molecular mass is 62 g/mol determine the empirical and molecular formula of ethylene glycol.



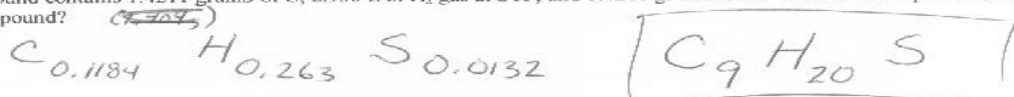
7. Caffeine, which occurs in coffee, tea, and kola, is a stimulant for the central nervous system. A 1.261 gram sample of pure caffeine contains 0.624 grams C, 0.065 grams H, 0.364 grams N, and the rest is O. What is the empirical formula of caffeine?



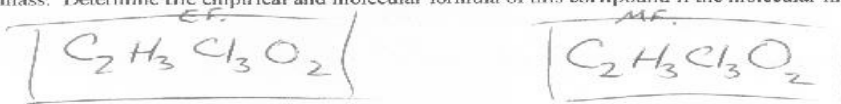
8. Butane gas contains only C and H. If the compound is 82.8% C, what is the empirical formula of the compound? If its molecular mass is 58 g/mol what is the molecular formula?



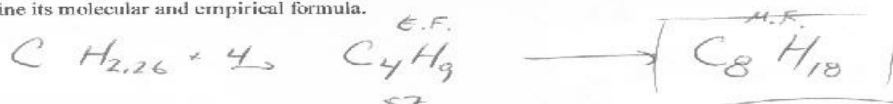
9. A compound contains 1.4211 grams of C, 2.950 L of  $\text{H}_2$  gas at STP, and 0.4211 grams of S. What is the empirical formula of this compound?



10. Chloral hydrate is a drug that is used as a sedative and a hypnotic. It is used in detective stories to make a Mickey Finn. A Mickey is slipped into an unsuspecting victims drink to knock them out. The compound contains 14.5% C, 1.81% H, 64.4% Cl, and 19.3% O by mass. Determine the empirical and molecular formula of this compound if the molecular mass is 166 g/mol.



11. The molecular mass of petroleum is 114 g/mol. If a sample of fuel contains 21.05 grams of carbon and 44.24 dm<sup>3</sup> of  $\text{H}_2$  gas at STP, determine its molecular and empirical formula.



12. An oxide of nitrogen contains 100.0 L of  $\text{H}_2$  gas and 50.0 L of  $\text{O}_2$  gas at 25°C and 2.3 atm pressure. What is the empirical formula of the compound?

