Empirical formula test revision Year 11 Chemistry

Name _____

1) Three unidentified compounds are analysed and found to have the empirical formula CH_2O. What is needed to identify each compound?

2) An organic compound has the empirical formula C_2H_5O and a molar mass of 90g/mol. What is the molecular formula of the compound?

3) What is the empirical formula of a compound containing 47.37% carbon, 10.59% hydrogen and 42.04% oxygen by mass?

4) A compound is found to have the molecular formula $C_2H_3O_2$. Find its percentage composition.

5) During experiments it is important to weigh accurately the given substances. Electronic balances have systematic errors of about +/- 0.005 g. A student weighed two samples of the same compound.
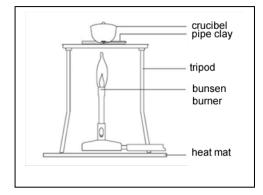Sample A = 0.011 grams
Sample 12.501 grams
Which sample is most accurate? Explain

6) A 200.0 g sample of pure $MgSO_4.5H_2O$ (**molar mass 310.4 amu)** contains:
a) how many grams of water
b) how many mol of oxygen atoms
c) what mass , in grams, of sulphur
d) what percent by mass of Mg

7) A compound was analysed and found to contain 40% carbon, 7% hydrogen and 53% oxygen by mass. If 3.01 X 10^{23} molecules of this compound weigh 30.0 g find the molecular formula of this compound. Atomic mass C=12.0, H=1.0, O=16.0

8) A 5.80 g sample of a hydrocarbon undergoes complete combustion to produce 17.6 g of CO_2 and 9.00 g of H_2O.
a) Find its empirical formula. Show all working out in the space provided below.

b) if 5.80 grams represents 0.10 mol of the substance find its molecular formula.

9) When exposed to the atmosphere, $CuSO_4$ bonds with water molecules in the air. This behaviour can be shown as $CuSO_4 \bullet xH_2O$ where x is some integer quantity of water molecules. A student used the setup below to find the value of x.

The student strongly heated a 4.00 g sample of $CuSO_4.xH_2O$ and recorded the mass of the sample every two minutes to constant mass. The final mass recorded was 2.65.

a) Calculate the mol $CuSO_4$ present in the sample

b) Calculate the mol of water present.

c) Calculate the value of x.