

# Chemistry 135 Semester 01-2012

## Homework for Submission #4

Answer the following questions in the spaces provided below and submit them for marking on or before 2 pm Wednesday 14<sup>th</sup> March 2012 in the chemistry drop box. Only answers showing full working can attract full marks. Express your answer to the correct number of significant figures. *Answers showing evidence of copying will attract zero marks.* Work out your answers in rough before putting your answers on them neatly and concisely.

- 1) Calculate the number of moles of sodium contained in 0.100 mol of sodium carbonate. (2)
- 2) Calculate the number of moles of oxygen *atoms* present in 1.20 mol of silver nitrate. (2)
- 3) Calculate the number of moles of oxygen *gas* liberated when 0.536 mol of lead(II) nitrate are heated. (2)
- 4) Calculate the number of moles of nitrogen *gas* that must be combined with hydrogen to form 0.750 mol of ammonia. (2)
- 5) Calculate the percentage composition of copper(II) sulfate 5-water ( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ), otherwise referred to as “copper(II) sulfate crystals” – the normal form of copper(II) sulfate produced by crystallisation from water. (3)

- 6) A compound has the following composition by mass: 32.0% carbon, 6.71% hydrogen, 42.6% oxygen and 18.7% nitrogen. Find its empirical formula, and its molecular formula if its RMM is 225.2. (3)

- 7) A 0.1005 g sample of compound X is burned completely in excess oxygen, producing 0.2829 g of carbon dioxide and 0.1159 g of water. Find the empirical formula of X, given that it is a compound of carbon, hydrogen and oxygen only. If the compound has a molar mass of  $312 \text{ g mol}^{-1}$  to 3 s.f., determine its molecular formula. Suggest the names of two compounds that this formula might refer to. (You may answer question 7 on a separate sheet of paper if you wish.)