

Revised August 2012



HONORS WORKSHEET 4d: Stoichiometry

- Use the periodic table found here;
<http://www.adriandingleschemistrypages.com/apptable.pdf>
- Show ALL working, and where and when appropriate, use a few words to explain your calculations
- Do NOT round off until the end of a calculation
- Record ALL answers to sensible numbers of significant figures

1. Consider the following **unbalanced** combustion equation.

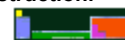


(a) How many grams of heptane (C_7H_{16}) will react with exactly 0.4782 g of O_2 gas? (2)

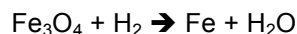
(b) How many grams of CO_2 will *theoretically* be formed by the reactants in (a)? (2)

(c) If the % yield in the reaction in (a) is 45%, how many grams of carbon dioxide will *actually* be produced? (1)

Revised August 2012

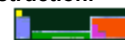


2. This **unbalanced** chemical equation is relevant to both parts (a) and (b) of this question



- (a) Iron ore, in the form of the mixed iron oxide shown, can be reduced by the addition of hydrogen gas. How many grams of Iron metal will be produced in the process, if 411 g of Fe_3O_4 are reacted completely with hydrogen gas? (2)
- (b) Determine the amount of water produced in this reaction in moles, if 1201 g of iron ore are reacted with sufficient hydrogen to convert it to products, in such a way that the reaction has a 48.22 % yield. (2)

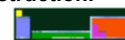
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3. A sample of the following hydrated salt shown below was weighed, heated to drive off the water of crystallization, cooled and reweighed repeatedly, until constant mass was achieved. From the results obtained, calculate the value of **X** in the formula of the hydrate. (4)

11.75g of $\text{KAl}(\text{SO}_4)_2 \cdot \text{XH}_2\text{O}$ gave a residue of 6.39 g.

Revised August 2012



4. Using the general equation below to help



(a) Write a balanced equation for the reaction of sodium carbonate with hydrochloric acid. (2)

(b) If 27.2 g of sodium carbonate are reacted with 44.2 g of HCl, what mass of sodium chloride will be produced? (4)

(c) Which reactant, and how many grams, will be left over after the reaction? (3)