*Review – Unit 3 (quantities)*

**Moles**

There are 6.02 x 1023 particles in one mole

Molar mass is calculated from periodic table

N

n

NA

m

n

M

**Percentage Composition**

Element mass ÷ compound mass x 100%

E.g. in H2O, H = 11% (2 g ÷ 18 g x 100%)

**Simplest and molecular formulae**

Definitions of simplest & molecular formula

Determining simplest formula from % composition, grams of reactants, or moles

Calculating molecular formula from simplest formula and molar mass

**Hydrate**

Find the mass of anhydrous compound

Find the mass of water

Determine moles of each

Divide by smallest answer

**Stoichiometry**

Balanced equation, convert to moles, molar ratio, get your answer, therefore statement

**Limiting reagents**

Compare each reactant to a given product

The least amount of product is the LR

To calculate excess amount:

1. Determine nused: molar ratio of product to excess
2. nexcess = nstart - nused

**Percentage yields**

Percentage yield = actual/theoretical x100%

Actual yield is given, theoretical is calculated

4 reasons why actual yield falls short

*Review questions*

1. Give the percentage composition for each compound: a) H2SO4, b) Ca(OH)2.
2. Calculate the molar mass of a) Na3PO4🢟5H2O, b) Fe2(Cr2O7)3.
3. a) How many moles are in 16 grams of CuCl2? b) How much does 70 moles of NaCl weigh?
4. a) How many molecules are in exactly 4 moles of H2O? b) How many hydrogen atoms are in exactly 4 moles of H2O? c) How many hydrogen atoms are in 0.173 moles of H2O?
5. What mass of magnesium oxide results when 56.3 g O2 combines with excess magnesium?
6. Label as simplest formula, molecular formula, or both: a) CuCl2, b) CO2, c) O2, d) C4H10.
7. A substance is 80% C and 20% hydrogen by mass. a) What is the simplest formula? b) What is the molecular formula of the compound if the molar mass is 30 g/mol?
8. A 20g sample of a hydrate of nickel sulphate (NiSO4) lost 9.63g of water when heated. Determine the hydrate’s formula.
9. What four things may cause actual yields to differ from theoretical yields?
10. Given the reaction 3O2 + 4NH3 → 2N2 + 6H2O, if 20.58 g of O2 combines with 26 g NH3 …

a) What is the limiting reagent? b) What mass of water can theoretically form? c) If 15 g of water is the actual yield, what is the percentage yield? d) What is the excess reactant mass?

**11.** In a reaction, copper is heated with sulphur, forming cuprous sulphide. What is the % yield if 97 g of cuprous sulphide forms from the combination of 100 g of Cu with 50 g of sulphur?

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