

## SEMESTER 2 STUDY GUIDE

**You must show your work for any question that requires you to do calculations**

### Unit 8 and Unit 9 - The Mole and Stoichiometry

1. Give a definition of the term mole  
a specific number of particles, which is approximately  $6.022 \times 10^{23}$  particles, also known as Avogadro's number.
2. How many liters of a gas are in one mole?  
one mole of any ideal gas occupies 22.4 liters.
3. How many particles/atoms/molecules/formula units are in one mole?  
 $6.022 \times 10^{23}$  particles.
4. How do you determine one mole when it comes to the mass of a substance?  
(g/mol)
5. Convert 2 moles of  $O_2$  gas into mass in grams.  
32 g/mol. Therefore, 2 moles of  $O_2$  gas is equal to 64 grams of  $O_2$  gas.
6. Convert 3.5 moles of NaCl into formula units.  
 $6.022 \times 10^{23}$  particles/mol. Therefore, 3.5 moles of NaCl is equal to  $2.11 \times 10^{24}$  formula units of NaCl.
7. Convert 0.25 moles of chlorine gas into liters.  
 $V = nRT/P = (0.25 \text{ mol})(0.0821 \text{ L}\cdot\text{atm/mol}\cdot\text{K})(273 \text{ K})/(1 \text{ atm}) = 5.57$  liters of chlorine gas.
8. Convert 56.25 grams of water into moles.  
18 g/mol. Therefore, 56.25 grams of water is equal to 3.125 moles of water.
9. Convert 15.65 liters of  $N_2$  gas into moles.  
 $n = PV/RT = (1 \text{ atm})(15.65 \text{ L})/(0.0821 \text{ L}\cdot\text{atm/mol}\cdot\text{K})(273 \text{ K}) = 0.680$  moles of  $N_2$  gas.
10. Convert  $1.65 \times 10^{24}$  atoms of Mg into moles.  
 $6.022 \times 10^{23}$  particles/mol. Therefore,  $1.65 \times 10^{24}$  atoms of Mg is equal to 27.4 moles of Mg.
11. Convert  $1.65 \times 10^{24}$  atoms of Mg to mass.  
24.31 g/mol. Therefore,  $1.65 \times 10^{24}$  atoms of Mg is equal to 667 grams of Mg.
12. Convert 6.25 grams of  $CO_2$  to molecules of  $CO_2$   
 $(0.142 \text{ mol})(6.022 \times 10^{23} \text{ molecules/mol}) = 8.56 \times 10^{22}$  molecules of  $CO_2$ .
13. Determine the limiting reactant if you have a 3.86 grams sample of  $NO_2$  and a 45.25 gram sample of  $O_2$ .  
 $2NO_2(g) + O_2 \rightarrow 2NO$   
 $(3.86 \text{ g})/(46.01 \text{ g/mol}) = 0.084 \text{ mol of } NO_2$
14. What is the maximum amount of NO that can be produced from the reaction in #13?  
 $2NO_2(g) + O_2(g) \rightarrow 2NO(g)$

# Chem 1 Semester 2 Study Guide

**Christian G. Meyer**



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Record ... Catalog ... Announcements Clemson Agricultural College of South Carolina, 1924      Baker University Catalog Baker University, 1912      Catalog University of Maine at Orono, 1909      Bulletin ... Lombard College, 1928      General Catalog LaSalle-Peru-Oglesby Junior College (LaSalle, Ill.), 1926      Bulletin of Clarkson College of Technology Clarkson College of Technology, 1914      **Catalogue and Register** University of Michigan, 1909 Announcements for the following year included in some vols      Chemistry Education in the ICT Age Minu Gupta Bhowon, Sabina Jhaumeer-Laulloo, Henri Li Kam Wah, Ponnadurai Ramasami, 2009-07-21 th th The 20 International Conference on Chemical Education 20 ICCE which had rd th Chemistry in the ICT Age as the theme was held from 3 to 8 August 2008 at Le M ridien Hotel Pointe aux Piments in Mauritius With more than 200 participants from 40 countries the conference featured 140 oral and 50 poster presentations th Participants of the 20 ICCE were invited to submit full papers and the latter were subjected to peer review The selected accepted papers are collected in this book of proceedings This book of proceedings encloses 39 presentations covering topics ranging from fundamental to applied chemistry such as Arts and Chemistry Education Biochemistry and Biotechnology Chemical Education for Development Chemistry at Secondary Level Chemistry at Tertiary Level Chemistry Teacher Education Chemistry and Society Chemistry Olympiad Context Oriented Chemistry ICT and Chemistry Education Green

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