

# HW01 - Fundamentals of Chemistry

This homework covers Chapter 1 in Chembook from sections 1.1 through 1.11. The first ten questions are fundamentals review questions from chapters 1.1-1.7. The last ten questions are from 1.8-1.11. Some helpful videos for the challenge questions on this homework include:

- [Composition Stoichiometry](#)
- [Reaction Stoichiometry](#)
- [Reaction Stoichiometry Easy, Medium, Hard](#)

1 2 points

The concept and use of *significant figures* allows us to communicate an implied accuracy of a measured amount without specifically writing out a plus or minus ( $\pm$ ) value.

- True
- False

2 2 points

A technician in a laboratory records the day's barometric pressure as 747.0 Torr (mm of Hg). How many significant figures are in her recorded number?

- 4
- 3
- infinite
- 2

3 3 points

A recipe calls for  $1\frac{1}{2}$  cups of sugar. Which of the following best describes that sugar in terms of matter classification? (check all that apply)

- pure substance
- homogeneous mixture
- heterogeneous mixture
- element
- compound
- solid
- liquid
- gas

4 5 points

There are a dozen golf balls in a box. 24 of those boxes will fill a carton. 18 cartons are strapped together to make a palette. A golf retailer orders 5 palettes of golf balls. How many total golf balls did they just order?

Type your answer...

5 5 points

A chunk of metal is weighed and the mass is found to be 139.5 grams. A large graduated cylinder is nearby and has 25.6 mL of water in it. The chunk of metal is put into the graduated cylinder and the water line (meniscus) is displaced up to 37.9 mL. What is the density of this metal?(answer in g/mL)

Type your answer...

6 5 points

Looking carefully at a sidewalk you realize that it is best described as

- 
- a homogeneous mixture
- a pure substance
- a heterogeneous mixture
- an element
- a compound

7 5 points

What is the atomic mass (aka atomic weight) of potassium?

(yes, DO use a periodic table for this - you will have one on the exam as well)

- 32.07
- 30.97
- 39.10
- 22.99
- 40.08

8 5 points

The sequential counting numbers (1, 2, 3,...) for the elements on the periodic table are known as which of the following?

- atomic numbers
- atomic masses
- electron configurations
- isotopic abundance

9 2 points

Mixtures can have variable compositions based on the amounts of the different substances that compose them. We communicate the amounts through the use of concentration terms. We chemists have one (and only one) concentration term that we have all agreed to use as a standard.

- True
- False

10 5 points

Which of the following statements is true regarding the use of the mole in experimental chemistry?

- An atom is a packet of  $6.022 \times 10^{23}$  moles
- Converting from molecules to moles is important to chemists so that they can use the "macro-scale" units of grams with the atomic masses found on the periodic table
- The molar mass of an atom has the units of amu, whereas the atomic mass of an atom has the units g/mol
- A mole is much smaller than an atom or a molecule, so it is much easier to work with in a laboratory setting

11 5 points

What is the molar mass of  $\text{NH}_4\text{Cl}$ ?

- 53.49 g/mol
- 50.50 g/mol
- 17.11 g/mol
- 49.46 g/mol

12 5 points

How many moles are in 1.46 kilograms of sulfur (S)?

- 45.5 moles
- .0455 moles
- 46.72 moles
- 91.0 moles
- .0910 moles

13 5 points

How many moles are in 142.5 g methanol,  $\text{CH}_3\text{OH}$ ?

- 4.45 mol
- 4566 mol
- 4.58 mol
- 88.55 mol

14 5 points

Calculate the mass of 14.4 moles  $\text{HgO}$ . Answer in kilograms.

- $2.30 \times 10^{-1}$  kg
- $1.50 \times 10^{-2}$  kg
- 3.12 kg
- $1.44 \times 10^{-2}$  kg
- 230 kg
- 15.0 kg
- 2.89 kg

15 5 points

How many moles are in 1.85 L  $\text{H}_2\text{O}$ ? The density of water = 1 kg/ L

- 0.102 mol
- 103 mol
- 33.3 mol
- 12.8 mol

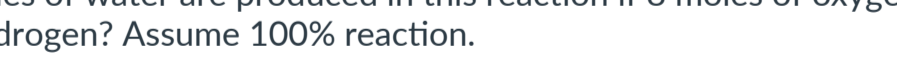
16 5 points

4.5 moles of an unknown metal (M) weighs 109.35 g. What is the identity of the metal?

- Mg
- Na
- Sc
- Al
- Li

17 5 points

Balance the following reaction:



What are the coefficients of the balanced chemical reaction? Note: if there is no coefficient, report the coefficient as 1.

- 1, 3, 2, 2
- 1, 1, 2, 2
- 2, 3, 4, 2
- 2, 2, 4, 2

18 5 points

Consider the following balanced combustion reaction:



How many moles of water are produced in this reaction if 8 moles of oxygen are reacted with excess hydrogen? Assume 100% reaction.

- 16 moles
- 8 moles
- 4 moles
- 12 moles

19 5 points

Reactants A and B react to form C in the following balanced generic reaction:



In a particular experimental set-up, reactant B is found to be the limiting reagent. Which of the following must be true?

- Reactant B will run out while there is still excess A remaining
- Reactant A and B will run out simultaneously
- Reactant B will always be the limiting reagent no matter how much of each reactant you begin with
- There is at least twice the amount of reactant B than A in the beginning of the experiment

20 5 points

Consider the following reaction:



If 4 moles of  $\text{N}_2$  react with 6 moles of  $\text{H}_2$ , how many moles of  $\text{NH}_3$  are formed?

- 12 moles
- 8 moles
- 5.33 moles
- 4 moles

21 5 points

Consider the following balanced reaction:



When 15 moles of  $\text{O}_2$  are reacted to completion with 8 moles of  $\text{C}_2\text{H}_4$ , what is the mass of carbon dioxide formed?

- 440 g
- 660 g
- 704 g
- 352 g

22 6 points

Calculate the mass of  $\text{Na}_2\text{SO}_4$  formed when 5.00 moles of  $\text{H}_2\text{SO}_4$  react with 5.00 moles  $\text{NaOH}$  in the following balanced chemical equation. Answer in grams.



- 5.00 g
- 142 g
- 2.50 g
- 355 g
- 710 g