

Name:

Date:

**IB Chemistry YR 1 Summer Assignment**

**Directions:** Answer all of the following questions to show mastery of basic skills necessary for success in IB Chemistry. If you are unsure of how to do any of the following tasks, please watch the video provided by Ms. Berrafato. This assignment is due (for a grade) on **August 12<sup>th</sup>, 2022**.

Link to video notes: [YR1BootCampIB.pptx](#)

**Part 1: Subatomic Particles and Nuclear Notation**

**Directions:** For each of the isotopes provided, write down the correct nuclear notation (1-10). For problems 11-20, list out the proper amount of each subatomic particle.

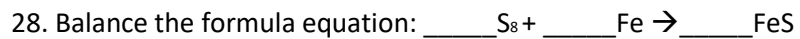
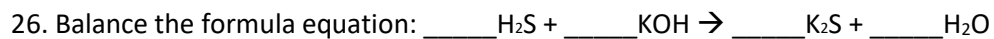
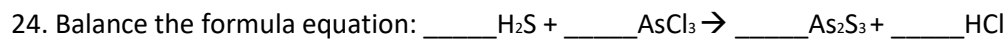
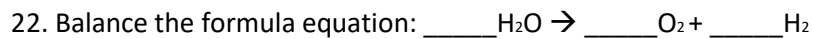
- 1.) C-14
- 2.) Hf-179
- 3.) H-2
- 4.) Ag-107
- 5.) Zr-91
- 6.) Mn-55
- 7.) Pt-196
- 8.) Am-244
- 9.) K-39
- 10.) O-16

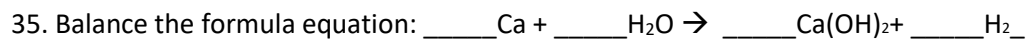
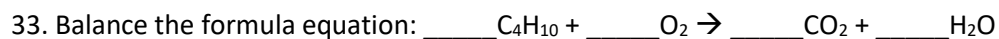
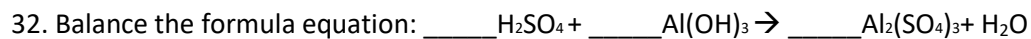
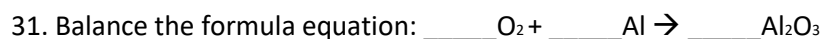
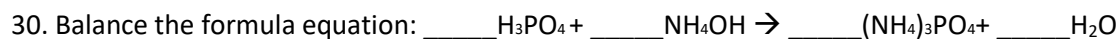
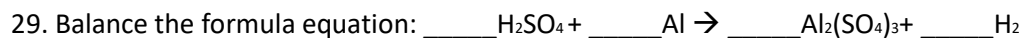
Element	Protons	Neutrons	Electrons
11.) Mn			25
12.)	6		
13.) Ir		192	
14.) $K^+$			
15.) $I^-$			
16.) $Ca^{2+}$			
17.) $C^{4-}$			
18.)	21		
19.) W			
20.)	25		

**Part 2: Balancing Chemical Reactions**

**Directions:** Balance the following chemical equations. Whole number integers only.

21. Balance the formula equation:  $\underline{\quad} Cu + \underline{\quad} O_2 \rightarrow \underline{\quad} CuO$





### Part 3: Stoichiometry Basics

Directions: For questions 36-42, calculate the molar mass of each sample.

36.)  $\text{NH}_3$

37.)  $\text{Bi}(\text{NO}_3)_3$

38.)  $\text{C}_2\text{HCl}_3\text{O}_2$

39.)  $\text{CH}_3\text{COOH}$

40.)  $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$

41.)  $\text{C}_6\text{H}_{12}\text{O}_6$

42.)  $\text{HgSO}_4$

**Directions:** For problems 43-65, answer the following questions as accurately as possible. Make sure you are using the right units.

43.) How many moles of sodium atoms correspond to  $1.56 \times 10^{21}$  atoms of sodium?

44.) How many moles of Al atoms are needed to combine with 1.58 mol of O atoms to make aluminum oxide,  $\text{Al}_2\text{O}_3$ ?

45.) How many moles of Al are in 2.16 mol of  $\text{Al}_2\text{O}_3$ ?

46.) Aluminum sulfate,  $\text{Al}_2(\text{SO}_4)_3$ , is a compound used in sewage treatment plants.

- Construct a pair of conversion factors that relate moles of aluminum to moles of sulfur for this compound
- Construct a pair of conversion factors that relate moles of sulfur to moles of  $\text{Al}_2(\text{SO}_4)_3$
- How many moles of Al are in a sample of this compound if the sample also contains 0.900 mol S?
- How many moles of S are in 1.16 mol  $\text{Al}_2(\text{SO}_4)_3$ ?

47.) How many moles of  $\text{H}_2$  and  $\text{N}_2$  can be formed by the decomposition of 0.145 mol of ammonia,  $\text{NH}_3$ ?

48.) What is the total number of atoms in 0.260 mol of glucose,  $\text{C}_6\text{H}_{12}\text{O}_6$ ?

49.) What is the mass of 1.00 mol of each of the following elements?

- Sodium

- b. Sulfur
- c. Chlorine

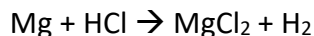
50.) Determine the mass in grams of each of the following:

- a. 1.35 mol Fe
- b. 24.5 mol O
- c. 0.876 mol Ca
- d. 1.25 mol  $\text{Ca}_3(\text{PO}_4)_2$
- e. 0.625 mol  $\text{Fe}(\text{NO}_3)_3$
- f. 0.600 mol  $\text{C}_4\text{H}_{10}$
- g. 1.45 mol  $(\text{NH}_4)_2\text{CO}_3$

51.) Calculate the number of moles of each compound:

- a. 21.5 g  $\text{CaCO}_3$
- b. 1.56 g  $\text{NH}_3$
- c. 16.8 g  $\text{Sr}(\text{NO}_3)_2$
- d. 6.98  $\mu\text{g}$   $\text{Na}_2\text{CrO}_4$

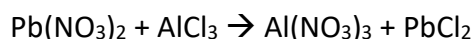
52.) 0.15 mol Mg reacting with 0.25 mol HCl. How many moles of  $\text{H}_2$  is formed?



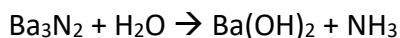
53.) 0.90 mol  $\text{C}_2\text{H}_6$  reacting with 3.50 mol  $\text{O}_2$ . How many moles of  $\text{CO}_2$  is formed?



54.) 2.60 mol  $\text{Pb}(\text{NO}_3)_2$  reacting with 3.00 mol  $\text{AlCl}_3$ . Which element is in excess and how much remains after the reaction?



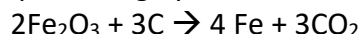
55.) 1.45 mol  $\text{Ba}_3\text{N}_2$  reacting with 10.0 mol  $\text{H}_2\text{O}$ . Which reactant is present in excess and how much remains after the reaction?



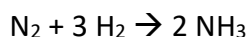
56.) 1.00 g of Lithium reacts with 200  $\text{cm}^3$  of a 0.450 mol  $\text{dm}^{-3}$  solution of sulphuric acid solution. What is the concentration of lithium sulphate solution produced, and what mass of which reactant remains?



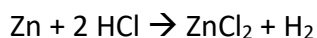
57.) When 50.0 tons of iron oxide was reacted with excess carbon. 30.0 tons of iron was produced. What was the percentage yield?



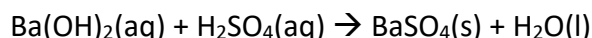
58.) Under typical conditions, the production of ammonia in the Haber process has a yield of about 28.5%. What mass of nitrogen would you need in order to produce 1000 kg of ammonia?



59.) 3.50 g of zinc reacts with 75.0 cm<sup>3</sup> of 0.500 M hydrochloric acid solution. What concentration is the zinc chloride solution produced?



60.) Adding 15.0 cm<sup>3</sup> 6.00M sulphuric acid to 500 cm<sup>3</sup> 0.200 mol dm<sup>-3</sup> of barium hydroxide solution produced 14.5 g barium sulphate. What is the % yield?



61.) 23.4 g of powdered calcium carbonate is added to 100 cm<sup>3</sup> of 0.550 mol dm<sup>-3</sup> phosphoric acid solution. What is the maximum mass of carbon dioxide that could be produced?



62.) What quantity in moles is there in 1.50x10<sup>22</sup> molecules ethene (C<sub>2</sub>H<sub>4</sub>)?

63.) What quantity in moles is there in 2.58x10<sup>25</sup> molecules of trinitrotoluene?

64.) What quantity in moles is there in 8.75x10<sup>19</sup> atoms of silicon?

65.) How many atoms are there in 2.55 mol of carbon?

66.) How many molecules are there in 6.75x10<sup>-4</sup> mol of water?