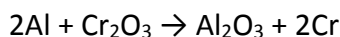


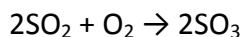
G11 Chemistry: Class 9 Homework**MULTIPLE CHOICE: Circle the correct answer. [5 marks]**

1. How many grams of Cr can be produced by the reaction of 44.1 g of Cr_2O_3 with 35.0 g of Al according to the following chemical reaction?



- A) 7.56 g
B) 30.2 g
C) 67.4 g
D) 104 g
E) None of these.
2. Washing soda is a hydrate of sodium carbonate. Elemental analysis of a sample of washing soda gave 4.20% C and 7.05% H. What is the formula for washing soda?
- A) $\text{Na}_2\text{CO}_3 \cdot 2\text{H}_2\text{O}$
B) $\text{Na}_2\text{CO}_3 \cdot 4\text{H}_2\text{O}$
C) $\text{Na}_2\text{CO}_3 \cdot 6\text{H}_2\text{O}$
D) $\text{Na}_2\text{CO}_3 \cdot 8\text{H}_2\text{O}$
E) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$
3. The first step in the Ostwald process for producing nitric acid is
- $$4\text{NH}_3(\text{g}) + 5\text{O}_2(\text{g}) \rightarrow 4\text{NO}(\text{g}) + 6\text{H}_2\text{O}(\text{g}).$$
- If the reaction of 150. g of ammonia with 150. g of oxygen gas yields 87. g of nitric oxide (NO), what is the percent yield of this reaction?
- A) 100%
B) 49%
C) 77%
D) 33%
E) 62%
4. Ammonia reacts with diatomic oxygen to form nitric oxide and water vapor:
- $$4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$$
- When 20.0 g NH_3 and 50.0 g O_2 are allowed to react, which is the limiting reagent?
- A) NH_3
B) O_2
C) NO
D) H_2O
E) No reagent is limiting.

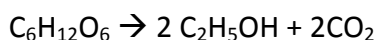
5. Calculate the mass of excess reagent remaining at the end of the reaction in which 90.0 g of SO_2 are mixed with 100.0 g of O_2 .



- A) 11.5 g
- B) 22.5 g
- C) 67.5 g
- D) 77.5 g
- E) 400 g

SHORT ANSWER: Answer the following questions.

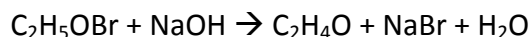
1. Yeast can act on a sugar, such as glucose, $\text{C}_6\text{H}_{12}\text{O}_6$ to produce ethyl alcohol, $\text{C}_2\text{H}_5\text{OH}$ and carbon dioxide.



If 223 g of ethyl alcohol are recovered after 1.63kg of glucose react, what is the percentage yield of the reaction? **[6 marks]**

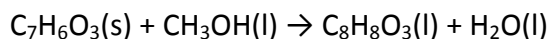
2. Marble is made primarily of calcium carbonate. When calcium carbonate reacts with hydrogen chloride, it reacts to form calcium chloride, carbon dioxide and water. If this reaction occurs with 81.5% yield, what mass of carbon dioxide will be collected if 15.7 g of CaCO_3 is added to sufficient hydrogen chloride? **[7 marks]**

3. Ethylene oxide, C_2H_4O is a multi-purpose industrial chemical used, among other things as a rocket propellant. It can be prepared by reacting ethylene bromohydrin, C_2H_5OBr with $NaOH$.



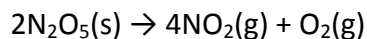
If this reaction proceeds with an 89% yield, what mass of C_2H_4O can be obtained when 3.61×10^{23} molecules of C_2H_5OBr react with excess $NaOH$? **[5 marks]**

4. Methyl salicylate, otherwise known as oil of wintergreen, is produced by the wintergreen plant. It can also be synthesized by heating salicylic acid, $C_7H_6O_3$, with methanol, CH_3OH .



A chemist reacts 3.50 g of salicylic acid with excess methanol. She calculates the theoretical yield of methyl salicylate to be 3.86 g. If 2.84 g of methyl salicylate are recovered, what is the percentage yield of the reaction? **[2 marks]**

5. Dinitrogen pentoxide is a white solid. When heated it decomposes to produce nitrogen dioxide and oxygen.



How many grams of oxygen gas will be produced in this reaction when 2.34 g of NO_2 are made? **[5 marks]**

6. A 2.524 g sample of a compound contains carbon, hydrogen, and oxygen. The sample is subjected to carbon-hydrogen analysis. 3.703 g of carbon dioxide and 1.514 g of water are collected. **[10 marks]**

a) Determine the empirical formula of the compound.

b) If one molecule of the compound contains 12 atoms of hydrogen, what is the molecular formula of the compound?