Stoichiometry Test Remediation

<table>
<thead>
<tr>
<th>Name</th>
<th>stoichiometry</th>
<th>limiting reactant</th>
<th>sig digs</th>
<th>mass</th>
</tr>
</thead>
</table>

**Favorites**

1. Google *periodic trends* and find an image that shows at least the trends in atomic radius, electronegativity, and ionization energy. Print or sketch that image.

2. Choose the element in each pair that has the higher...
   - a) electronegativity – O or S
   - b) atomic radius – Mg or Na
   - c) ionization energy – Ne or C

3. Explain the reasons for each of your choices in #2.

**Empirical Formulas**

4. List the steps needed to find the empirical formula from the percents by mass of the elements in a compound.

5. What is the empirical formula to find the formula of a compound with 59.96% O, 35.00 % N, and 5.04% hydrogen?

6. What is the empirical formula for a compound that is 36.1% Ca and 63.89% Cl.

**percent yield**

7. Print out the mole map and staple it to this sheet. Yes, actually print the one found on my reference page.

8. Write the formula to find the percent yield.

9. What is the theoretical yield, and how do you find it?

10. What is the percent yield if, instead of the expected 93 grams of sodium chloride produced, only 12.2 grams were recovered?

11. What is the percent yield when 45 grams of calcium chloride reacts with hydrogen nitrate solution to produce 48 grams of hydrochloric acid?

**Stoichiometry**

12. Print out the mole map and staple it to this sheet. Yes, actually print the one found on my reference page.

13. For each of these problems, list the unit path (ex: grams of 1st thing → mole of 1st thing → moles of 2nd thing...)

   - How many moles of carbon dioxide would have 3.4 x 10²⁵ f.u.
   - What is the mass of 1.39 x 10³⁴ atoms of chlorine.

14. In the reaction C₂H₄ + O₂ → CO₂ + H₂O, how many grams of water can be made from 231.3 grams of oxygen?

   - Where on the mole map to where on the mole map are you going? How many steps will it take? What are those steps?

15. In the reaction Al + O₂ → Al₂O₃, how many moles of oxygen are needed to react with 12.2 grams of aluminum?

   - Where on the mole map to where on the mole map are you going? How many steps will it take? What are those steps?

**Limiting Reactant**
16. How do you find the limiting reactant?

17. After you do both calculations, how do you identify the limiting reactant?

18. When sodium hydroxide reacts with phosphoric acid, it produces sodium phosphate and water. If 35.60 grams of NaOH react with 30.80 grams of H₃PO₄, how many grams of Na₃PO₄ can be made? Which reactant limits your production?

19. When 2.00 g of ammonia reacts with 4.00 grams of oxygen, how many grams of nitrogen monoxide can be made alongside the other water produced? What is the limiting reactant?

**Significant Digits**

20. Which number in a problem determines how many significant digits can be in the answer?

21. How many significant digits are in a mole ratio?

22. Label each of these numbers with how many significant digits there are and round off the answer to the correct number of digits.

\[
4.5 \text{ g } H_2O \times \frac{1 \text{ mol } H_2O}{18.02 \text{ g } H_2O} \times \frac{5 \text{ mol } Al_2O_3}{3 \text{ mol } H_2O} = 0.416204217536 \text{ mol } Al_2O_3
\]

22. Label each of these numbers with how many significant digits there are and round off the answer to the correct number of digits.

\[
5.233 \times 10^{24} \text{ mlc } BaO \times \frac{1 \text{ mol } BaO}{6.022 \times 10^{23} \text{ mlc } BaO} \times \frac{15 \text{ mol } H_2}{7 \text{ mol } BaO} \times \frac{2.02 \text{ g } H_2}{1 \text{ mol } H_2} = 37.6144375385491 \text{ g } H_2
\]

**Mass**

23. Write the masses of each of these elements correctly rounded to two decimal places...H...C...S...N...O...F...Cr...Na...Cl...

Ag...Fe...Pb...Hg...Ca...Mg...O

24. Calculate the masses of one mole of each of these compounds...NaCl...NaOH...(NH₄)₃PO₄...Al(NO₃)₃...Mg(OH)₂

**Answers**

1. Print it...

2 & 3. Na – more p+ pull own e- inward more...Ne – more p+ hold own e- more tightly, harder to remove...O – fewer e- lets nucleus get closer to e- from other atoms, pulls harder on them 4. % → g/mol / smallest moles...subscripts * whole # sometimes 5.

NH₃NO₃(O)₂H₃ 6. CaCl₂ 8. actual/theoretical X 100 9. How much you should make...do 3-step process from limiting reactant. 10.13.1% 11. 30% 13. f.u. → moles & atoms → molecules → moles → grams 14. Balanced? 86.83g...grams 1st → grams 2nd...3 steps...1st line, mole ratio, 1st line 15. grams 1st → moles 2nd...2 steps...1st line, mole ratio...balanced?...0.508 mol 16. Answer on the mole map 17. the reactant that makes less product 18. NaOH limits...48.64 g Na₃PO₄...phosphoric acid is hydrogen phosphate 19. 4 NH₃ + 5 O₂ → 4 NO + 6 H₂O...3.00 g NO...O₂ limits 20. the number with the fewest sig digs 21. They’re exact. 22. 2, 4, exact...0.42 mol 22. 4,4,exact...37.6 g H₂ 23. Not in order...24.31...40.08...200.59...16.00...107.87...55.85...207.19...32.06...12.01...1.01...14.01...19.00...22.99...35.45...52.00

24. 58.44...58.33...40.00...213.01...149.12...