Name: _____Per.: _____Date: _____

**CST Study Guide 3: Stoichiometry (Standard 3) (Note: Molar Volume @ STP = 22.4L/mol)**
**Use a separate sheet of paper to show your work!**

1. Define mole.
2. How many particles are present in one mole of a substance?
3. What are the substances to the left of the arrow called? To the right? What do the coefficients mean?
4. Given the following equation: $2\ C_4H_{10} + 13\ O_2 \rightarrow 8\ CO_2 + 10\ H_2O$, what are the mole-to-mole ratios for the following?
   a. $C_4H_{10}$ / $O_2$ (2:13 because there are two moles of $C_4H_{10}$ for every 13 moles of $O_2$)
   b. $O_2$ / $CO_2$ c. $O_2$ / $H_2O$ d. $C_4H_{10}$ / $CO_2$ e. $C_4H_{10}$ / $H_2O$
5. Balance the following equation: $KClO_3 \rightarrow KCl + O_2$
How many moles of $O_2$ can be produced by letting 12 moles of $KClO_3$ react? (18 mol $O_2$)
6. Balance the following equation: $K + Cl_2 \rightarrow KCl$
How many grams of K is needed to produce from 10.0 g of KCl in excess $Cl_2$? (5.24g K)
How many grams of KCl is produced from 1.00 g of $Cl_2$ and excess K? (2.10g KCl)
7. Balance the following equation: $Na_2O + H_2O \rightarrow NaOH$
How many moles of NaOH is produced from 120. grams of $Na_2O$? (3.87 mol NaOH)
How many grams of $Na_2O$ are required to produce 3.000 moles of NaOH? (92.97 g $Na_2O$)
8. Balance the following equation: $Fe + S_8 \rightarrow FeS$
What mass of iron is needed to react with 16.00 grams of sulfur? (27.86 g Fe)
How many moles of FeS are produced when 16.0 grams of sulfur reacts in excess iron? (0.499 mol FeS)
9. Balance the following equation: $NaClO_3 \rightarrow NaCl + O_2$
12.0 moles of $NaClO_3$ will produce how many grams of $O_2$? (576 g $O_2$)
10. Balance the following equation: $Cu + AgNO_3 \rightarrow Cu(NO_3)_2 + Ag$
How many moles of Cu are needed to react with 3.50 moles of $AgNO_3$? (1.75 mol Cu)
If 89.5 grams of Ag were produced, how many grams of Cu reacted? (26.4 g Cu)
11. Balance the reaction: $NH_3 + O_2 \rightarrow NO + H_2O$
When 1.20 mole of ammonia reacts, what is the **total** number of moles of products formed? (3.00 moles total)
12. How many atoms are there is 2.1mol of CaS? ($1.3 \times 10^{24}$ atoms)
13. How many molecules does a 35.4g sample of CO have? ($7.61 \times 10^{23}$ molecules)
14. $1.63 \times 10^{24}$ molecules of ammonia ($NH_3$) make up how many moles? (2.71 moles)
15. How much mass does 3.5 mol of $HNO_3$ have? (220g)
16. How much mass does $4.68 \times 10^{23}$ formula units of $Cu(NO_3)_2$ have? (146g)
17. How many formula units make up 116g of $Fe_2(SO_4)_3$? ($1.75 \times 10^{23}$ formula units)
18. How many liters will 3.44 mol of $O_2$ occupy at STP? (77.1L)
19. How many moles of $N_2$ are there in a 2.04L balloon at STP? (0.0911 mol)