Name: _____

UNIT 12 TEST REVIEW - K

1. Show how to set up a stoichiometry problem with one unknown and one given.

$$\frac{\text{unknown x}}{\text{given}} = \frac{\#\text{ from equation - same units as unknown}}{\#\text{ from equation - same units as given}}$$

2. Show how to set up a Limiting Reactant Stoich. Problem.

$$\frac{\text{unknown x}}{\text{given}} = \frac{\#\text{ from equation - same unit as unknown}}{\#\text{ from equation - same unit as given}}$$

UNKNOWN is 1ST # from PROBLEM

3. Show how to set up a Mole to Mole Ratio

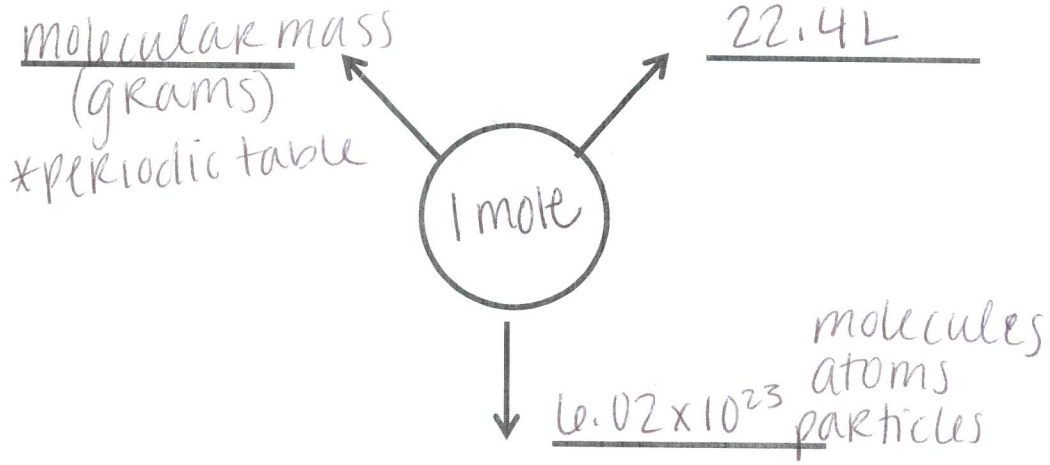
#:# (coefficients)

4. What is the formula for Percent Yield?

$$\frac{\text{actual}}{\text{theoretical}} \times 100$$

5. What is the formula for Percent Error?

6. Fill out the Mole conversions.



7. What are the units for the following:

Mass	g
Volume	L
Energy	KJ / J / KCal

6

8. $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$, if 5.75L of oxygen are consumed in the above reaction, how many L of carbon dioxide are produced?

x

$$\frac{X\ L\ CO_2}{5.75\ L\ O_2} = \frac{3(22.4)\ L\ CO_2}{5(22.4)\ L\ O_2}$$

$X = 3.45\ L\ CO_2$

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9. In the decomposition of baking soda, $NaHCO_3(s) + 1{,}800\ kJ \rightarrow CO_2(g) + NaOH(s)$, how much energy is required if there is 9.5×10^{-3} moles of NaOH produced?

$$\frac{X\ KJ}{9.5\times10^{-3}\ moles\ NaOH} = \frac{1800\ KJ}{1\ mole}$$

$X = 17.1\ KJ$

10. BALANCE THE FOLLOWING AND SOLVE:

X ____ $Cu(s)$ + 2 $AgNO_3(aq) \rightarrow$ ____ $Cu(NO_3)_2(aq)$ + 2 $Ag(s)$

If 0.0266 moles of copper and 0.75 moles of silver nitrate are available to react, how many grams of silver are produced?

LR: $\frac{X\ moles\ Cu}{.75\ moles\ AgNO_3} = \frac{1\ mole\ Cu}{2\ mole\ AgNO_3}$

$X = .375\ mole\ Cu \leftarrow LR$

$\frac{X\ g\ Ag}{.0266\ mole\ Cu} = \frac{215.736\ g\ Ag}{1\ mole\ Cu}$

$X = 5.74\ g\ Ag$

11. $4FeCr_2O_7 + 8K_2CO_3 + O_2 \longrightarrow 2Fe_2O_3 + 8K_2CrO_4 + 8CO_2$ How many grams of $FeCr_2O_7$ are required to produce 3.44 g of CO_2?

$$\frac{X\ g\ FeCr_2O_7}{3.44\ g\ CO_2} = \frac{1087.328\ g\ FeCr_2O_7}{352.072\ g\ CO_2}$$

$X = 10.02\ g\ FeCr_2O_7$

12. In the following reaction, $2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$, how many moles of oxygen would be required to produce 5.76 moles of water?

$$\frac{X\ moles\ O_2}{5.76\ moles\ H_2O} = \frac{1\ mole\ O_2}{2\ mole\ H_2O}$$

$X = 2.88\ mole\ O_2$

13. $Cr_2O_3 + 3C \rightarrow 2Cr + 3CO$

If the experimental yield obtained was 18.45 g of Cr, but you should have produced 535 g of Cr, what is the percent yield?

$$\frac{18.45\ g\ Cr}{535\ g\ Cr} = .034486 \times 100 = 3.45\%$$

14. How many moles are there in 442.9 grams of CCl_4?

$$\frac{X\ moles\ CCl_4}{442.9\ g} \quad \frac{1\ mole}{153.823\ g}$$

$X = 2.88\ moles\ CCl_4$

15. Determine the mass of barium bromate that can be prepared from 3.32 g of $Ba(OH)_2$ given this unbalanced equation: 2 $HBrO_3$ + ___ $Ba(OH)_2 \longrightarrow$ ___ $Ba(BrO_3)_2$ + 2 H_2O

$$\frac{X\ Ba(BrO_3)_2}{3.32\ g\ Ba(OH)_2} = \frac{393.132\ g\ Ba(BrO_3)_2}{171.344\ g\ Ba(OH)_2}$$

$X = 7.62\ g\ Ba(BrO_3)_2$

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16. BALANCE THE FOLLOWING: _____ $CaO(s)$ + ____ $H_2O(l)$ → _____ $Ca(OH)_2(aq)$ BALANCED

17. How many grams of calcium hydroxide will be formed in this reaction when 1.02 g of calcium oxide and 0.304 g of water are available to react?

LR: $\frac{X\ g\ CaO}{.304g\ H_2O} = \frac{56.079\ g\ CaO}{18.015g\ H_2O}$

$X = .946\ g\ CaO$ ← less than given, so LR: H_2O

$\frac{X\ g\ Ca(OH)_2}{.304g\ H_2O} = \frac{74.094g\ Ca(OH)_2}{18.015g\ H_2O}$

$X = 1.25\ g\ Ca(OH)_2$

18. The body breaks down sugar (glucose) using this chemical reaction: $C_6H_{12}O_6(s) + 6O_2(g) \rightarrow 6CO_2(g) + 6H_2O(l) + 27{,}000kJ$; how many moles O_2 would be needed if 34,290 kJ of energy were produced

$\frac{X\ moles\ O_2}{34290\ KJ} = \frac{6\ moles\ O_2}{27000\ KJ}$ $X = 7.62\ moles\ O_2$

19. Convert 2.92×10^{22} atoms of Sn to grams.

$2.92 \times 10^{22}\ atoms\ Sn \left| \frac{1\ mole}{6.02 \times 10^{23}\ atoms\ Sn} \right| \frac{118.71g\ Sn}{1\ mole}$

5.76 g

20. Calculate the theoretical yield of AlF_3 obtained from the reaction of 0.56 moles of Al in the reaction: $2Al + 3F_2 \rightarrow 2AlF_3$. If 40 grams of the product was actually produced, calculate the percent yield.

$\frac{X\ \cancel{moles}\ grams\ AlF_3}{.56\ moles\ Al} = \frac{167.952g\ AlF_3}{\cancel{53.964g}\ Al\ (2\ moles)}$ $X = 47.03\ g\ AlF_3$

$\%\ yield = \frac{40}{47.03} \times 100 = 85.06\%$

21. In the following unbalanced equation: __CO + __H_2 → __CH_3OH, if the actual yield for CH_3OH was 23.0g and the theoretical was 23.4g, what was the % yield?

$\frac{23.0g}{23.4g} \times 100 = 98.29\%$

22. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O + 242kJ$

How many kJ are produced from 52 g of CH_4 in the above equation?

$\frac{X\ KJ}{52g\ CH_4} = \frac{242\ KJ}{16.043g\ CH_4} = 784.39\ KJ$

23. Fe + CuCl2 + 93kJ FeCl32 + Cu

How many grams of FeCu2 are made from 800kJ of energy?

(x) (given)

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24. $K_3PO_4 + Al(NO_3)_3 \rightarrow 3KNO_3 + AlPO_4$

How many grams of aluminum phosphate are produced from 12 moles of aluminum nitrate in the above equation?

$$\frac{X\text{ g } AlPO_4}{12\text{ moles } Al(NO_3)_3} = \frac{121.952\text{ g } AlPO_4}{1\text{ mole } Al(NO_3)_3}$$

$X = 1463.42\text{ g } AlPO_4$

25. Study the diagram showing a chemical reaction and the chemical equation that represents the reaction. Then complete the table. Show your calculations for questions y - aa in the space below the table.

$O_2 + 2NO \rightarrow 2NO_2$

$O_2 + 2NO \rightarrow 2NO_2$

X

The molar masses are:

O_2 - 32.00 g/mol
NO - 30.01 g/mol
NO_2 - 46.01 g/mole

Amount of O_2	Amount of NO	Amount of NO_2	Limiting Reactant	~~Amount and~~ Name of Excess Reactant
1 molecule	2 molecules	2 molecules	None	None
4 molecules	4 molecules	4 molecules	NO	2 molecules O_2
2 moles	8 moles	a. 4 moles	b. O_2	c. NO
1.00 mole	2.00 mole	d. 2 moles	e. O_2 & NO	f. none
4.00 mole	4.00 mole	g. 4 moles	h. NO	i. O_2
5.00 mole	7.00 mole	j. 7 moles	k. NO	l. O_2
1.00 mole	4.00 mole	m. 2 moles	n. O_2	o. NO
0.500 mole	0.200 mole	p. .200 moles	q. NO	r. O_2
32.00 g X	60.02 g	s. 92.02g	t. O_2/NO	u.
16.00 g	80.00 g	v. 46.01g	w. O_2	x. NO
10.00 g X	20.00 g	y. 28.76g NO_2	z. O_2	aa. NO

26. WORK FOR Y, Z, AND AA:

t $\frac{X\text{ g } O_2}{60.02\text{g NO}} = \frac{32\text{g } O_2}{60.02\text{g NO}}$

$X = 32$

Z $\frac{X\text{ g } O_2}{20\text{ g NO}} = \frac{32\text{g } O_2}{60.02\text{g NO}}$

$60.02X = 640$

$X = 10.66$

Y $\frac{X\text{ g } NO_2}{10\text{g } O_2} = \frac{92.02\text{g } NO_2}{32.00\text{g } O_2}$

$32X = 920.2\text{g}$

$X = 28.76\text{g } NO_2$