STE PART
Pretest 1.4

1. The technical definition of a mole is *the number of particles found in 12.0000 grams of* ^{12}C. What number are we referring to?

2. What is the molar mass of ….

a. $Be(OH)_2$

b. $_{23}V$

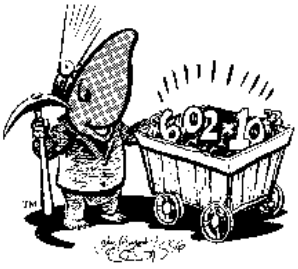
3. Convert the following:

a. 300 g of Mg = _____moles

b. 1 g of water = _____moles

c. 2 moles of O_2 per L= _____grams/L

d. 6 moles of O_2 = _____molecules



e. 6 moles of O_2 = _____atoms

4. Monty Mole found a mole of gold. If gold sells for $48 US per gram in Oct 2014, what is the value of Monty's mole of gold?

5. Two molecules of helium (He) is how many grams?

6. Given: $4\ NH3_{(g)} + 5\ O2_{(g)} \rightarrow 4\ NO_{(g)} + 6\ H2O_{(g)+} + 673\ kJ$

a. How many moles of water will be produced if 5 moles of ammonia, $NH_{3(g)}$, react?
b. How many grams of oxygen reacted if only one mole of NO reacted?

c. How many grams of oxygen react with every 1.0 gram of $NH3_{(g)}$?

d. How many kJ of heat are released when 3 moles of oxygen react?

7. Given: $H_2SO_4 + 2\ KOH \rightarrow K_2SO_4 + 2\ H_2O$

What concentration of KOH is needed (in g/L) if 50 mL of KOH are supposed to neutralize 300 ml of a 0.20 g/L H_2SO_4 solution ?

STE
Pretest 1.4 Solutions

1. The technical definition of a mole is *the number of particles found in 12.0000 grams of* ^{12}C. What number are we referring to?

6.02×10^{23} particles(in this case atoms)/mole = Avogadro's number

2. What is the molar mass of ….

a. $Be(OH)_2$

9 + 16*2 + 1*2 = 43 g//mole

b. $_{23}V$

51 g/mole

Remember:
I'm a little furry animal that multiplies. If you have moles *multiply* by molar mass to get mass in grams. To get molecules, *multiply* moles by $6.02X10^{23}$.

3. Convert the following:

a. 300 g of Mg = _____moles

300 g (mole/24 g) = 12.5 moles

b. 1 g of water = _____moles

1 g(mole/18 g) = 0.056 moles

c. 2 moles of O_2 per L= _____grams/L

2 moles (32 g/mole)/L = 64 g/L

d. 6 moles of O_2 = _____molecules

6 moles (6.02×10^{23} molecules/mole) = 3.6×10^{24} molecules

e. 6 moles of O_2 = _____atoms
6 moles of O_2 (6.02×10^{23} molecules/mole) (2 atoms of O /molecule of O_2)
= 7.2×10^{24} atoms of O

4. Monty Mole found a mole of gold. If gold sells for $48 US per gram in Oct 2013, what is the value of Monty's mole of gold?

1 mole Au = 197 g

197 g ($48/g) = $ 9456 US

5. Two molecules of helium(He) is how many grams?

2 molecules He $\left(\frac{mole}{6.02\ X\ 10^{23} molecules}\right)\left(\frac{4\,g}{mole}\right)$ = 1.33 X 10^{-23} g He

6. Given: $4\ NH3_{(g)}$ + $5\ O2_{(g)}$ → $4\ NO_{(g)}$ + $6\ H_2O_{(g)+}$ + 673 kJ

a. How many moles of water will be produced if 5 moles of ammonia, $NH_{3(g)}$, react?

5 moles NH_3 (6 H_2O/ 4 $NH_{3(g))}$) = 7.5 moles H_2O

b. How many grams of oxygen reacted if only one mole of NO reacted?

$1 mole\ NO\left(\frac{5\,mol\ O_2}{4\,mol\ NO}\right)$

= 1.25 moles of oxygen

1.25 moles (32g/mole) = 40 g

c. How many grams of oxygen react with every 1.0 gram of $NH3_{(g)}$?

1.0 g $NH3$(mole/17 g) = 0.05882352941176471 moles $NH3$

$0.05882352941176471 \text{ moles } NH_3\left(\frac{5\,mol\ O_2}{4\,mol\ NH_3}\right) = 0.074\,moles\ O_2$

$0.074\,moles\ O_2$ (32 g/mole) = 2.35 g O_2

d. How many kJ of heat are released when 3 moles of oxygen react?

$3\ moles\ O_2\left(\frac{673kJ}{5\,mol\ O_2}\right)$ = 404 kJ

7. Given: H_2SO_4 + 2 KOH → K_2SO_4 + 2 H_2O

What concentration of KOH is needed (in g /L) if 50 mL of KOH are supposed to neutralize 300 ml of a 0.20 g/L H_2SO_4 solution ?

m = CV = 0.20 g/L(0.300 L) = 0.06 g H_2SO_4

0.06 g H_2SO_4 (mole/98 g) = 6.122 X 10^{-4} moles H_2SO_4
6.122 X 10^{-4} moles H_2SO_4 (2 mol KOH/1 mol H_2SO_4) = 0.00122 moles KOH

0.00122 moles KOH (56 g/mole) = 0.06832 g of KOH
C = m/V = 0.06832 g of KOH /0.050 L = 1.37 g/L
FLASHBACK

8. What is the chemical formula of a compound created by mixing Cu^{+2} with PO_4^{3-}?

   Total charge has to be zero, so $Cu_3(PO_4)_2$

9. From the second period of the periodic table, identify:
   a) the atom with the largest atomic radius — Li
   b) the atom with the highest electronegativity — F
   c) the atom with the highest ionization energy — Ne

10. There are three isotopes of Q: 312 , 316 and 317. The most abundant one is 312. 75% of Q is ^{312}Q. If the atomic mass of Q is 313.16, what is the percentage abundance of ^{316} Q?

    312*.75 + x*316 + (0.25 - x)*317 = 313.16
    x= 0.09
    9% ^{316} Q