Fill in the correct answer on the answer sheet.

$\rho = m / V$ $N = N_A\, n$ $N_A = 6.022 \times 10^{23}\ \text{mol}^{-1}$

$M = m / n$ $aA + bB \rightarrow cC + dD$: $n_A/a = n_B/b = n_C/c = n_D/d$ $T_K/K = t_{\circ C}/^\circ\text{C} + 273.15$

Be sure you <u>always</u> provide the proper units!

1) A scientific theory is:

A) a very tentative suggestion to generalize or explain observations.
B) an explanation for many consistent observations.
C) a statement that one puts forth to prove a particular point.
D) a phenomenon that is proven.
E) a generalization that covers many observations.

2) Convert 9.28×10^3 ng to µg.

3) A) What is the result, to the proper number of significant figures, of the operation: (You may need to use scientific notation to express the proper number of significant figures.)
$(80.83 \times 5.0) \times 16.5$.

B) What is the result, to the proper number of significant figures, of the operation:
$0.38 - 0.366 + 0.747$

4) Calculate the mass of a piece of metal that has a density of 9.12 g mL^{-1} and a volume of 60.8 mL.

5) Calculate the volume of a piece of metal that has a mass of 72.0 g and a density of 11.07 g ml^{-1}.

6) How many neutrons and protons are there in O–18 ?

7) A sample consists of 100g of iron and 33.80 g in NaCl. What is the percent NaCl?

8) Which of the following compounds is a totally ionic compound?
A) HCl **B)** CH_3COOH **C)** CH_4 **D)** $NaNO_3$ **E)** NaCl

9) Which of the following compounds is a totally covalent compound?
A) NaOH **B)** UH_3 **C)** KCl **D)** HCl **E)** KH

10) How much is 284.30 °C in kelvins?

11) Complete the following reactions as Brønsted–Lowery acid–base reactions.
$HNO_3 + H_2O \rightarrow$
$C_6H_5NH_2 + H_2O \rightarrow$
$H_2O + HClO_3 \rightarrow$
$CH_3NH_2 + HCl \rightarrow$

12) How many molecules are there in 70.0 moles of CH_3COOH ?

13) How many grams are there in 8.42 mol of HCl ?

14) How many grams are there in 3.05×10^{25} molecules of CH_4 ?

15) Calculate the percentage of each of the elements in the compound $LiNO_3$.

16) What is the simplest (empirical) formula for a compound that is 29.4% Ca , 23.6% S and 47.0% O.

17) In the following reaction, how many moles of CO_2 are produced if 8.71 mol of C_2H_6 are reacted in an excess of O_2 ?
$2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$

18) In the following reaction, how many grams of CO_2 are produced if 5.92 grams of CH_3OH are reacted in an excess of O_2 ?
$2CH_3OH + 4O_2 \rightarrow 2CO_2 + 4H_2O$

19) In the following reaction, how many grams of CO_2 are produced if 5.17 grams of C_3H_7OH are reacted with 5.36 g of O_2 ?
$2C_3H_7OH + 8O_2 \rightarrow 6CO_2 + 6H_2O$

20) In the following reaction, 36.9 g of CO_2 is recovered when 57.6 grams of O_2 is reacted with an excess of CH_3OH . What is the percent yield for this reaction?
$2CH_3OH + 4O_2 \rightarrow 2CO_2 + 4H_2O$

NAME_____

1) Circle the correct letter: **A** **B** **C** **D** **E**

2) _____ µg

3) A) _____

B) _____

4) _____ _____

5) _____ _____

6) protons = _____ neutrons = _____

7) _____ %

8) Circle the correct letter: **A** **B** **C** **D** **E**

9) Circle the correct letter: **A** **B** **C** **D** **E**

10) _____ _____

11) $HNO_3 + H_2O \rightarrow$ _____ + _____

$C_6H_5NH_2 + H_2O \rightarrow$ _____ + _____

$H_2O + HClO_3 \rightarrow$ _____ + _____

$CH_3NH_2 + HCl \rightarrow$ _____ + _____

12) _____ molecules of CH_3COOH

13) _____ _____

14) _____ _____

15) $LiNO_3$ Li = _____ % N = _____ % O = _____ %

16) Ca _____ S _____ O _____

17) _____ _____

18) _____ _____

19) _____ _____

20) _____ _____

1) **B**

2) 9.28×10^{0} µg

3) A) 6.6×10^{3} sig. fig.

   B) 0.76 sig. fig.

4) 554.5 g

5) 6.50 mL

6) protons = 8 neutrons = 10

7) 25.26%

8) **E)**

9) **D)**

10) 557.45 K

11) $HNO_3 + H_2O \rightarrow H_3O^+ + NO_3^-$

    $C_6H_5NH_2 + H_2O \rightarrow C_6H_5NH_3^+ + OH^-$

    $H_2O + HClO_3 \rightarrow H_3O^+ + ClO_3^-$

    $CH_3NH_2 + HCl \rightarrow CH_3NH_3^+ + Cl^-$

12) 4.22×10^{25} molecules ofCH_3COOH .

13) 307 g

14) 8.12×10^{2} g

15) Li = 10.1% N = 20.3% O = 69.6%

16) $Ca_1 S_1 O_4$

17) 17.4 mol CO_2

18) 8.14 gCO_2

19) 5.53 g CO_2

20) 93.1%