

Fill in the correct answer on the answer sheet.

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

$$M = m / n \quad C = n / V \quad \text{on this line the units are: for } m \text{ grams and for } V \text{ liters.}$$

$$aA + bB \rightarrow cC + dD : \quad n_A/a = n_B/b = n_C/c = n_D/d \quad C_1V_1 = C_2V_2 \quad T_K = t_{\text{C}} + 273.15$$

- 1) A scientific hypothesis 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 2×10^{-1} cg 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.)
 $(0.885 \times 0.81) \times 5.0$.

- B) What is the result, to the proper number of significant figures, of the operation:
 $5577.0 - 7685.60 + 8.5280$

- 4) Calculate the volume of a piece of metal that has a density of 13.21 g mL^{-1} and a mass of 28.7 g.

- 5) How many neutron and protons are there in Fe-56 ?

- 6) Which of the following are ionic, which are covalent and which are mixed (ionic covalent)?
 CCl_4 , Y_2S_3 , SO_2 , NaClO_4

- 7) Identify whether the following is an Arrhenius acid, Arrhenius base or neither.
 NaOH , HCl , NH_3 , FeCl_2

- 8) Complete the following reactions as Brønsted–Lowery acid–base reactions.
 $\text{CH}_3\text{NH}_2 + \text{H}_2\text{O} \rightarrow$
 $\text{HF} + \text{NH}_3 \rightarrow$
 $\text{HNO}_3 + \text{H}_2\text{O} \rightarrow$
 $\text{C}_6\text{H}_5\text{NH}_2 + \text{H}_2\text{O} \rightarrow$

- 9) How many molecules are there in 43.9 moles of HNO_3 ?

- 10) How many grams are there in 4.08 mol of CH_4 ?

- 11) How many grams are there in 2.32×10^{25} molecules of NH_3 ?
- 12) Calculate the percentage of each of the elements in the compound CaSO_4 .
- 13) In the following reaction, how many moles of CO_2 are produced if 1.44 mol of C_2H_6 are reacted in an excess of O_2 ?
$$2\text{C}_2\text{H}_6 + 7\text{O}_2 \rightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}$$
- 14) In the following reaction, how many grams of CO_2 are produced if 4.99 grams of CH_3OH are reacted in an excess of O_2 ?
$$2\text{CH}_3\text{OH} + 4\text{O}_2 \rightarrow 2\text{CO}_2 + 4\text{H}_2\text{O}$$
- 15) In the following reaction, how many grams of CO_2 are produced if 4.04 grams of $\text{C}_3\text{H}_7\text{OH}$ are reacted with 4.04 g of O_2 ?
$$2\text{C}_3\text{H}_7\text{OH} + 8\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$$
- 16) In the following reaction, 14.7 g of CO_2 is recovered when 19.3 grams of O_2 is reacted with an excess of C_4H_{10} . What is the percent yield for this reaction?
$$2\text{C}_4\text{H}_{10} + 13\text{O}_2 \rightarrow 8\text{CO}_2 + 10\text{H}_2\text{O}$$
- 17) 0.347 mol of NaCl is dissolved in 6.55 L of water solution. What is the molarity of the solution?
- 18) 21.360 g of CH_3COOH is dissolved in 632 mL of water solution. What is the molarity of the solution?
- 19) A 0.185 M solution is diluted from 190 mL to 611 mL. What is the concentration of the resultant solution?
- 20) How many **liters** of 0.130 M solution of CH_3COOH can be produced from 39.0 mL of 1.35 M CH_3COOH ?

ANSWER SHEET

NAME _____

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

2) _____ μg

3) _____

4) _____

5) protons = _____ neutrons = _____

6) Circle the correct answer:

CCl₄ ionic covalent mixedY₂S₃ ionic covalent mixedSO₂ ionic covalent mixedNaClO₄ ionic covalent mixed

7) Circle the correct answer:

NaOH is: an acid a base neither

HCl is: an acid a base neither

NH₃ is: an acid a base neitherFeCl₂ is: an acid a base neither8) CH₃NH₂ + H₂O → _____ + _____HF + NH₃ → _____ + _____HNO₃ + H₂O → _____ + _____C₆H₅NH₂ + H₂O → _____ + _____9) _____ molecules of HNO₃

10) _____ g

ANSWER SHEET

NAME _____

11) _____ g

12) CaSO_4 Ca = _____ % S = _____ % O = _____ %13) _____ mole of CO_2 14) _____ g of CO_2 15) _____ g of CO_2

16) _____ %

17) _____ M

18) _____ M

19) _____ M

20) _____ **L**

- 1) A
- 2) $2 \times 10^3 \mu\text{g}$
- 3) A) 3.6×10^0
B) -2100.1
- 4) 379 g
- 5) protons = 26 neutrons = 30
- 6)

CCl_4	covalent
Y_2S_3	ionic
SO_2	covalent
NaClO_4	mixed
- 7)

NaOH	base
HCl	acid
NH_3	base
FeCl_2	neither
- 8) $\text{CH}_3\text{NH}_2 + \text{H}_2\text{O} \rightarrow \text{CH}_3\text{NH}_3^+ + \text{OH}^-$
 $\text{HF} + \text{NH}_3 \rightarrow \text{NH}_4^+ + \text{F}^-$
 $\text{HNO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{NO}_3^-$
 $\text{C}_6\text{H}_5\text{NH}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_5\text{NH}_3^+ + \text{OH}^-$
- 9) 2.64×10^{25} molecules of HNO_3 .
- 10) 65.3 g
- 11) 6.55×10^2 g
- 12) Ca = 29.4% S = 23.6% O = 47.0%
- 13) 2.88 mol CO_2
- 14) 6.86 g of CO_2
- 15) 4.166 g of CO_2
- 16) 89.9%
- 17) 0.0530 M
- 18) 0.5633 M
- 19) 0.0575 M
- 20) 0.405 L