Name Answer Key Hour _____

Chapter 2 Review

(Honors Chemistry)

A. Convert the following numbers into Scientific Notation.

1. 1001 1.001×10^{3}
2. 69 000 000 6.9×10^{7}
3. 300 3×10^{2}
4. 0.000407 4.07×10^{-4}
5. 973.0 9.730×10^{2}
6. 0.0000740 7.40×10^{-5}

B. Convert the following numbers from Scientific Notation to expanded form.

1. 2.21×10^{3} 2210
2. 4.701×10^{5} 470100
3. 2.3×10^{-4} 0.00023
4. 1.500×10^{-3} 0.001500
5. 5.13×10^{-6} 0.00000513
6. 9.72×10^{7} 972 00000

C. Determine the number of significant digits in the following numbers.

1. .00345 3
2. 900 000 1
3. 53001 5
4. 502.2 4
5. 77.0 3
6. 567.0 4
7. 4.673×10^{5} 4
8. .00008 1
9. 570.07 5

D. Answer the following concept questions

1. What are the 3 main types of graphs used in chemistry? When are they used?

   Circle Bar Line

2. Explain how to calculate slope on a line graph. $\frac{Y_2 - Y_1}{X_2 - X_1}$ or $\frac{\Delta Y}{\Delta X}$

3. List the metric prefixes in order from largest to smallest. What is their value in relation to 1?

   Giga - mega - Kilo - hecto - deca - deci - centi - milli - micro - nano

   1000 - 100 - 10 | 1/10 - 1/100 - 1/1000

4. What does it mean to be an accurate measurement? What is important when making accurate measurements?

   Several decimal places a quality measuring device

5. What does it mean to have precise measurements? What is important to make precise measurements?

   Several consistent measurements skill of the scientist

6. Why would a scientist need to calibrate a scientific measuring device? What does calibrate mean?

   increase accuracy adjust to make more accurate

7. Compare weight vs. Mass. Which can change and which doesn't change?

Mass: the amount of matter an object contains

weight: Depends on gravity

8. What is the boiling and freezing point on the Celsius scale? Fahrenheit scale? Kelvin scale?

Freezing: 0°C 32°F 273 K

Boiling: 100°C 212°F 373 K

9. What is the density of water? When will objects float and sink in water?

1.0 g/mL

over 1.0 g/mL = objects sink

under 1.0 g/mL = objects Float

10. What are the seven base SI units?

m - Kg - s - A - K - mol - cd

11. What is the estimated digit in any measurement?

The last significant digit in a measurement, the rounded digit

12. What does it mean to be a derived unit? Give some examples of derived units.

more than 1 measurement required (volume, density, speed)

13. If mass stays constant, how does a volume change affect density?

Volume increase = density decrease

volume decrease = density increase

14. If volume stays constant, how does a mass change affect density?

mass increase = density increase

mass decrease = density decrease

15. How does a temperature increase affect the volume and density of a substance?

Temp increase = volume increase = density decrease

16. How does a temperature decrease affect the volume and density of a substance? What is the exception?

Temp decrease = Volume decrease = density increase | water @ 4°C

17. Explain the difference between a positive and negative slope?

Positive = increases to right | Negative = decreases to right

18. Explain the significance of a straight line on a graph?

Direct relationship between variables

19. How do you calculate error in the lab?

Accepted - Experimental

20. Why is percent error more important than error when determining your success in an experiment?

Error only tells you the amount you are off, percent error relates the error to the accepted value.

21. Which is warmer, 357 K or 79 °F?

84°C vs. 26.3 °C

22. What is the significance of a negative and positive exponent for a number written in scientific notation?

Positive Exponent: measurement greater than 10

Negative Exponent: measurement less than 1

E. Solve the following problems. Show work and put answers in correct scientific form.

1. The density of mercury metal is 13.6 g/cm^3. What is the mass of 3.16 cm^3 of mercury metal?

$$m = D \cdot V = 13.6 \frac{g}{cm^3} \times 3.16\ cm^3 = 4.3 \times 10^1\ g$$

2. The density of neon gas is 0.901 g/cm^3. If a sample of neon has a mass of 45.6 g, what is its volume?

$$V = \frac{m}{D} = \frac{45.6\ g}{.901\ g/cm^3} = 5.06 \times 10^1\ cm^3$$

3. Convert a density of 8.90 g/cm^3 to its equivalent in kg/dm^3.

$$\frac{8.90\ g}{cm^3} \left| \frac{1\ Kg}{1000\ g} \right| \frac{1000\ cm^3}{1\ dm^3} = 8.90\ Kg/dm^3$$

4. Working in the laboratory, a student finds the density of a piece of pure aluminum to be 2.85 g/cm^3. The accepted value for the density of aluminum is 2.699 g/cm^3. What is the student's percent error?

$$\left| \frac{2.699 - 2.85}{2.699} \right| \times 100 = 5.59\ \%$$

5. A student takes an object with an accepted mass of 200.0 g and masses it on his own balance. He records the mass of the object as 196.5 g. What is his percent error?

$$\left| \frac{196.5 - 200.0}{200.0} \right| \times 100 = 1.75\ \%$$

6. A student is calculating the density of cobalt and obtains an error of 1.30 g/mL. The accepted value for the density of cobalt is 8.90 g/mL, what is the student's percent error?

$$\left| \frac{1.30}{8.90} \right| \times 100 = 14.61\ \%$$

7. Convert 5.0 km into inches

$$5.0\ Km \left| \frac{1000\ m}{1\ Km} \right| \frac{100\ cm}{1\ m} \left| \frac{1\ inch}{2.5\ cm} \right| = 2.0 \times 10^5\ inches$$

8. Convert ng into kilograms

$$6.541 \times 10^{14}\ ng \left| \frac{1\ g}{1000\ 000\ 000\ ng} \right| \frac{1\ Kg}{1000\ g} = 6.541 \times 10^2\ Kg$$

9. Convert mL into dL

$$4.07 \times 10^7\ mL \left| \frac{1\ L}{1000\ mL} \right| \frac{10\ dL}{1\ L} = 4.07 \times 10^5\ dL$$

10. Convert 3.06 x 10^5 mm/min. into hm/day

$$\frac{3.06 \times 10^5\ mm}{min} \left| \frac{1\ m}{1000\ mm} \right| \frac{1\ hm}{100\ m} \left| \frac{60\ min}{1\ hr} \right| \frac{24\ hr}{1\ day} = 4.41 \times 10^3\ hm/day$$

11. Convert 3.7×10^{-3} kg/cL into mg/mL

$$\frac{3.7 \times 10^{-3}\ \text{Kg}}{\text{cL}} \left| \frac{1000\ \text{g}}{1\ \text{Kg}} \right| \frac{1000\ \text{mg}}{1\ \text{g}} \left| \frac{100\ \text{cL}}{1\ \text{L}} \right| \frac{1\ \text{L}}{1000\ \text{mL}} = 3.7 \times 10^{2}\ \text{mg/mL}$$

12. 1.59×10^{7} mm/sec into miles/h

$$\frac{1.59 \times 10^{7}\ \text{mm}}{\text{sec}} \left| \frac{1\ \text{m}}{1000\ \text{mm}} \right| \frac{1\ \text{Km}}{1000\ \text{m}} \left| \frac{1\ \text{mile}}{1.6\ \text{Km}} \right| \frac{60\ \text{sec}}{1\ \text{min}} \left| \frac{60\ \text{min}}{1\ \text{hr}} \right. = 3.58 \times 10^{4}\ \text{miles/h}$$

13. Traveling at 65 miles/hour, how many minutes will it take to drive 125 miles?

$$\frac{125\ \text{miles}}{65\ \text{miles}} \left| \frac{1\ \text{hr}}{1\ \text{hr}} \right| \frac{60\ \text{min}}{1\ \text{hr}} = 1.15 \times 10^{2}\ \text{minutes}$$

14. A car travels a distance of 456.7-km in 2.3 hours. Calculate its speed in meters per second.

$$\frac{456.7\ \text{Km}}{2.3\ \text{hrs}} \left| \frac{1000\ \text{m}}{1\ \text{Km}} \right| \frac{1\ \text{hr}}{60\ \text{min}} \left| \frac{1\ \text{min}}{60\ \text{sec}} \right. = 5.516 \times 10^{1}\ \text{m/s}$$

15. Traveling at 65 miles/hour, how many feet can you travel in 22 minutes? (1 mile = 5280 feet)

$$\frac{22\ \text{min}}{60\ \text{min}} \left| \frac{1\ \text{hr}}{1\ \text{hr}} \right| \frac{65\ \text{miles}}{1\ \text{mile}} \left| \frac{5280\ \text{Ft.}}{1\ \text{mile}} \right. = 1.3 \times 10^{5}\ \text{Feet}$$

F. Add, Subtract, Multiply or Divide the following numbers in scientific notation. Round Properly!!

$(8.6 \times 10^{4}) \div (2.15 \times 10^{2}) =$ 4.0×10^{2}

$(6.400 \times 10^{4}) \div (3.2 \times 10^{2}) =$ 2.0×10^{2}

$(5.02 \times 10^{-3}) \times (6 \times 10^{-2}) =$ 3×10^{-4}

$(4.42 \times 10^{-3}) \times (4 \times 10^{-2}) =$ 2×10^{-4}

$(5.45 \times 10^{3}) + (4.185 \times 10^{3}) =$ 9.64×10^{3}

$(3.950 \times 10^{5}) + (7.9 \times 10^{5}) =$ 1.2×10^{6}

$(5.830 \times 10^{-3}) - (2.2 \times 10^{-3}) =$ 3.6×10^{-3}

$(7.8 \times 10^{-2}) - (2.20 \times 10^{-2}) =$ 5.6×10^{-2}

$(1.02 \times 10^{-2}) \div (5.1 \times 10^{-2}) =$ 2.0×10^{-1}

$(9.80 \times 10^{-3}) \div (4.6 \times 10^{-2}) =$ 2.1×10^{-1}

$(2.530 \times 10^{4}) \times (6.2 \times 10^{2}) =$ 1.6×10^{7}

$(4.53 \times 10^{4}) \times (3.20 \times 10^{2}) =$ 1.45×10^{7}

$(7 \times 10^{-4}) + (4.0 \times 10^{-4}) =$ 1×10^{-3}

$(2 \times 10^{-4}) + (8.000 \times 10^{-4}) =$ 1×10^{-3}

$(8.543 \times 10^{8}) - (2.01 \times 10^{8}) =$ 6.53×10^{8}

$(4.54 \times 10^{8}) - (1.01 \times 10^{8}) =$ 3.53×10^{8}

$(4.56 \times 10^{5}) \times (7.5 \times 10^{4}) =$ 3.4×10^{10}

$(6.53 \times 10^{5}) \times (6.5 \times 10^{4}) =$ 4.2×10^{10}

$(9.3043 \times 10^{4}) + (7.33 \times 10^{4}) =$ 1.66×10^{5}

$(3.33 \times 10^{4}) + (3.33 \times 10^{4}) =$ 6.66×10^{4}