Chemistry 11
Unit I & II Test

REVIEW PACKAGE

Key

Learning Goal: To be able to operate in the chemistry lab in a safe manner	***Learning Goal: to be able to measure and calculate in a way that is consistent with everyone in the scientific community***
Concept 1: Location of Equipment	Concept 1: Chemical Nomenclature
Concept 2: Fire Safety	Concept 2: Determining the Number of Significant Figures
Concept 3: Chemical Safety	Concept 3: Calculations with Significant Figures – Single Operations
Concept 4: Emergency Priorities	Concept 4: Calculations with Significant Figures – Multiple Operations
Concept 5: Laboratory Equipment	Concept 5: Measuring with Chemistry Equipment
Concept 6: Writing a Formal Lab Report	Concept 6: Modeling the Scientific Method
Concept 7: Classifying Matter	Concept 7: Unit Conversions
	Concept 8: Unit Conversions using Derived Quantities

1) Give a qualitative and quantitative description of the following:

*several correct answers!

	Qualitative	**Quantitative (estimate)**
A can of Coke	the can is red	the can contains 355mL
A ruler	the yellow ruler	the 30cm ruler

2) *Plutonium is a radioactive chemical element with an atomic mass of 244 g/mol. It is found to have a silver appearance and will expand to 70.0% its volume when exposed to moist air and can ignite spontaneously. The density of plutonium was experimentally found to be 20 times greater than water.*

Fill out the table below by giving two observations and two pieces of data.

	Observation	**Data**
Plutonium		

3) A beaker full of water is at room temperature. If you leave it alone, without adding any heat, it takes relatively a long time for water to evaporate. Describe the physical properties of water at room temperature by circling your answers below.

Hardness:	high / low / NA
Viscosity:	high / low / NA
Malleability:	high / low / NA
Luster:	high / low / NA
Melting Point:	0°C / 100°C / NA
Freezing Temperature:	0°C / 100°C / NA

→ not is solid state!

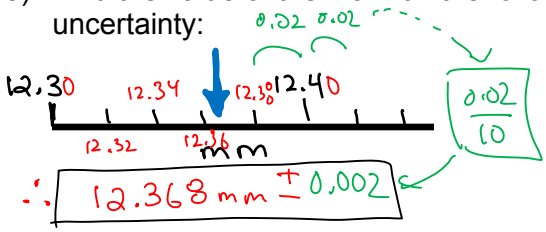
→ either answer accepted!

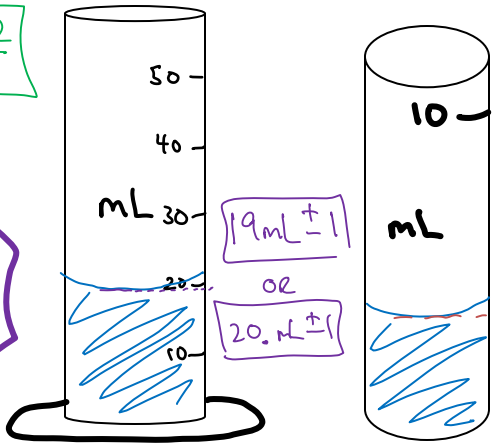
4) How many significant figures in the following?

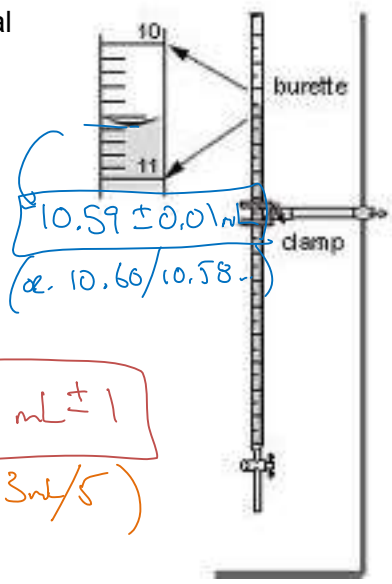
a) 2.00032 mm = 6 **b)** 1000 m = 1 **c)** 50000.0 ns = 6

d) 0.0000030000 MW = 5 **e)** 3.000×10^{-4} pL = 4 **f)** 0.06 L = 1

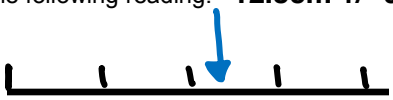
5) Find the value of the mark on the following apparatus and include experimental uncertainty:







*5) Complete the sketch of the apparatus below By writing in the correct #'s to the scale given the following reading: **12.3cm +/- 0.1**



6) Calculate the following to the correct number of significant figures :

a) 37.89 x 24 = 909.36
(4) (2) ∴ (2)
9.0×10^2

b) 45.9 / 35.22 – 10 =
(3) (4)
1.30 − 10 ⇒ 1.30 − 10 = −8.7 ⇒ ∴ −10

c) 1000 / 23.4 x 4.57 x 10^{-4} =
(1) (3) (3) "perfect" (infinite)
= 0.0195 = 0.02

d) 478 x 10.9 – 33.90 + 23.000 / 3.4 =
(3) (3) (5) (2)
∴ (3) 5210. (2) 6.765
∴ 5210 − 33.90 + 6.8 =
⇒ 5210 − 33.90 = 5176.1
∴ 5180 + 6.8 = 5186.8
∴ 5190 OR 5.19×10^3

7) If 1 mol of cyclobutane produces 1.34 x 10^3 J of heat when burned, how many mols of octane must be burned to produce 23000 J of heat?

K: 23000 J
U: ? mol
C.F.: $\frac{1\ mol}{1.34 \times 10^3 J}$

$$\underset{(2)}{23000\,J} \times \frac{1\ mol}{\underset{(3)}{1.34 \times 10^3\,J}} = \underset{(2)}{17.164\ mol} \Rightarrow 17\ mol$$

8) If 1 L of blood has a mass of 1.2 kg;
a. What is the mass of 8.34 L of blood?

$$8.34\,L \times \frac{1.2\ kg}{1\ L} = 10.008\ kg = 10.\ kg \text{ or } 1.0 \times 10^2\ kg$$

b. How much blood would a vampire need to drink, if he wants to gain 459 g by tomorrow?

$$459\,g \times \frac{\cancel{kg}}{(10^3)\,g} \times \frac{1\,L}{1.2\,kg} = 0.3825\,L$$

0.38L

Calculate the equivalence between the following metric units: **Note:** (pico = 10^{-12}); (nano = 10^{-9}); (deci = 10^{-1})

1.24 x 10^9 nJ = ? kJ	3333 dg / mL = ? kg / ML
$1.24\times10^{9}\,nJ \times \frac{(10^{-9})\,J}{nJ} \times \frac{kJ}{(10^3)\,J}$ $= 1.24\times10^{-3}\,kJ$	$3333\,\frac{dg}{mL} \times \frac{(10^{-1})\,g}{dg} \times \frac{kg}{(10^3)\,g} \times \frac{mL}{(10^{-3})\,L} \times \frac{(10^6)\,L}{ML} =$ $= 3.333\times10^{8}\,\frac{kg}{ML}$

9) If it takes 1012 J of energy to melt 1.00 g of iron, then;

c. What mass of iron can be melted by 102 dJ of heat?

$$102\,dJ \times \frac{(10^{-1})\,J}{\cancel{dJ}} \times \frac{1.00\,g}{1012\,J} = 0.01008\,g$$

$= 0.0101\,g$

d. How many kilojoules of heat are required to melt 79.4 g of iron?

$$79.4\,g \times \frac{1012\,J}{1.00\,g} \times \frac{kJ}{(10^3)\,J} = 80.352\,kJ$$

80.4 kJ

10) A special star has a volume of 8.34×10^{41} L, an average density of 2.03 g/mL and made purely of deuterium (an isotope of hydrogen). If this star burns an average of 8.9×10^{10} kg per second, how many years will it take for the star to burn up (i.e. use up all the deuterium)?

$$8.34\times10^{41}\,L \times \frac{mL}{(10^{-3})\,L} \times \frac{2.03\,g}{\infty mL} \times \frac{kg}{(10^{3})\,g} \times \frac{\infty sec}{8.9\times10^{10}\,kg} \times \cdots$$

$$\cdots \times \frac{1\,min}{60\,sec} \times \frac{1\,hr}{60\,min} \times \frac{1\,d}{24\,hr} \times \frac{1\,year}{365\,d} = 6.03\times10^{23}\,yr$$

$6.0\times10^{23}\,yr$

11) Complete the following table:

CHEMICAL NAME	CHEMICAL FORMULA
phosphorus pentoxide	PO_5
diiodine hexabromide	I_2Br_6
cesium hydroxide	$CsOH$
sodium hydrogen carbonate	$NaHCO_3$
silver chloride	AgCl
beryllium acetate	$Be(CH_3COO)_2$
sulphuric acid (dihydrogen monosulphate)	H_2SO_4
silicon tetrabromide	$SiBr_4$

tin(IV) nitrate	$Sn(NO_3)_4$
chromium(III) chromate	$Cr_2(CrO_4)_3$
xenon disulphide	XeS_2
tricarbon tetraoxide	C_3O_4