General Chemistry Summer Homework for 2018-2019

Welcome, chemists! My name is Ms. Klug and I will be your chemistry teacher next year! I am excited to meet you and begin a year full of challenge, thinking and working hard, and becoming better people together.

You will need to confidently use math in chemistry – scientific notation, exponent familiarity and algebraic manipulations will come alive for you in chemistry and help you understand the concepts we learn. I always tell my students that I did not find science or math interesting until I took chemistry and saw that math can be used to explain "real life" phenomena and that there is a purpose to all those math classes I was required to take! I will expect a working knowledge of parts 1 and 2 when we begin chemistry together in the fall. **Part 3 we will have a quiz on at the beginning of the year! Also, things I expect you to be comfortable with from your previous classes**: designing an experiment, analyzing data (and graphing data properly!), use and understanding of the property of density (and the equation), and, of course CREATIVE, INDEPENDENT THINKING!

Part 1: Math with powers of 10

You should have covered these topics in your math classes in the last few years. If you have trouble with these problems, see the links I have provided for a refresher.

1) Scientific notation:
*Review the concepts here: http://www.chem.tamu.edu/class/fyp/mathrev/mr-scnot.html
and here: http://www.purplemath.com/modules/exponent3.htm

*Try these problems:
   Convert the following numbers in the problems <u>to</u> scientific notation:
      a) There are 97,000 km in blood vessels in the human body

      b) The mass of the sun is approximately 1,989,000,000,000,000,000,000,000,000,000,000 grams

      c) The cosmos contains approximately 50,000,000,000 galaxies

      d) A plant cell is approximately 0.00001276 meters wide

      e) A computer processes a certain command in 15 nanoseconds. (A nanosecond is one billionth of a second.) In decimal form, this number is 0. 000 000 015.

Convert the following numbers <u>from</u> scientific notation to decimal (standard) <u>notation</u>:

f) The age of earth is approximately 4.5 x 10^9 years

g) The diameter of a strand of human hair is 7.5 x 10^{-5} m

h) A proton's mass is 1.673 x 10^{-24} g

2) Exponent (powers of 10) manipulations:
*Review here: http://www.chem.tamu.edu/class/fyp/mathrev/mr-expnt.html

*Try these problems:

a) 10^{-5} x 10^7 =

b) $10^{11} / 10^{-2}$ =

c) $\dfrac{(9.1 \times 10^{-7})}{(2.2 \times 10^3)}$ =

**NOTE: you <u>must</u> have a scientific calculator for chemistry and I highly recommend one that has the "E" button (which means "x 10 to the power of"). You MUST know how to use exponents with your calculator – you should have learned this in your math classes.

3) Fraction manipulations: A review of fifth grade math!
*Review here if needed: http://www.mathsisfun.com/mixed-fractions.html

Simplify the following mixed fractions to proper fractions:

a) $4\dfrac{3}{4}$ b) $7\dfrac{1}{2}$

c) $5\dfrac{5}{6}$ d) $9\dfrac{2}{3}$

Convert the following decimal numbers into proper fractions (don't round them, there are fractions for each one):

e) 2.33   f) 3.75

g) 6.5   h) 4.17

i) 5.25   k) 1.66

Part 2: Confidence with algebra!

Again, this should be nothing new, but the ability to rearrange equations using basic algebra is essential to your success in chemistry. Practice, practice, practice!

4) Algebraic manipulations: *Review here (don't worry about example 5):
http://www.chem.tamu.edu/class/fyp/mathrev/mr-algeb.html

*Try these problems:

Consider the equation: $\dfrac{A}{B} = C$

    a)   Rearrange the equation to solve for B

    b) If B = 9.1 and C = 1.2, solve for A

Consider the equation: **XY = AB**

    c) Rearrange the equation to solve for B

    Challenge: **Consider the equation:** $\dfrac{JK^2}{L} = \dfrac{M}{N}$

    d) Rearrange the equation to solve for K

Part 3: Time to Prepare for Periodic Table Work!

Element Names and Symbols to KNOW and LOVE
all year next year!

You also must know the _approximate_ location of these elements on the Periodic Table for a quiz when we return from summer!

Start quizzing yourself EARLY and OFTEN throughout the summer - make flash cards or make yourself a quizlet, etc.

Table 4.3 The Names and Symbols of the Most Common Elements

Element	Symbol	Element	Symbol
aluminum	Al	lithium	Li
antimony (stibium)*	Sb	magnesium	Mg
argon	Ar	manganese	Mn
arsenic	As	mercury (hydrargyrum)	Hg
barium	Ba	neon	Ne
bismuth	Bi	nickel	Ni
boron	B	nitrogen	N
bromine	Br	oxygen	O
cadmium	Cd	phosphorus	P
calcium	Ca	platinum	Pt
carbon	C	potassium (kalium)	K
chlorine	Cl	radium	Ra
chromium	Cr	silicon	Si
cobalt	Co	silver (argentium)	Ag
copper (cuprum)	Cu	sodium (natrium)	Na
fluorine	F	strontium	Sr
gold (aurum)	Au	sulfur	S
helium	He	tin (stannum)	Sn
hydrogen	H	titanium	Ti
iodine	I	tungsten (wolfram)	W
iron (ferrum)	Fe	uranium	U
lead (plumbum)	Pb	zinc	Zn

*Where appropriate, the original name is shown in parentheses so that you can see where some of the symbols came from.

hydrogen 1 H 1.0079																	helium 2 He 4.0026
lithium 3 Li 6.941	beryllium 4 Be 9.0122											boron 5 B 10.811	carbon 6 C 12.011	nitrogen 7 N 14.007	oxygen 8 O 15.999	fluorine 9 F 18.998	neon 10 Ne 20.180
sodium 11 Na 22.990	magnesium 12 Mg 24.305											aluminium 13 Al 26.982	silicon 14 Si 28.086	phosphorus 15 P 30.974	sulfur 16 S 32.065	chlorine 17 Cl 35.453	argon 18 Ar 39.948
potassium 19 K 39.098	calcium 20 Ca 40.078	scandium 21 Sc 44.956	titanium 22 Ti 47.867	vanadium 23 V 50.942	chromium 24 Cr 51.996	manganese 25 Mn 54.938	iron 26 Fe 55.845	cobalt 27 Co 58.933	nickel 28 Ni 58.693	copper 29 Cu 63.546	zinc 30 Zn 65.39	gallium 31 Ga 69.723	germanium 32 Ge 72.61	arsenic 33 As 74.922	selenium 34 Se 78.96	bromine 35 Br 79.904	krypton 36 Kr 83.80
rubidium 37 Rb 85.468	strontium 38 Sr 87.62	yttrium 39 Y 88.906	zirconium 40 Zr 91.224	niobium 41 Nb 92.906	molybdenum 42 Mo 95.94	technetium 43 Tc [98]	ruthenium 44 Ru 101.07	rhodium 45 Rh 102.91	palladium 46 Pd 106.42	silver 47 Ag 107.87	cadmium 48 Cd 112.41	indium 49 In 114.82	tin 50 Sn 118.71	antimony 51 Sb 121.76	tellurium 52 Te 127.60	iodine 53 I 126.90	xenon 54 Xe 131.29
caesium 55 Cs 132.91	barium 56 Ba 137.33	57-70 *	lutetium 71 Lu 174.97	hafnium 72 Hf 178.49	tantalum 73 Ta 180.95	tungsten 74 W 183.84	rhenium 75 Re 186.21	osmium 76 Os 190.23	iridium 77 Ir 192.22	platinum 78 Pt 195.08	gold 79 Au 196.97	mercury 80 Hg 200.59	thallium 81 Tl 204.38	lead 82 Pb 207.2	bismuth 83 Bi 208.98	polonium 84 Po [209]	astatine 85 At [210]	radon 86 Rn [222]
francium 87 Fr [223]	radium 88 Ra [226]	89-102 **	lawrencium 103 Lr [262]	rutherfordium 104 Rf [261]	dubnium 105 Db [262]	seaborgium 106 Sg [266]	bohrium 107 Bh [264]	hassium 108 Hs [269]	meitnerium 109 Mt [268]	ununnilium 110 Uun [271]	unununium 111 Uuu [272]	ununbium 112 Uub [277]		ununquedium 114 Uuq [299]			

*Lanthanide series	lanthanum 57 La 138.91	cerium 58 Ce 140.12	praseodymium 59 Pr 140.91	neodymium 60 Nd 144.24	promethium 61 Pm [145]	samarium 62 Sm 150.36	europium 63 Eu 151.96	gadolinium 64 Gd 157.25	terbium 65 Tb 158.93	dysprosium 66 Dy 162.50	holmium 67 Ho 164.93	erbium 68 Er 167.26	thulium 69 Tm 168.93	ytterbium 70 Yb 173.04
**Actinide series	actinium 89 Ac [227]	thorium 90 Th 232.04	protactinium 91 Pa 231.04	uranium 92 U 238.03	neptunium 93 Np [237]	plutonium 94 Pu [244]	americium 95 Am [243]	curium 96 Cm [247]	berkelium 97 Bk [247]	californium 98 Cf [251]	einsteinium 99 Es [252]	fermium 100 Fm [257]	mendelevium 101 Md [258]	nobelium 102 No [259]