## Chem 120 Quiz 2 - Sept. 5, 2008

Complete the following problems. You must show your work for mathematical problems to receive full credit. Show your answers to the correct number of significant figures with the correct units.

- 1. Complete the following conversions. (8 pts.)
  - a.  $1.46 \times 10^{-8} \text{ kg} = ?? \mu\text{g}$

$$1.46 \times 10^{-8} \text{ kg} \times 10^{-8} \text{ kg} \times 10^{-8} \text{ g} \times 10^{-8} \text{ g} = 14.6 \text{ } \mu\text{g}$$

b.  $1.28 \times 10^4 \text{ mm}^3 = ?? \text{ cm}^3$ 

1.28 x 10<sup>4</sup> mm<sup>3</sup> x 
$$\frac{(10^{-3} \text{ m})^3}{(1 \text{ mm})^3}$$
 x  $\frac{(1 \text{ cm})^3}{(10^{-2} \text{ m})^3}$  = 12.8 cm<sup>3</sup>

2. A degreasing solution consisting of 8.50% acetone and 91.5% water by mass has a density of 0.9867 g/mL. An industrial cleaning application requires 2.54 kg of acetone, how many liters of solution must be used to deliver this mass of acetone? (9 pts.)

2.54 kg acetone 
$$=$$
 x  $=$  100 kg solution  $=$  x  $=$  103 g solution  $=$  29882 g solution needed 1 kg solution

29882 g solution 
$$=$$
  $\frac{1 \text{ mL solution}}{0.9867 \text{ g solution}} = \frac{1 \text{ mL}}{10^3 \text{ mL}} = \frac{30.2 \text{ g}}{10^3 \text{ mL}} = \frac{30.2 \text{ mL}}{10^3 \text{ mL}} = \frac$ 

3. We often calculate the standard deviation of a dataset as a means of examining the precision of a dataset with a goal of evaluating the "quality" of the results. What does the standard deviation tell us about our data? Why do we often use a confidence limit instead? (Be concise, a few of sentences is sufficient. You don't need to list equations) (8 pts.)

The standard deviation is a measure of the scatter of our data around some average. Ideally, we collect a large number of data points to best determine the standard deviation. In practice, however, we often collect only a small data set. To compensate for this, we use the confidence limit which has a built in scaling factor to account for our small number of data points.

## **Possibly Useful Information**

$e_4 = \sqrt{e_1^2 + e_2^2 + e_3^2}$	$\frac{e_4}{v_4} = \sqrt{\left(\frac{e_1}{v_1}\right)^2 + \left(\frac{e_2}{v_2}\right)^2 + \left(\frac{e_3}{v_3}\right)^2}$
$\mu = \overline{x} + \frac{ts}{\sqrt{n}}$	$\overline{x} = \frac{\sum x_i}{n}$
Too much of anything will kill you!	$s = \sqrt{\frac{\sum (x_i - \overline{x})^2}{n - 1}}$
D = m/v	Don't talk to strangers!

## PERIODIC CHART OF THE ELEMENTS

IA	IIA	IIIB	IVB	VΒ	VIΒ	VIIB		VIII		IB	IIB	IIIA	IVA	٧A	VΙΑ	VIIA :	GASES
1.003	97															1 H 1.00797	He 4.0026
.3		]										5	6	7.	8	9	10
6.93	i   <b>Be</b>											<b>B</b>	C 12.0112	N 14.0067	15.9994	<b>⊢</b> 18.9984	Ne 20.183
_ 11	I	1										13	14	15	16	17	18
N 22.98	a Mg											AI 26.9815	Si 28.086	<b>P</b> 30.9738	S 32.064	CI 35.453	<b>Ar</b>
19		_21	22	23	24	25	_26	27	28	29	30	31	32	33	34	35	36
∣K	. ∣Ca	Sc	Ti	V	Cr	Mn	Fe	Со	Ni	Cu	Zn	Ga	Ge	As	Se	∣Br∣	Kr
39.1	02 40.08	44.956	<b>Ti</b> 47.90	<b>V</b> 50.942		54.9380	55.847	58.9332	58.71	63.54	65.37	69.72	72.59	74.9216	78.96	79.909	83.80
39.1 <b>3</b> 7	02 40.08 38		Ti 47.90 <b>40</b>	41	42	54.9380 <b>43</b>	55.847 <b>44</b>		58.71 <b>46</b>	63.54 47	65.37 <b>48</b>	69.72 <b>49</b>	72.59 <b>50</b>	74.9216 <b>51</b>			83.80 <b>54</b>
39.1 <b>37</b> <b>R</b>	02 40.08 38 5 Sr	44.956	Zr	Nb		54.9380	55.847 <b>44</b> <b>Ru</b>	58.9332 <b>45</b> <b>Rh</b>	58.71	47 <b>Ag</b>	65.37	69.72	72.59	74.9216	<sup>78.96</sup> <b>Te</b>	79.909 <b>53</b>	83.80
39.1 37 <b>R</b> I 85.4	02 40.08 38 Sr 87.62	44.956 <b>39</b> <b>Y</b> 88.905	<b>Zr</b>	41 <b>Nb</b> 92.906	42 <b>Mo</b> 95.94	54.9380 <b>43</b> <b>TC</b> (99)	55.847 <b>44</b> <b>Ru</b> 101.07	58.9332 <b>45</b> <b>Rh</b> 102.905	58.71 <b>46</b> <b>Pd</b> 106.4	63.54 <b>47</b> <b>Ag</b> 107.870	65.37 <b>48</b> <b>Cd</b> 112.40	69.72 49 In 114.82	72.59 <b>50</b> <b>Sn</b> 118.69	74.9216 51 Sb 121.75	78.96 <b>52</b> <b>Te</b> 127.60	79.909 <b>53</b> <b>1</b> 126.904	54 <b>Xe</b> 131.30
39.1 37 <b>R</b> I 85.4 55	02 40.08 38 Sr 87.62 56	39 Y	40 Zr 91.22 72	Nb	42 <b>Mo</b> 95.94 74	54.9380 <b>43</b> <b>C</b> (99) <b>75</b>	55.847 44 Ru 101.07 76	58.9332 <b>45</b> <b>Rh</b> 102.905 <b>77</b>	98.71 46 Pd 106.4 78	47 <b>Ag</b>	65.37 48 Cd 112.40 80	69.72 <b>49</b> <b>In</b>	72.59 <b>50</b> <b>Sn</b> 118.69 <b>82</b>	74.9216 51 Sb 121.75 83	78.96 52 <b>Te</b> 127.60 <b>84</b>	79.909 <b>53</b>	54 Xe 131.30 86
39.1 RI 85.4 55 C:	02 40.08 9 38 0 Sr 17 87.62 5 56 5 Ba	39 <b>Y</b> 88.905	2r 91.22 72 Hf	Nb 92,906 73 Ta	42 <b>Mo</b> 95,94 74 <b>W</b>	54.9380 <b>43</b> <b>TC</b> (99)	55.847 <b>44</b> <b>Ru</b> 101.07	58.9332 <b>45</b> <b>Rh</b> 102.905	78 Pt	63.54 47 Ag 107.870 79 Au	65.37 48 Cd 112.40 80 Hg	69.72 49 In 114.82 81 TI	50 Sn 118.69 82 Pb	74.9216 51 Sb 121.75 83 Bi	78.96 52 <b>Te</b> 127.60 <b>84</b> <b>Po</b>	79.909 <b>53</b> <b>1</b> 126.904	54 <b>Xe</b> 131.30
39.1 37 RI 85.4 55 C:	02 40.08 38 5 Sr 87.62 5 56 5 Ba 105 137.34	39 Y 88.905 *57 La 138.91	72 Hf 178.49	41 Nb 92.906 73 Ta 180.948	42 Mo 95.94 74 W 183.85	75 Re	55.847 44 Ru 101.07 76 Os 190.2	58.9332 <b>45</b> <b>Rh</b> 102.905 77 <b>Ir</b> 192.2	78 Pt 195.09	63.54 47 Ag 107.870 <b>79</b> Au 196.967	65,37 48 Cd 112,40 80 Hg 200,59	69.72 49 In 114.82	50 Sn 118.69 82 Pb	74.9216 51 Sb 121.75 83	78.96 52 <b>Te</b> 127.60 <b>84</b> <b>Po</b>	79.909 <b>53</b> 126.904 <b>85</b>	54 Xe 131.30 86
39.1 37 RI 85.4 55 C: 132.9	02 40.08 38 5 Sr 17 87.62 5 56 8 Ba 105 137.34 88	39 Y 88.905 *57 La	40 Zr 91.22 72 Hf 178.49	41 Nb 92,906 73 Ta 180,948 105	42 Mo 95.94 74 W 183.85 106	43 Tc (99) 75 Re 186.2 107	55.847 44 Ru 101.07 76 Os	58.9332 45 Rh 102.905 77 Ir 192.2 109	78 Pt 195.09	63.54 47 Ag 107.870 79 Au 196.967	65,37 48 Cd 112,40 80 Hg 200,59 112	69.72 49 In 114.82 81 TI	50 Sn 118.69 82 Pb	74.9216 51 Sb 121.75 83 Bi	78.96 52 <b>Te</b> 127.60 <b>84</b> <b>Po</b>	79.909 53 1 126.904 85 At	54 Xe 131.30 86 Rn
39.1 37 RI 85.4 55 C:	02 40.08 38 0 Sr 17 87.62 5 56 8 Ba 105 137.34	39 Y 88.905 *57 La 138.91	72 Hf 178.49	41 Nb 92.906 73 Ta 180.948	42 Mo 95.94 74 W 183.85	75 Re	55.847 44 Ru 101.07 76 Os 190.2	58.9332 <b>45</b> <b>Rh</b> 102.905 77 <b>Ir</b> 192.2	78 Pt 195.09	63.54 47 Ag 107.870 <b>79</b> Au 196.967	65,37 48 Cd 112,40 80 Hg 200,59	69.72 49 In 114.82 81 TI	50 Sn 118.69 82 Pb	74.9216 51 Sb 121.75 83 Bi	78.96 52 <b>Te</b> 127.60 <b>84</b> <b>Po</b>	79.909 53 1 126.904 85 At	54 Xe 131.30 86 Rn

Numbers in parenthesis are mass numbers of most stable or most common isotope.

\*\* Lantha nide Series\*\*

\$ 59 60

Atomic weights corrected to conform to the 1963 values of the Commission on Atomic Weights.

The group designations used here are the former Chemical Abstract Service numbers.

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce	Pr	Nd	Pm	Sm	Fu	Gd	Tb	Dν	Ho	Fr	Tml	Yb	Lu
140.12	140.907	144.24	(147)	150.35	151.96	157.25	158.924	162.50	164.930	167.26	168.934	173.04	174.97

INERT

‡Actinide Series

90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th	Pa	U	Np	Pu	Αm	Cm	Bk	Cf	Es	Fm	Md	No	l r
232.038		238.03				(247)				(253)		(256)	(257)