

Wrong/no units, -2

Wrong sig figs, -2

Last digit of answers can be  $\pm 1$  off from key.

Initials: \_\_\_\_\_

Chemistry 105 A

Exam 1

01/14/13

Dr. Thomas Bertolini

First Letter of  
Last Name

PLEASE PRINT YOUR NAME IN BLOCK LETTERS

Name: Last: \_\_\_\_\_ First: \_\_\_\_\_

Circle Lab TA: Alvin Atanu Dewi Nikita Phuong Subhasish Tharindu Yu Hsuan

Circle Lab time: W1 W4 Th9:30 Th11 Th12:30 Th2 Th3:30

Instructions (points will be deducted if not followed):

- a. You must show work to receive credit. If more space is needed, write on the back of the previous page. Do not write work on the periodic table page since work written on the periodic table page (p7) will not be graded.
- b. There are 10 problems on pages 2-6. Please count them before you begin. A periodic table and some useful equations can be found on p. 7.
- c. You MUST use black or blue ink. (No pencil, no red ink.)
- d. Your exam will be scanned. Do not tear off the periodic table page.
- e. Complete Items 1-6 on this cover page. Write your initials on each page. Write both initials and full name on last page.
- f. Only the Casio fx-260 calculator may be used on Chem 105a/b exams.
- g. Turn off cell phones and other electronic communication devices and put them away, out of sight. They may not be taken out of your bag during the exam.
- h. When time is called, stop working on your exam immediately, turn the exam over and pass it to the aisle.

5. Please Sign Below:

I certify that I have observed all the rules of Academic Integrity while taking this examination.

\_\_\_\_\_  
Signature

6. Last 4 Digits of USC ID:

\_\_\_\_ \_

Question	Points	Score	Grader
1	10		
2	6		
3	6		
4	10		
5	10		
6	10		
7	10		
8	10		
9	14		
10	14		
	Initials, etc.		
<b>Total</b>	<b>100</b>		

KEY

Wrong/no units, -2

Wrong sig figs, -2

Last digit of answers can be  $\pm 1$  off from key.

Initials: \_\_\_\_\_

1. (10 pt) Write the missing formulas or names for the following compounds. **2 points each**

a) mercury(I) nitrate \_\_\_\_\_  $\text{Hg}_2(\text{NO}_3)_2$

b) beryllium nitride \_\_\_\_\_  $\text{Be}_3\text{N}_2$

c) scandium nitrite \_\_\_\_\_  $\text{Sc}(\text{NO}_2)_3$

d) \_\_\_\_\_ selenium hexafluoride  $\text{SeF}_6$

e) \_\_\_\_\_ dichromic acid or hydrogen dichromate  $\text{H}_2\text{Cr}_2\text{O}_7$

a – c +1 metal, +1 anion

d +1 selenium +1 hexafluoride

e all-or-nothing

2. (6 pt) You have two samples of an unknown liquid: an 6.1 mL sample and a 4.22 mL sample. You pour them both into a vial weighing 10.953 g. If the total mass of the vial and liquid samples is 19.705 g, what is the density of the liquid?

$$(19.705 - 10.953 \text{ g}) / (4.22 + 6.1 \text{ mL}) = 8.752 / 10.32 = 0.848 \text{ g/mL}$$

0.848 g/mL or g/cm<sup>3</sup>, 6

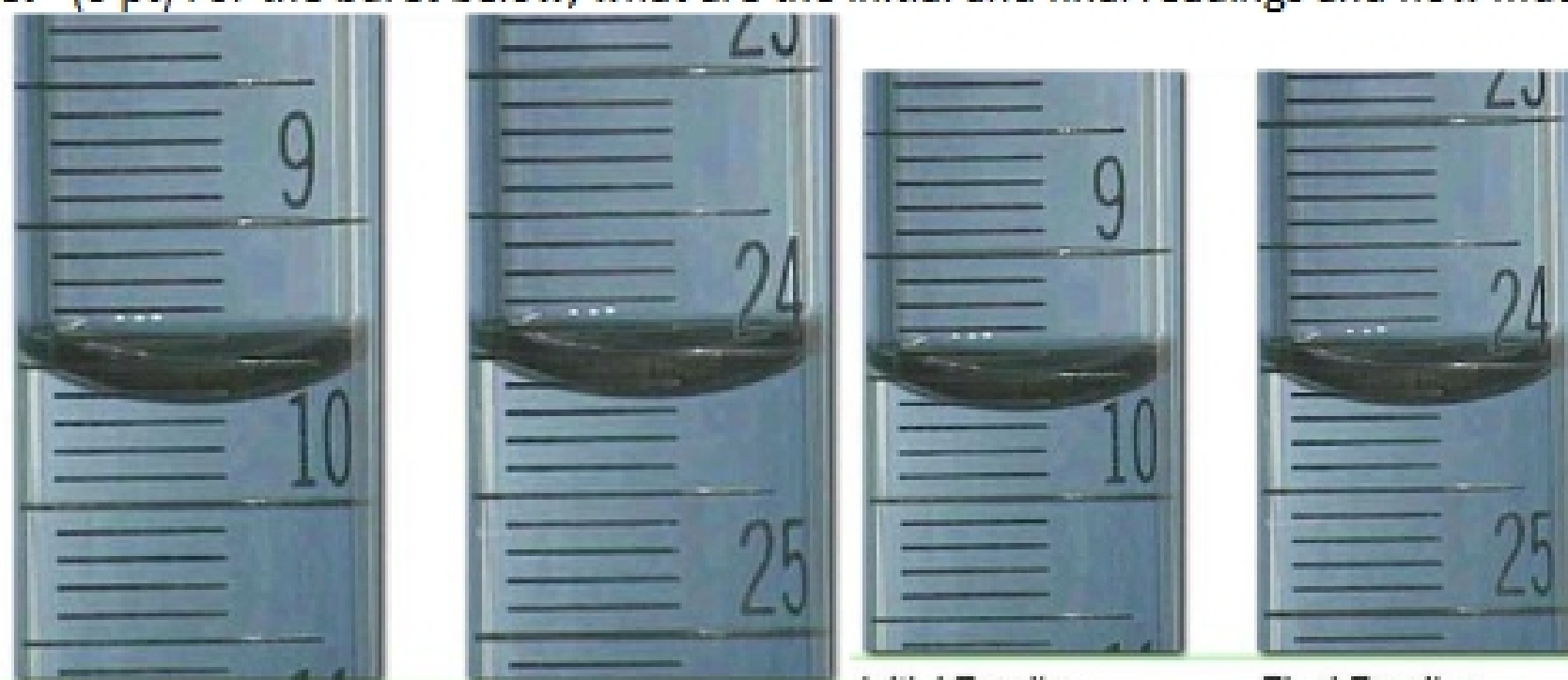
0.85, 0.8481 g/mL or g/cm<sup>3</sup>, 3

wrong value, 0

0.848 [no units], 4

0.85, 0.8481 [no units], 1

3. (6 pt) For the buret below, what are the initial and final readings and how much liquid was transferred?



Initial Reading

Final Reading

Initial Reading  
9.63 mL

Final Reading  
24.16 mL

Initial reading: \_\_\_\_\_ 9.62, 9.63, 9.64 mL 0 pts wrong sf; 1 pt 9.61, 9.65

Final reading: \_\_\_\_\_ 24.14, 24.15, 24.16, 24.17 mL 0 pts wrong sf; 1 pt 24.13, 24.18

Volume of liquid transferred: \_\_\_\_\_ 14.51 – 14.55, 4 sf mL 0 pts wrong sf

Wrong/no units, -2

Wrong sig figs, -2

Last digit of answers can be ±1 off from key.

Initials: \_\_\_\_\_

4. (10 pt) The human body has 50 trillion cells. Each cell has 23 pairs of chromosomes, and each chromosome has 3.75 billion nucleotides. If the height of a single nucleotide in DNA is 3.4 angstroms, what is the length in miles of all of the DNA strands in the human body? 1 angstrom =  $10^{-10}$  m; 1 mile = 1.609 km

$$50 \times 10^{12} \text{ cells (46 chromosomes/cell)} (3.75 \times 10^9 \text{ nucleotides / chromosome}) \\ (3.4 \times 10^{-10} \text{ m / nucleotide}) (1 \text{ km / } 1000 \text{ m}) (1 \text{ mile / } 1.609 \text{ km}) = 2 \times 10^{12} \text{ miles}$$

If answer correct...

...and work shown, **10**

...and no work shown, **0**

If answer incorrect...

... and formatted exactly as above with one math error, **6**

... since student used 23 chromosomes, **6**

... and incorrectly formatted, **0**

5. (10 pt) Write balanced chemical equations for the following reactions at room temperature. Include subscripts to indicate the state of each reactant and product. **5 pts each**

- a. Niobium metal reacts with chlorine to give niobium(V) chloride.



- b. Zinc metal reacts with iodine to give zinc iodide.



Missing/incorrect state, (s) or (g): -1 each instance (∴ students who omit states entirely lose 6 points)

Equation not balanced, -3 per reaction

Wrong chemical formula(s), equation otherwise balanced, -3 per reaction

6. (10 pt) Balance the following reactions. Do not use fraction coefficients.

