

Name: _____

Chemistry 31 – Introductory Chemistry
Exam #1 – Part 2

Directions: There are 4 questions with multiple parts. Each question is worth 6 points. You **must show all your work to receive full credit** (including units and correct significant figures). Please **clearly and neatly** write out your answers, scan and upload the file to Canvas.

Question #1

A. Convert 52.10 μL to ML:

$$\frac{52.10 \mu\text{L}}{1 \mu\text{L}} \cdot \frac{0.000001}{1 \text{ mL}} = 0.000052 \quad \frac{1,000,000}{1 \mu\text{L}} = 50 \text{ ML}$$

B. Convert 87.2 mi/s^2 into km/hr^2 :

$$1 \text{ mile} = 1609.34 \text{ m}$$

$$1 \text{ mi} = 1.60934 \text{ km}$$

$$1100000000 \text{ mi} \cdot \frac{1.60934 \text{ km}}{1 \text{ mi}} = 1.82 \times 10^9$$

$$\frac{87.2 \text{ mi/s}}{1 \text{ sec}^2} \cdot \frac{3600 \text{ sec}}{1 \text{ min}} \cdot \frac{3600 \text{ min}}{1 \text{ hr}} \cdot \frac{1.60934 \text{ km}}{1 \text{ mi}} = \frac{1100000000 \text{ mi}}{1 \text{ hr}^2} \quad 1.82 \times 10^9 \text{ km/hr}^2$$

C. Convert 443.5 K to $^{\circ}\text{F}$:

$$\text{K} - 273.15 \cdot \frac{9}{5} + 32$$

$$443.5 - 273.15 = 170.4 \cdot \frac{9}{5} = 306.72 + 32 = 338.72^{\circ}\text{F}$$

Question #2

Archeologists discover a silver crown in an ancient tomb. When they place the crown in a tub of water it displaces 0.6212 L of water. The density of silver is 10.49 g/cm^3 .

$$\frac{0.6212 \text{ L}}{1 \text{ L}} \cdot \frac{0.001 \text{ cm}^3}{1 \text{ mL}} = 0.0006212 \text{ cm}^3$$

$$10.49 \cdot 0.0006212 = 0.00651 \text{ grams}$$

A. Silver is worth \$720.11 per kg. Without taking into consideration any historical value for the crown, what is the crown worth?

$$\frac{0.00651 \text{ kg}}{1 \text{ kg}} \cdot 720.11 = 4.69 \text{ dollars}$$

Question #3

- A. Write a complete nuclear symbol for a species that has 73 protons, 108 neutrons and 68 electrons:



- B. Is the following set of four quantum numbers valid? $n = 3$, $l = 2$, $m_l = -1$, $m_s = +\frac{1}{2}$

yes

- C. If not valid, explain why. If valid, what orbital designation would be used for this electron?

d orbital because $l = 2$

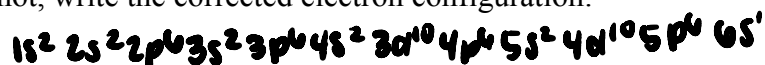
Question #4

A student writes out the ground state electron configuration for Cs as: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 4f^1$

- A. Is the student correct?

no

- B. If not, write the corrected electron configuration:



- C. The student was asked to check their answer against the Periodic Table and still thought they were correct. They knew Cs was in Group 1 and thought their electron configuration had 1 valence electron. In the original electron configuration shown in the question, circle what the student must have thought was the valence electron.

- D. Did their original electron configuration shown in the question have 1 valence electron? Why or why not?

yes it did as the outer layer did only contain one unpaired electron and the rest of the electrons were paired