

General Chemistry 1 (*CHEM 1141*)

Shawnee State University – Fall 2016
September 23, 2016

Exam # 1C

Name _____

Please write your full name, and the exam version (1C) that you have on the scantron sheet !

Please check the box next to your correct section number.

- Section #:** 1. (Monday Lab, 11:00 AM – 1:50 PM) 2. (Wednesday Lab, 11:00 AM – 1:50 PM)
3. (Tuesday Lab, 3:30 PM – 6:20 PM) 4. (Thursday Lab, 3:30 PM – 6:20 PM)
5. (Wednesday Lab, 2:00 PM – 4:50 PM)

Multiple Choice: _____ / 30

Q11: _____ / 10

Q12: _____ / 10

Q13: _____ / 10

Q14: _____ / 10

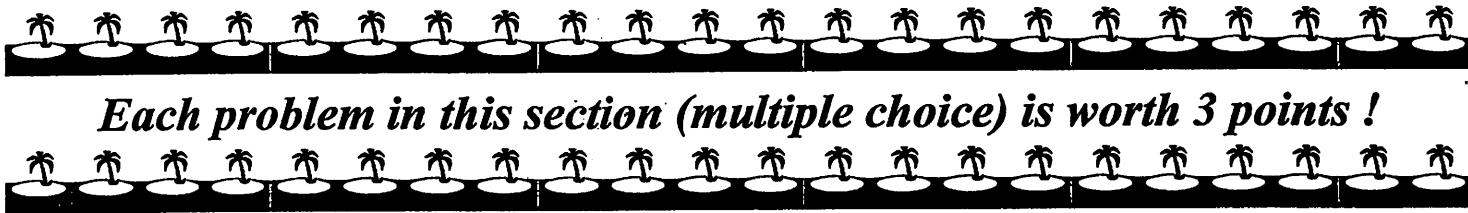
Q15: _____ / 10

Q16: _____ / 10

Q17: _____ / 10

BONUS: _____ / 3

TOTAL: _____ / 100

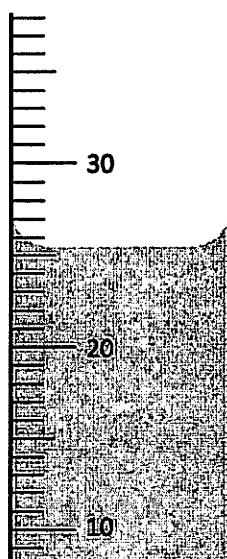


Each problem in this section (multiple choice) is worth 3 points !

- Q2.** Which of the following represents the *smallest* volume of water?

- A) 1.5×10^{-7} kL B) 15 cm³ C) 1.5×10^{-3} L
D) 1.5×10^5 μL E) 1.5×10^9 nL

- Q3.** Read the volume of water contained in the 100 mL graduated cylinder shown below to the correct number of significant figures.



- A) 20.5 mL B) 22.53 mL C) 25.53 mL D) 25.5 mL E) 25 mL

Q4. The density of gold is $19.3 \frac{\text{g}}{\text{cm}^3}$. This is an example of a(n):

- A) chemical property B) physical property C) intensive property
D) extensive property E) both B and C

Q5. A commonly offering isotope of tin is tin-118, while most oxygen occurs in nature as oxygen-16. A formula unit of tin(IV) oxide formed from these isotopes would contain how many neutrons?

- A) 66 B) 84 C) 76 D) 134 E) 150

Q6. How many significant figures are in the measurement $3.300 \times 10^4 \text{ kg}$ contain.

- A) 1 B) 2 C) 3 D) 4 E) 5

Q7. Which of the following symbols represent isotopes of the same element?

- 1) $^{19}_9\text{X}$ 2) $^{19}_{10}\text{X}$ 3) $^{21}_9\text{X}$ 4) $^{21}_{12}\text{X}$

- A) 1 and 2 B) 1 and 3 C) 1 and 4 D) 3 and 4 E) 1, 2, and 3

Q8. The Rutherford gold-foil scattering experiment provided evidence for:

- A) the existence of isotopes B) the electron cloud about the atom
C) the nuclear model of the atom D) the law of multiple proportions
E) the mass to charge ratio of the electron

Q9. The formulas for nitrate, nitrite, and sulfide ions are represented, respectively, as:

- A) NO_4^- , NO_3^- , SO_4^{2-} B) NO_3^- , N^{3-} , S^{2-} C) NO_2^- , NO_3^- , SO_3^{2-}
D) N^{3-} , NO^{2-} , SO_3^{2-} E) NO_3^- , NO_2^- , S^{2-}

Q10. A prospector found a grey colored metal nugget and wants to see if it is valuable. Your suggestion is to determine the density by obtaining the mass and volume of the nugget. The mass of the nugget was obtained by difference as follows:

$$\text{weigh pan + nugget} = 25.915 \text{ g}$$

$$\text{empty weigh pan} = 1.753 \text{ g}$$

Since this nugget is an irregularly shaped object, the volume of the nugget was determined by placing it in a graduated cylinder containing water as follows:

$$\text{graduated cylinder + water + nugget} = 18.45 \text{ mL}$$

$$\text{graduated cylinder + water} = 9.50 \text{ mL}$$

The density (*and identity*) of the nugget is:

A) $2.70 \frac{\text{g}}{\text{mL}}$ (*aluminum*)

B) $7.87 \frac{\text{g}}{\text{mL}}$ (*iron*)

C) $11.4 \frac{\text{g}}{\text{mL}}$ (*lead*)

D) $10.5 \frac{\text{g}}{\text{mL}}$ (*silver*)

E) $7.13 \frac{\text{g}}{\text{mL}}$ (*zinc*)



Each problem in this section (short answer) is worth 10 points !

All work must be show in order to receive credit !

You must use the factor-label (conversion-factor) method for all conversions !

Be sure to include units where applicable !

All numeric answers must be rounded to the correct number of significant figures !



Q11. Provide the correct name for each of the following compounds:

A) Li_2SO_4 _____

B) CuNO_2 _____

C) Br_3O_9 _____

D) $\text{Na}_3\text{PO}_4 \cdot 4 \text{ H}_2\text{O}$ _____

E) CF_4 _____

F) NH_4NO_3 _____

G) H_3PO_4 (*dissolved in water*) _____

Q12. Complete the following table:

| | | |
|--|----------------------------|----|
| Isotope Symbol ($\frac{A}{Z}\text{X}^{\pm}$) | $^{58}_{26}\text{Fe}^{3+}$ | |
| Ion Name | | |
| Atomic Number (Z) | | 17 |
| Mass Number (A) | | |
| Number of Protons | | |
| Number of Electrons | | 20 |
| Number of Neutrons | | 18 |

Q13. A barrel of oil as measured on the oil market is equal to 1.333 U.S. barrels. A U.S. barrel is equal to 31.5 gallons. If oil is on the market at \$ 94.0 per barrel, what is the price in dollars per gallon ?

Q14. Provide the correct chemical formula for each of the following compounds:

A) iron(III) sulfide _____

E) dibromine heptachloride _____

C) sodium phosphide _____

D) magnesium bicarbonate _____

E) potassium chromate _____

Q15. Fill in the blanks:

A) The name of the group IIA elements on the periodic table: _____

B) The name of an element in the fifth period on the periodic table: _____

C) The name of the group VIIIA elements on the periodic table: _____

D) The name of a metalloid on the periodic table: _____

E) The name of a transition metal on the periodic table: _____

Q16. Complete the following calculations and round your answers to the correct number of significant figures:

A) $365.079 - 43.20$ = _____

B) $\frac{7.2849 + 5.030}{89.7 - 2.04}$ = _____

C) $6.307 + 9.0745 + 12.83$ = _____

D) $\frac{8.0015 \text{ km} \times 4.806 \text{ km}}{3.08 \text{ km}}$ = _____

E) 0.0073590×0.08070 = _____

Q17. Mercury has a density of $13.56 \frac{\text{g}}{\text{mL}}$. What volume in milliliters (mL) does 248.0 g of mercury occupy? Convert this volume into cubic inches (in^3) given that 1 in = 2.54 cm.



3 Point Bonus Question



Name all seven elements that form diatomic molecules in their natural state.

Periodic Table

| 1 IA | 2 IIA | | | | | | | | | | | 13 IIIA | 14 IVA | 15 VA | 16 VIA | 17 VIIA | 18 VIIIA |
|-------------------|-------------------|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|-------------------|--------------------|
| 1 H 1.01 | 2 Be 9.01 | | | | | | | | | | | | | | | 2 He 4.00 | |
| 3 Li 6.94 | 4 Be 9.01 | | | | | | | | | | | 5 B 10.81 | 6 C 12.01 | 7 N 14.01 | 8 O 16.00 | 9 F 19.00 | 10 Ne 20.18 |
| 11 Na 22.99 | 12 Mg 24.31 | 3 Mg 24.31 | 4 Be 9.01 | 5 B 10.81 | 6 C 12.01 | 7 N 14.01 | 8 O 16.00 | 9 F 19.00 | 10 Ne 20.18 | 11 Na 22.99 | 12 Mg 24.31 | 13 Al 26.98 | 14 Si 28.09 | 15 P 30.97 | 16 S 32.07 | 17 Cl 35.45 | 18 Ar 39.95 |
| 19 K 39.1 | 20 Ca 40.08 | 21 Sc 44.96 | 22 Ti 47.88 | 23 V 50.94 | 24 Cr 52.00 | 25 Mn 54.94 | 26 Fe 55.85 | 27 Co 58.93 | 28 Ni 58.69 | 29 Cu 63.55 | 30 Zn 65.39 | 31 Ga 69.72 | 32 Ge 72.61 | 33 As 74.92 | 34 Se 78.96 | 35 Br 79.90 | 36 Kr 83.80 |
| 37 Rb 85.47 | 38 Sr 87.62 | 39 Y 88.91 | 40 Zr 91.22 | 41 Nb 92.91 | 42 Mo 95.94 | 43 Tc (98) | 44 Ru 101.07 | 45 Rh 102.91 | 46 Pd 106.42 | 47 Ag 107.87 | 48 Cd 112.41 | 49 In 114.82 | 50 Sn 118.71 | 51 Sb 121.76 | 52 Te 127.6 | 53 I 126.9 | 54 Xe 131.29 |
| 55 Cs 132.9 | 56 Ba 137.3 | 57 La [*] 138.9 | 58 Hf 178.5 | 59 Ta 180.9 | 60 W 183.9 | 61 Re 186.2 | 62 Os 190.2 | 63 Ir 192.2 | 64 Pt 195.1 | 65 Au 197.0 | 66 Hg 200.6 | 67 Tl 204.4 | 68 Pb 207.2 | 69 Bi 209 | 70 Po (209) | 71 At (210) | 72 Rn (222) |
| 87 Fr (223) | 88 Ra (226) | 89 Ac [^] (227) | 104 Rf (261) | 105 Db (262) | 106 Sg (263) | 107 Bh (264) | 108 Hs (265) | 109 Mt (268) | 110 Ds (271) | 111 Rg (272) | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--|
| * | 58 Ce 140.1 | 59 Pr 140.9 | 60 Nd 144.2 | 61 Pm (145) | 62 Sm 150.4 | 63 Eu 152.0 | 64 Gd 157.3 | 65 Tb 158.9 | 66 Dy 162.5 | 67 Ho 164.9 | 68 Er 167.3 | 69 Tm 168.9 | 70 Yb 173.0 | 71 Lu 175.0 | |
| ^ | 90 Th 232.0 | 91 Pa (231) | 92 U 238.0 | 93 Np (237) | 94 Pu (244) | 95 Am (243) | 96 Cm (247) | 97 Bk (247) | 98 Cf (251) | 99 Es (252) | 100 Fm (252) | 101 Md (257) | 102 No (258) | 103 Lr (260) | |