

Supplemental Homework 1 - Reviewing Important Concepts for the Final Exam

1. Complete the table below.

Element Name	Isotope Symbol	Z	A	# of neutrons	# of electrons	# of valence electrons
carbon	^{14}C	6	14	8	6	4
oxygen	^{18}O	8	18	10	8	6
phosphorus	^{31}P	15	31	16	15	5

2. A patient is prescribed 25 mg of amoxicillin to be taken four times daily. If the pharmacy has supplied a solution that contains 750 mg/5 mL, how many milliliters of the solution should the patient take in each dose?

$$\frac{25\text{mg}}{750\text{mg}} \times 5\text{mL} = 0.17\text{mL}$$

3. Perform the following unit conversions.

a) 940 mL to L 0.94L

b) 0.437 mg to μg $437\mu\text{g}$

$$\begin{array}{r} \text{Na}_2\text{SO}_4 \\ 2(22.99) \\ 32.06 \\ + 4(16.00) \\ \hline 142.04\text{g/mol} \end{array}$$

4. If 1250 mg of Na_2SO_4 is present in a 100. mL solution, what is the concentration in terms of the following?

a) Molarity $\frac{1250\text{mg Na}_2\text{SO}_4}{100.\text{mL}} \times \frac{10^3\text{mL}}{1\text{L}} \times \frac{1\text{g}}{10^3\text{mg}} \times \frac{1\text{mol Na}_2\text{SO}_4}{142.04\text{g}}$

$$0.0880\text{M Na}_2\text{SO}_4$$

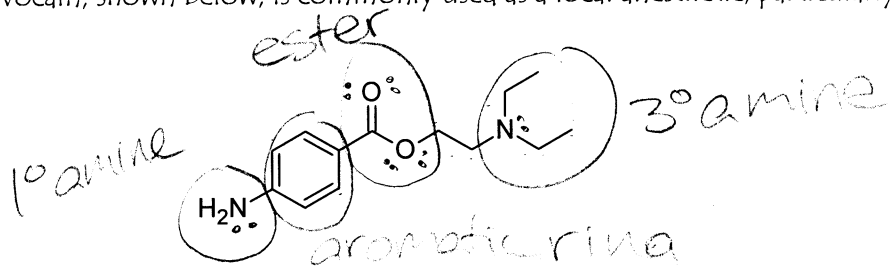
b) % (m/v)

$$\frac{1250\text{mg}}{100\text{mL}} \times \frac{1\text{g}}{10^3\text{mg}} \times 100 = 1.25\% (\text{m/v})$$

c) Eq/L of SO_4^{2-}

$$0.0880\text{mol Na}_2\text{SO}_4 \times \frac{1\text{mol SO}_4^{2-}}{1\text{mol Na}_2\text{SO}_4} \times \frac{2\text{Eq}}{1\text{mol SO}_4^{2-}} = 0.176\text{Eq/L}$$

5. Novocain, shown below, is commonly used as a local anesthetic, particularly in dentistry.



- a) Add any missing lone pair electrons to the structure above.
- b) Circle the structural features and classify the functional groups. For any alcohols or amines, indicate whether they are 1°, 2°, 3° or 4°.
- c) What is the chemical formula for Novocain?



- d) What is the molar mass of Novocain?

$$C \quad + \quad H \quad + \quad O \quad + \quad N$$

$$13(12.01) \quad 20(1.01) \quad 2(16.00) \quad 2(14.01)$$

$$236.35 \text{ g/mol}$$

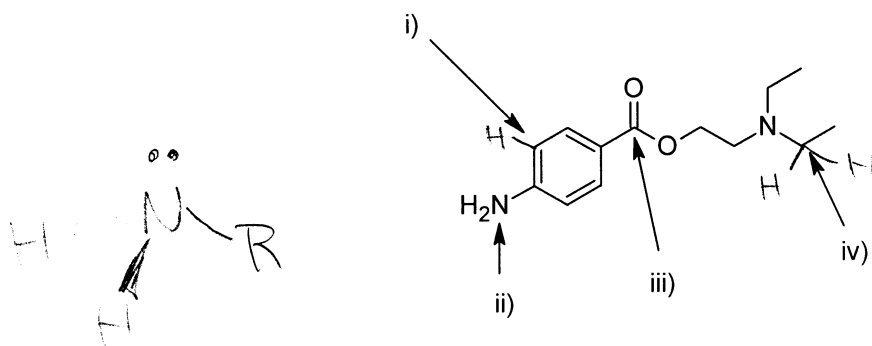
- e) How many grams of Novocain are needed to prepare 250 mL of a 0.40M solution?

add 1 more x S.K.

$$\frac{0.25 \text{ L sol'n} \mid 0.4 \text{ mol Nov}}{1 \text{ L sol'n} \mid 1 \text{ mol Nov}} \times 236.35 \text{ g} = 23.6 \text{ g}$$

23.6 g
↓ zsf
24 g

- f) Specify the electron and molecular geometry of the atoms indicated with arrows.



Central Atom	Electron Geometry	Molecular Geometry
i	trigonal planar	trigonal planar
ii	tetrahedral	trigonal pyramidal
iii	trigonal planar	trigonal planar
iv	tetrahedral	tetrahedral