initials Key

7. If you need 3.6×10^{24} molecules of oxalic acid, $H_2C_2O_4$, how many grams of the acid should you weigh out in the laboratory?

$$3.6 \times 10^{24} \text{ molecules} \cdot \frac{1 \text{ mol}}{6.022 \times 10^{23} \text{ molecules}} \cdot \frac{90.04 \text{ g } H_2C_2O_4}{1 \text{ mol}} = 540 \text{ g}$$

or 5.4×10^2 g

8. Maleic acid, which is used to manufacture artificial resins, has the empirical formula CHO. Its molar mass is 116.1 g/mol. What is its molecular formula?

$$\frac{116.1 \text{ g/mol}}{29.02 \text{ g/mol}} = \frac{\text{molecular mass}}{\text{Empirical mass}} = 4 \qquad C_4H_4O_4$$

Part II. Short Problems. **Answer 4 of the next 5 questions.** If you answer more than 4 questions cross out the one you wish not to be graded. For full credit please show your work including intermediate steps. **10 points each.**

9. The element X has three naturally occurring isotopes. The masses (amu) and % abundances of the isotopes are given in the table below. The average atomic mass of the element is _____ amu (Show your work)

Isotope	Percent Abundance	Mass (amu)
^{221}X	74.22	220.9
^{220}X	12.78	220.0
^{218}X	13.00	218.1

$0.7422 \times 220.9 \text{ amu} + 0.1278 \times 220.0 \text{ amu} + 0.1300 \times 218.1$

$= 220.42 \text{ amu}$