LAD E2 **Molarity and Dilution** Name________________________Per____

Procedure A: Preparing solutions from a solid:

Prepare a 0.012 M potassium permanganate solution using the solid potassium pernanganate, $KMnO_4$ and a 100. ml volumetric flask. Write out a brief bulleted **procedure** in the space below right. Below left clearly present any formulas and calculations used.

Calculations *(Clearly presented.)*

Lab Procedure

(Not a calculation explanation, you've shown that already to the left, a lab procedure. These bullets are only a suggestion, you may need more or less than provided.)

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Procedure B: Preparing dilute solutions from a "stock" solution:

Prepare a 0.00035 M $KMnO_4$ solution using the 0.012 M solution of $KMnO_4$ that you just made, and the 250. ml volumetric flask you have been given. Write out a brief bulleted **procedure** in the space below right. Below left clearly present any formulas and calculations used. Use a small square of parafilm and your thumb to cover the flask so you can invert the flask a couple of times and then transfer to the 400 ml beaker. Then pour some of your solution into the small plastic cuvette and place in the class cuvette rack for further analysis. Pour your left-over solutions into the proper beakers on the black cart. Rinse out all container and leave them on the tray for the next period.

Calculations *(Clearly presented.)*

Lab Procedure

(Not a calculation explanation, you've shown that already to the left, a lab procedure. These bullets are only a suggestion, you may need more or less than provided.)

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LAD E2 Molarity and Dilution Error Analysis

For each of the error scenarios listed below, circle larger, smaller, or no different, then *justify with arrows on the formula shown.*

1. For Procedure A, compared to the 0.012 M solution that you were *attempting to prepare*, would the ***actual molarity*** of the solution that you *did prepare* be larger, smaller, or no different if you calculated the molar mass of potassium permanganate using the formula K_2MnO_4 instead of the correct formula? *Justify with only ↑ or ↓ arrows on the formula below.*

$$\frac{M_{Attempted}(mol)}{1L} \times Vol(L) \times \frac{MM(g)}{1mol} = \#\ g\ \ actually\ \ put\ \ in\ \ Flask$$

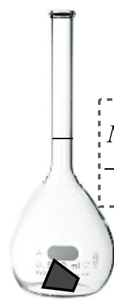
2. For Procedure A, compared to the 0.012 M solution that you were *attempting to prepare*, would the ***actual molarity*** of the solution you that *did prepare* be larger, smaller, or no different if you were weighing out the $KMnO_4$, and some of the $KMnO_4$ landed on the balance pan, but not in your weighing dish? *Justify with only ↑ or ↓ arrows on the formula to the right.*

$$\frac{Mass(g)thatActuallyGotIntoFlask \times \frac{1mol}{MM(g)}}{Vol\ \ of\ \ Solution(L)} = \frac{M(mol)}{(L)}$$

3. For Procedure A, compared to the 0.012 M solution that you were *attempting to prepare*, would the ***actual molarity*** of the solution that you *did prepare* be larger, smaller, or no different if you filled your volumetric flask to the top, beyond the line on the neck of the flask? *Justify with only ↑ or ↓ arrows on the formula to the right.*

$$\frac{Mass(g)thatActuallyGotIntoFlask \times \frac{1mol}{MM(g)}}{Vol\ \ of\ \ Solution(L)} = \frac{M(mol)}{(L)}$$

4. For Procedure A, compared to the 0.012 M solution that you were *attempting to prepare*, would the ***actual molarity*** of the solution that you *did prepare* be larger, smaller, or no different if a small rubber stopper had fallen into your flask before you finished filling the flask, and you couldn't get it out, so you decided to move on and proceed as if it weren't even there? *Justify with only ↑ or ↓ arrows on the formula to the right.*



$$\frac{Mass(g)thatActuallyGotIntoFlask \times \frac{1mol}{MM(g)}}{Vol\ \ of\ \ Solution(L)} = \frac{M(mol)}{(L)}$$

5. For Procedure A, compared to the 0.012 M solution that you were *attempting to prepare*, would the ***actual molarity*** of the solution that you *did prepare* be larger, smaller, or no different if some of the salt stuck to the weighing dish and did not get into the volumetric flask? *Justify with only ↑ or ↓ arrows on the formula to the right.*

$$\frac{Mass(g)thatActuallyGotIntoFlask \times \frac{1mol}{MM(g)}}{Vol\ \ of\ \ Solution(L)} = \frac{M(mol)}{(L)}$$

6. For Procedure B, compared to the 0.00035 M $KMnO_4$ solution that you were *attempting to prepare*, would the ***actual molarity*** of the solution that you *did prepare* be larger, smaller, or no different if the **graduated cylinder** were wet before you measure out the volume of the concentrated **stock** solution? *Justify with only ↑ or ↓ arrows on the formula to the right.*

$$\frac{M_{conc} \times V_{conc}}{V_{dil}} = M_{dil}$$

7. For Procedure B, compared to the 0.00035 M $KMnO_4$ solution that you were *attempting to prepare*, would the ***actual molarity*** of the solution that you *did prepare* be larger, smaller, or no different if the **volumetric flask** were wet before you added the concentrated **stock** solution? *Justify with only ↑ or ↓ arrows on the formula to the right..*

$$\frac{M_{conc} \times V_{conc}}{V_{dil}} = M_{dil}$$

8. For Procedure B, compared to the 0.00035 M $KMnO_4$ solution that you were *attempting to prepare*, would the ***actual molarity*** of the solution that you *did prepare* be larger, smaller, or no different if you read the top of the meniscus, instead of the bottom of the meniscus of the concentrated **stock** solution in the **graduated cylinder**? *Justify with only ↑ or ↓ arrows on the formula to the right..*

$$\frac{M_{conc} \times V_{conc}}{V_{dil}} = M_{dil}$$