

Concentration Test

Directions: Number a piece of paper from 1 to 20. Answer each question, writing your answers on your paper. The correct answers to the questions appear at the end of the practice test.

Answer the next four questions from the following problem.

A solution is made by dissolving 12.552 grams of potassium permanganate (KmnO_4) in 290 mL of water. What is the molarity of the solution?

1. What are the units that will be given in the answer?
A. grams B. mL of solution C. moles/liter D. moles

2. What is one proportion given in the problem that will be needed to solve it?
A. $\frac{12.552 \text{ g}}{290 \text{ mL}}$ B. $\frac{12.552 \text{ g}}{290 \text{ mL}}$
C. $\frac{12.552 \text{ g}}{158 \text{ g}}$ D. $\frac{158 \text{ g}}{290 \text{ mL}}$

3. How would this problem be set-up?

A. $\frac{12.552 \text{ g}}{290 \text{ mL}} \cdot \frac{158 \text{ g}}{1 \text{ mole}} \cdot \frac{1000 \text{ mL}}{1 \text{ Liter}}$	B. $\frac{290 \text{ mL}}{12.552 \text{ g}} \cdot \frac{1 \text{ mole}}{158 \text{ g}} \cdot \frac{1000 \text{ mL}}{1 \text{ Liter}}$
C. $\frac{12.552 \text{ g}}{290 \text{ mL}} \cdot \frac{1 \text{ mole}}{158 \text{ g}} \cdot \frac{1 \text{ Liter}}{1000 \text{ mL}}$	D. $\frac{12.552 \text{ g}}{290 \text{ mL}} \cdot \frac{1 \text{ mole}}{158 \text{ g}} \cdot \frac{1000 \text{ mL}}{1 \text{ Liter}}$

4. What is the correct answer? –NOTE THAT UNITS ARE NOT GIVEN.
A. .27 C. 2.11
B. 6838 D. .00027

Along some streams degradable oxygen-demanding wastes are discharged. Along one such stream the following readings were obtained. Use the data table to construct a graph. Use your graph to answer questions 5 to 9.

Distance from point of discharge (Meters)	Dissolved Oxygen (PPM)
-25 M	40 ppm
0 M (point where waste enters stream)	35 ppm
25 M	20 ppm
50 M	5 ppm
75 M	15 ppm
100 M	28 ppm

5. What is the independent variable (X axis) in the above situation?
6. What is the predicted dissolved oxygen concentration at 15 meters from the point of discharge?
7. What do you think the dissolved oxygen concentration will be at in 300 meters from the point of discharge?
8. Why does the amount of dissolved oxygen decrease as the distance from the point of discharge increases, during the first part of the graph?
9. If people take their drinking from this stream, what does our graph tell us about where (when) they should take it out?

Complete the following problems, SHOWING ALL OF YOUR WORK!

Calculate the molar mass of each of the following compounds:

10. KClO_4
11. Al_2S_3
12. $\text{Mg}(\text{OH})_2$

Calculate the number of grams, or the number of moles, in each of the following:

13. moles in 8 g of CaSO_4
14. grams in 3 mole of CuCl_2

15. Calculate the percent concentration (mass/volume) of 154 grams of baking soda dissolved in 1.4 L of water.

16. How many grams of sugar are in 355 mL (12oz.) of a 13.2% (mass/mass) Dr. Pepper? Assume 1 mL of Dr. Pepper has a mass of 1g.

17. The average person has 200 ppm of Carbon monoxide in their blood. If you have 2 Kg of blood in your body, how many mg of Carbon Monoxide do you contain?

18. A solution contains 280 g of salt (NaCl) in water to make 2700 mL of solution. Calculate the molarity of the solution.

19. Solve using a picket fence. How many grams of lithium nitrate (LiNO_3) are needed to make 850 mL of a 1.5 M lithium nitrate solution?

20. A plant has 500 mL of an arsenic solution which contains 1500 ppm. How much water must be mixed with the arsenic solution to dilute it to a concentration of .05 ppm (the EPA standard)?

1. C
2. B
3. D
4. A
5. The distance from point of discharge
6. 26 ppm
7. 40 ppm
8. The dissolved oxygen is being used by bacteria to decompose (break-down) the waste materials.
9. They should take it out much farther than 100 meters, so the dissolved oxygen can be recovered and all the wastes broken down.
10. 138.5 grams/mole
11. 150 grams/mole
12. 58 grams/mole
13. .06 moles
14. 403.5 grams
15. 11 %
16. 46.86 grams
17. 400 ppm
18. 1.8 moles/liter (molarity)
19. 87.9 grams
20. 15 million milliliters or 15,000 liters