

Molarity Practice Problems

- 1) How many grams of potassium carbonate are needed to make 200 mL of a 2.5 M solution?

Conc

$$2.5 M = \frac{X \text{ moles } K_2CO_3}{.200 L}$$

$$X = .50 \text{ moles } K_2CO_3$$

$$\frac{.50 \text{ moles } K_2CO_3}{1} \times \frac{138.21 g}{1 \text{ mole}} = \boxed{69.11 g K_2CO_3}$$

- 2) How many liters of 4 M solution can be made using 100 grams of lithium bromide?

$$4 M = \frac{1.15 \text{ mol}}{X L}$$

$$X = \boxed{.286 L} = 286 \text{ mL}$$

$$\frac{100 g}{1} \times \frac{1 \text{ mol}}{86.84 g} = 1.15 \text{ mol}$$

- 3) What is the concentration of an aqueous solution with a volume of 450 mL that contains 200 grams of iron (II) chloride?

$$\frac{200 g}{1} \times \frac{1 \text{ mole}}{126.75 g} = 1.58 \text{ mol}$$

$$M = \frac{1.58 \text{ mol}}{.450 L} = \boxed{3.51 M}$$

* has a mistake in the question

- 4) How many grams of ammonium sulfate are needed to make a 0.25 M solution at a concentration of 6 M?

$$6 M = \frac{X}{.250 L}$$

$$X = 1.5 \text{ moles}$$

$$\frac{1.5 \text{ moles}}{1} \times \frac{132.17 g}{1 \text{ mole}} = \boxed{198.26 g}$$

(NH ₄) ₂ SO ₄	28.02
	8.08
	32.07
	64.00
	132.17

- 5) What is the concentration of a solution with a volume of 2.5 liters containing 660 grams of calcium phosphate?

$$\frac{660 g}{1} \times \frac{1 \text{ mole}}{310.18 g} = 2.13 \text{ moles}$$

$$\frac{2.13 \text{ moles}}{2.5 L} = \boxed{.85 M}$$

Ca ₃ (PO ₄) ₂	120.24
	61.94
	128.00
	310.18

- 6) How many grams of copper (II) fluoride are needed to make 6.7 liters of a 1.2 M solution?

$$1.2 M = \frac{X \text{ moles}}{6.7 L}$$

$$X = 8.04 \text{ moles}$$

$$\frac{8.04 \text{ moles}}{1} \times \frac{101.55 g}{1 \text{ mole}} = \boxed{816.46 g}$$

CuF ₂	63.55
	38.00
	101.55 g

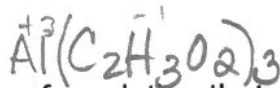


7) How many liters of 0.88 M solution can be made with 25.5 grams of lithium fluoride?

MW = 25.939 g/mol

$$V = \frac{n}{M} = \frac{0.983 \text{ mol}}{0.88 \text{ M}} = \boxed{1.12 \text{ L}}$$

$$25.5 \text{ g} \left(\frac{1 \text{ mol}}{25.939 \text{ g}} \right) = 0.983 \text{ mol}$$



8) What is the concentration of a solution that with a volume of 660 mL that contains 33.4 grams of aluminum acetate?

MW = 204.114 g/mol

$$M = \frac{n}{V} = \frac{0.164 \text{ mol}}{0.660 \text{ L}} = \boxed{0.25 \text{ M}}$$

$$33.4 \text{ g} \left(\frac{1 \text{ mol}}{204.114 \text{ g}} \right) = 0.164 \text{ mol}$$

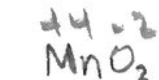
9) How many liters of 0.75 M solution can be made using 75 grams of lead (II) oxide?

MW = 223.199 g/mol

$$V = \frac{n}{M} = \frac{0.336 \text{ mol}}{0.75 \text{ M}} = 0.448 \text{ L} = \boxed{0.45 \text{ L}}$$

$$75 \text{ g} \left(\frac{1 \text{ mol}}{223.199 \text{ g}} \right) = 0.336 \text{ mol PbO}$$

10) How many grams of manganese (IV) oxide are needed to make a 5.6 liters of a 2.1 M solution?

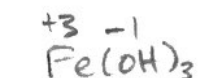


MW = 86.936 g/mol

$$n = MV = (2.1 \text{ M})(5.6 \text{ L}) = 11.76 \text{ mol} \quad *$$

$$(11.76 \text{ mol}) \left(\frac{86.936 \text{ g}}{1 \text{ mol}} \right) = \boxed{1022.37 \text{ g}} \text{ practical application}$$

11) What is the concentration of a solution with a volume of 9 mL that contains 2 grams of iron (III) hydroxide?



MW = 106.868 g/mol

$$M = \frac{0.0187 \text{ mol}}{0.009 \text{ L}} = \boxed{2.08 \text{ M}}$$

$$2 \text{ g} \left(\frac{1 \text{ mol}}{106.868 \text{ g}} \right) = 0.0187 \text{ mol}$$

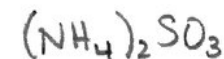
12) How many liters of 3.4 M solution can be made using 78 grams of isopropanol (C₃H₈O)?

MW = 60.096 g/mol

$$V = \frac{n}{M} = \frac{1.298 \text{ mol}}{3.4 \text{ M}} = \boxed{0.38 \text{ L}}$$

$$78 \text{ g} \left(\frac{1 \text{ mol}}{60.096 \text{ g}} \right) = 1.298 \text{ mol}$$

13) What is the concentration of a solution with a volume of 3.3 mL that contains 12 grams of ammonium sulfite?



MW = 116.135 g/mol

$$M = \frac{n}{V} = \frac{0.103 \text{ mol}}{0.0033 \text{ L}} = \boxed{31.21 \text{ M}}$$

$$12 \text{ g} \left(\frac{1 \text{ mol}}{116.135 \text{ g}} \right) = 0.103 \text{ mol}$$