## Calculations of Solution Concentration - Answers

*California State Standard: Students know how to calculate the concentration of a solute in terms of grams per liter, molarity, parts per million, and percent composition.*

### Molarity

1) 20 grams of NaOH is dissolved in enough water to make 1 liter of solution

$$\frac{20\,g\,NaOH}{}\left|\frac{1\,mol\,NaOH}{40\,g\,NaOH}\right.=0.5\,mol$$

$$\frac{0.5\,mol}{1\,L}=0.5\,mol/L$$

2) 45 grams of glucose, $C_6H_{12}O_6$ is dissolved in enough water to make 0.500 liters of solution

$$\frac{45\,g\,C_6H_{12}O_6}{}\left|\frac{1\,mol\,C_6H_{12}O_6}{180\,g\,C_6H_{12}O_6}\right.=0.25\,mol$$

$$\frac{0.25\,mol}{0.5\,L}=0.50\,mol/L$$

3) 116 grams of KF is dissolved in enough water to make 4 L of solution

$$\frac{116\,g\,KF}{}\left|\frac{1\,mol\,KF}{58\,g\,KF}\right.=2\,mol$$

$$\frac{2\,mol}{4\,L}=0.5\,mol/L$$

4) 63 grams of $HNO_3$ is dissolved in enough water to make 100 liters of solution

$$\frac{63\,g\,HNO_3}{}\left|\frac{1\,mol\,HNO_3}{63\,g\,HNO_3}\right.=1\,mol$$

$$\frac{1\,mol}{100\,L}=0.01\,mol/L$$

5) 280 grams of CaO is dissolved in enough water to make 10 L of solution

$$\frac{280\,g\,CaO}{}\left|\frac{1\,mol\,CaO}{56\,g\,CaO}\right.=5\,mol$$

$$\frac{5\,mol}{10\,L}=0.5\,mol/L$$

### Percent composition

6) 20 grams of NaOH is dissolved in enough water to make 1 liter of solution

$$\frac{20\,g\,solute}{1000\,g\,solution}x100=2\%$$

7) 45 grams of glucose, $C_6H_{12}O_6$ is dissolved in enough water to make 0.500 liters of solution

$$\frac{45\,g\,solute}{500\,g\,solution}x\,100=9\%$$

8) 116 grams of KF is dissolved in enough water to make 4 L of solution

$$\frac{116\,g\,solute}{4000\,g\,solution}x\,100=2.9\%$$

9) 63 grams of $HNO_3$ is dissolved in enough water to make 100 liters of solution

$$\frac{63\,g\,solute}{100\,000\,g\,solution}x100=0.063\%$$

10) 280 grams of CaO is dissolved in enough water to make 10 L of solution

$$\frac{280\,g\,solute}{10\,000\,g\,solution}x100=2.8\%$$

**Parts per million (ppm**

11) 20 grams of NaOH is dissolved in enough water to make 1 liter of solution

$$\frac{20\,g\ solute}{1000\,g\ solution} x10^6 = 20{,}000\ ppm$$

12) 45 grams of glucose, $C_6H_{12}O_6$ is dissolved in enough water to make 0.500 liters of solution

$$\frac{45\,g\ solute}{500\,g\ solution} x10^6 = 90\ 000\ ppm$$

13) 116 grams of KF is dissolved in enough water to make 4 L of solution

$$\frac{116\,g\ solute}{4000\,g\ solution} x10^6 = 29000\ ppm$$

14) 63 grams of $HNO_3$ is dissolved in enough water to make 100 liters of solution

$$\frac{63\,g\ solute}{100\ 000\,g\ solution} x10^6 = 630\ ppm$$

15) 280 grams of CaO is dissolved in enough water to make 10 L of solution

$$\frac{280\,g\ solute}{10\ 000\,g\ solution} x10^6 = 28\ 000\ ppm$$

**Grams per liter**

16) 20 grams of NaOH is dissolved in enough water to make 1 liter of solution

$$\frac{20\,g}{1L} = 20\,g/L$$

17) 45 grams of glucose, $C_6H_{12}O_6$ is dissolved in enough water to make 0.5 liters of solution

$$\frac{45\,g}{0.5\,L} = 90\ g/L$$

18) 116 grams of KF is dissolved in enough water to make 4 L of solution

$$\frac{116\,g}{4\,L} = 29\,g/L$$

19) 63 grams of $HNO_3$ is dissolved in enough water to make 100 liters of solution

$$\frac{63\,g}{100\,L} = 0.63\,g/L$$

20) 280 grams of CaO is dissolved in enough water to make 10 L of solution

$$\frac{280\,g}{10\,L} = 28\,g/L$$