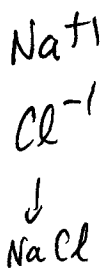


ES331 Oceanography – Practice Ocean Chemistry Problems



1. 225 g of NaCl is dissolved in 4.3 liters of water. Determine the following (show all of your math work):

- salinity in ppt
- salinity in ppm
- salinity in ppb
- The total no. of NaCl moles dissolved
- The (salinity) molarity of the solution

1 (a) ppt = g/L

$$225\text{g}/4.3\text{L} = 52.3\text{ ppt}$$

1 (b) ppm = mg/L

$$\frac{225\text{g} \left(\frac{1000\text{mg}}{\text{g}} \right)}{4.3\text{L}} = 52,325.6\text{ ppm}$$

2. 500 g of magnesium chloride and 400 g of sodium chloride are dissolved in 100 liters of water. Determine the following (show all of your math work):

- total salinity in ppt
- total salinity in ppm
- total salinity in ppb
- The total no. of sodium chloride moles dissolved
- The total no. of magnesium chloride moles dissolved
- The total (salinity) molarity of the solution

(1c) ppb = μg/L

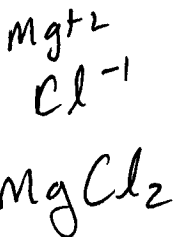
$$\frac{225\text{g} \left(1 \times 10^6 \frac{\mu\text{g}}{\text{g}} \right)}{4.3\text{L}} = 5.23 \times 10^7\text{ ppb}$$

(1d) At wt. Na = 23 g/mole
 At wt. Cl = 35 g/mole

NaCl = 58 g/mole

$$\left(\frac{1\text{mole}}{58\text{g}} \right) (225\text{g}) = 3.9\text{ mole}$$

(1e)
$$\frac{3.9\text{mole}}{4.3\text{L}} = \boxed{0.91\text{M}}$$



(2f) 500g MgCl₂ + 400g NaCl =
 900g "salt"

$$\text{ppt} = \frac{\text{g}}{\text{L}} = \frac{900\text{g}}{100\text{L}} = 9\text{ ppt}$$

(2g)
$$\frac{900\text{g} \left(\frac{1000\text{mg}}{\text{g}} \right)}{100\text{L}} = 9000\text{ ppm}$$

(2h)
$$\frac{900\text{g} \left(1 \times 10^6 \frac{\mu\text{g}}{\text{g}} \right)}{100\text{L}} = 9 \times 10^6\text{ ppb}$$

(2i)
$$400\text{g NaCl} \left(\frac{1\text{mole}}{58\text{g}} \right) = 6.9\text{ moles}$$

(2j) MgCl₂ = 24 + 2(35) = 94 g/mole

$$500\text{g MgCl}_2 \left(\frac{1\text{mole}}{94\text{g}} \right) = 5.3\text{ mole}$$

(2k)
$$6.9\text{mole} + 5.3\text{mole} = 12.2\text{mole}/100\text{L} = \boxed{0.122\text{M}}$$