PSC-4012 Quiz # 6 Name: Answers

Date:

1. Three solutions of aqueous sodium chloride are described below. Which of the following solutions: A, B, or C, is the saltiest? In otherwords, which has the highest molarity?

All calculations must be shown.

A: 158g NaCl dissolved in a 4500mL aqueous solution.

÷ 1000 = 4.5 L

$158\,g\,NaCl \times \frac{1\,mol}{58.44\,g} = 2.70\,mol\,NaCl$ $\quad C = \frac{n}{V} = \frac{2.70\,mol}{4.5\,L} = 0.601\,\frac{mol}{L}$

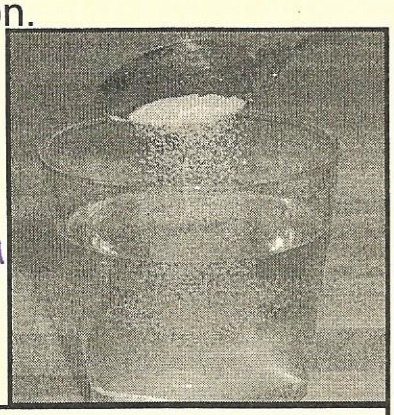
B: 0.28mol NaCl dissolved in a 4L solution.

$C = \frac{n}{V} = \frac{0.28\,mol}{4\,L} = 0.07\,\frac{mol}{L}$

C: 17g NaCl dissolved in a 500mL solution.

$17\,g\,NaCl \times \frac{1\,mol}{58.44\,g} = 0.291\,mol$

$C = \frac{n}{V} = \frac{0.291\,mol}{0.5\,L} = 0.582\,\frac{mol}{L}$



ANSWER: Solution A

Bonus: Ocean water is 2.5mol/L.
How many tsp salt can be collected
from a cup ot this water? (1c=237mL) (1g NaCl = 0.18tsp)

Ans: 6.23 tsp.

Show work for bonus here:

$\frac{2.5\,mol}{1\,L} = \frac{x\,mol}{.237\,L}$ $\quad x = 0.5925\,mol\,NaCl \times \frac{58.44\,g}{1\,mol} \times \frac{0.18\,tsp}{1\,g} = 6.23\,tsp$

2. Three different aqueous solutions of calcium acetate are described below. Determine which of the solutions, A, B, or C, has the greatest concentration (in molarity).

All work must be shown.

molar mass $Ca(CH_3COO)_2$: 158.18g

Solution A: 0.12 mol $Ca(CH_3COO)_2$ in 4000mL solution.

$c = \frac{n}{v} = \frac{0.12\ mol}{4\ L} = 0.03\ \frac{mol}{L}$

Solution B: 1g $Ca(CH_3COO)_2$ in 200mL solution.

$1\ g \times \frac{1\ mol}{158.18\ g} = 0.0063\ mol \qquad c = \frac{n}{v} = \frac{0.0063\ mol}{0.2\ L} = 0.032\ \frac{mol}{L}$

Solution C: 0.21g $Ca(CH_3COO)_2$ in 0.3L solution.

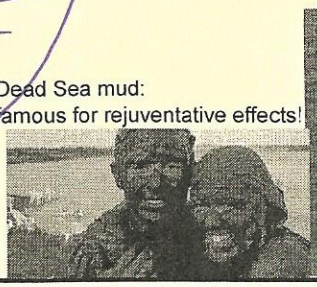
$0.21\ g \times \frac{1\ mol}{158.18\ g} = 0.00133\ mol \qquad c = \frac{n}{v} = \frac{0.00133\ mol}{0.3\ L}$

$c = 0.0044\ \frac{mol}{L}$

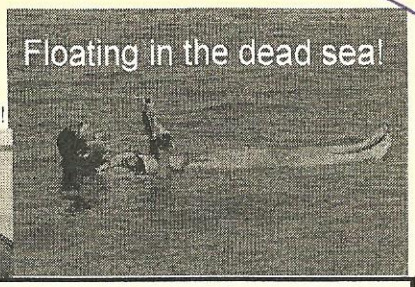
ANSWER : Solution B

$14.5\ g\ NaCl \times \frac{0.18\ tsp}{1\ g} = 2.61\ tsp\ NaCl$

$66.08\ g\ CaCl_2 \times \frac{1\ tsp}{3.4\ g} = 19.44\ tsp\ CaCl_2$



Dead Sea mud: famous for rejuvenative effects!



Bonus: The Dead Sea lies between Jordan and Palestine. It is 9.6 times as salty as the ocean. However, its salt is only 18% NaCl; the rest is $CaCl_2$. In total, 340g salt are dissolved per litre of water from the Dead Sea. How many tsp NaCl, and how many tsp $CaCl_2$ could be collected from 1 cup Dead Sea water? (1 tsp calcium chloride = 3.4g)

Answer: _____ tsp NaCl, _____ tsp $CaCl_2$

Show work for bonus here:

$340g \times .18 = 61.2g\ NaCl$ per L

$340 \times .82 = 278.8g\ CaCl_2$ per L

$\frac{61.2\ g\ NaCl}{1\ L} = \frac{x}{.237\ L}$ $x = 14.5g\ NaCl$ (per cup)

$\frac{278.8\ g\ CaCl_2}{1\ L} = \frac{x}{.237\ L}$ $x = 66.08g\ CaCl_2$ (per cup)

cont. above

3. Three sucrose (table sugar) aqueous solutions are described below. Which is the sweetest? Show all of your calculations.

A: 3kg $C_{12}H_{22}O_{11}$ in 20L solution

$3\,kg \times \frac{1000g}{1\,kg} \times \frac{1\,mol}{342.34g} = 8.76\,mol$ $\quad c = \frac{n}{v} = \frac{8.76\,mol}{20\,L} = 0.438\,\frac{mol}{L}$

B: 0.12mol $C_{12}H_{22}O_{11}$ in 280mL solution

$c = \frac{n}{v} = \frac{0.12\,mol}{0.28\,L} = 0.43\,\frac{mol}{L}$

C: 34g $C_{12}H_{22}O_{11}$ in 250mL solution

$34g \times \frac{1\,mol}{342.34g} = 0.0993\,mol$ $\quad c = \frac{n}{v} = \frac{0.0993\,mol}{0.25\,L} = 0.397\,\frac{mol}{L}$

ANSWER: Solution A

Bonus: There are 440g of sugar in a 2L bottle of coke. How many teaspoons of sugar are there in a 12oz can of coke? (8oz = 237mL) (1 tsp sugar = 4grams)

Answer: 20 tsp

Show work for bonus here:

$12oz \times \frac{237mL}{8oz} \times \frac{1L}{1000mL} = 0.3555\,L$

$\frac{440g}{2L} = \frac{xg}{0.3555\,L}$

$78.21g\ C_{12}H_{22}O_{11} \times \frac{1\,tsp}{4g} = 19.55\,tsp.$