Name: KEY

Calculations- Equations Table T

1. Which kelvin temperature is equivalent to –24°C?

→ Which equation do you need to use? $K = {}^{\circ}C + 273$

3 (1) 226 K (2) 273 K (3) 249 K (4) 297 K

2. If 0.025 gram of $Pb(NO_3)_2$ is dissolved in 100. grams of H_2O, what is the concentration of the resulting solution, in parts per million?

→ Which equation do you need to use? $ppm = \frac{\text{mass solute}}{\text{mass solution}} \times 1{,}000{,}000$

(1) 2.5×10^{-4} ppm (2) 2.5 ppm (3) 250 ppm (4) 4.0×10^{3} ppm

3

$$ppm = \frac{0.025\,g}{100\,g} \times 1{,}000{,}000$$

3. Based on data collected during a laboratory investigation, a student determined an experimental value of 322 joules per gram for the heat of fusion of H_2O. Calculate the student's percent error. Your response must include a correct numerical setup and the calculated result.

→ Which equation do you need to use? $\%\ error = \frac{mv - av}{av} \times 100$

$$\%\ error = \frac{322\ J/g - 334\ J/g}{334\ J/g} \times 100$$

← Table B!

-3.59 %

4. In a titration, a few drops of an indicator are added to a flask containing 35.0 milliliters of $HNO_3(aq)$ of unknown concentration. After 30.0 milliliters of 0.15 M NaOH(aq) solution is slowly added to the flask, the indicator changes color, showing the acid is neutralized.

a) The volume of the NaOH(aq) solution is expressed to what number of significant figures? 2

b) Show a numerical setup below for calculating the concentration of the $HNO_3(aq)$ solution.

→ Which equation do you need to use? $M_A V_A = M_B V_B$

$$M_A V_A = M_B V_B$$

$$X \cdot 35.0\,mL = 0.15M \times 30.0\,mL$$

$$X = \boxed{0.13M}$$

5. A student prepared two mixtures, each in a labeled beaker. Enough water at 20.°C was used to make 100 milliliters of each mixture.

Information about Two Mixtures at 20.°C

	Mixture 1	Mixture 2
Composition	NaCl in H_2O	Fe filings in H_2O
Student Observations	• colorless liquid • no visible solid on bottom of beaker	• colorless liquid • black solid on bottom of beaker
Other Data	• mass of NaCl(s) dissolved = 2.9 g	• mass of Fe(s) = 15.9 g • density of Fe(s) = 7.87 g/cm^3

Determine the volume of the Fe filings used to produce mixture 2.

→ Which equation do you need to use? $D = \frac{m}{V}$

$$\frac{7.87\ g/cm^3}{1} = \frac{15.9\ g}{x}$$

2.02 cm^3

6. One sample of a green vegetable contains 0.0035 gram of boron. Determine the total number of moles of boron in this sample.

→ Which equation do you need to use? $\#moles = \frac{given\ mass}{GFM}$

$$x = \frac{0.0035\ g}{10.81\ g/mol}$$

0.00032 moles

7. A 2.50-liter aqueous solution contains 1.25 moles of dissolved sodium chloride. The dissolving of NaCl(s) in water is represented by the equation below.

$$NaCl(s) \xrightarrow{H_2O} Na^+(aq) + Cl^-(aq)$$

a) Determine the molarity of this solution.

→ Which equation do you need to use? $Molarity = \frac{moles\ solute}{L\ solution}$

$$M = \frac{1.25\ mol}{2.50\ L}$$

0.500 M

8. Gypsum is a mineral that is used in the construction industry to make drywall (sheetrock). The chemical formula for this hydrated compound is $CaSO_4 \cdot 2\ H_2O$. A hydrated compound contains water molecules within its crystalline structure. Gypsum contains 2 moles of water for each 1 mole of calcium sulfate.

a) What is the gram formula mass of $CaSO_4 \cdot 2\ H_2O$?

Ca : 40.08 x 1 = 40.08
S : 32.065 x 1 = 32.065
O : 16 x 4 = + 64
136.145

H : 1.00794 x 4 = 4.03
O : 16 x 2 = + 32
36.03

136.145
+ 36.03
172.18 g/mol

b) In the space provided, show a correct numerical setup and calculate the percent composition by mass of water in this compound.

→ Which equation do you need to use? $\%\ comp = \frac{mass\ part}{mass\ whole} \times 100$

$\%\ comp = \frac{36.039}{172.18g} \times 100$

20.93 %