

# Download File PDF Technical Chemistry Gas Laws Magic Square Answer Key

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Technical Chemistry - Solutions Magic Square  
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You must show your work in the square.

A. The solubility of gas in water is 0.66g/L at 150 Pa of pressure. What is the solubility when the pressure is increased to 40 Pa? *Henry's Law*

$$\frac{S_1}{P_1} = \frac{S_2}{P_2}$$
$$\frac{0.66 \text{ g/L}}{150 \text{ Pa}} = \frac{x}{40 \text{ Pa}}$$
$$x = 1.76 \text{ g/L}$$

B. What mass of water must be added to 255.0g NaCl to make a 15.00% by mass solution? *Percent by Mass*

$$\frac{\text{mass of solute}}{\text{mass of solute} + \text{mass of solvent}} \times 100 = \text{percent by mass}$$
$$\frac{255.0 \text{ g}}{255.0 \text{ g} + x} \times 100 = 15.00$$
$$2550 = 15.00(255.0 + x)$$
$$2550 = 3825 + 15x$$
$$-1275 = 15x$$
$$x = -85 \text{ g}$$

C. What is the molarity of 150 mL of solution containing 0.875 mol of ammonium? *Molarity*

$$M = \frac{\text{mol solute}}{\text{L soln}}$$
$$M = \frac{0.875 \text{ mol}}{0.150 \text{ L}} = 5.83 \text{ M}$$

D. How many moles of solute are contained in 53 mL of a 12.2M solution? *Molarity*

$$M = \frac{\text{mol solute}}{\text{L soln}}$$
$$12.2 \text{ M} = \frac{x}{0.053 \text{ L}}$$
$$x = 0.647 \text{ mol}$$

E. How many grams of solute are contained in 750 mL of a 0.225M solution of NaOH? *Molarity*

$$M = \frac{\text{mol solute}}{\text{L soln}}$$
$$0.225 \text{ M} = \frac{x}{0.750 \text{ L}}$$
$$x = 0.16875 \text{ mol} \times 39.99 \text{ g/mol} = 6.74 \text{ g}$$

F. What is the molarity of a solution composed of 3.7g NaOH in 0.850 L of H<sub>2</sub>O? *Molarity*

$$m = \frac{\text{mol solute}}{\text{L of solvent}}$$
$$\frac{3.7 \text{ g}}{0.850 \text{ L}} = 4.35 \text{ g/L}$$
$$\frac{4.35 \text{ g/L}}{40.00 \text{ g/mol}} = 0.109 \text{ mol/L}$$

G. The solubility of a gas is 2.0g/L at 50 Pa of pressure. How much gas will dissolve in 5L at a pressure 10 Pa? *Henry's Law*

$$\frac{S_1}{P_1} = \frac{S_2}{P_2}$$
$$\frac{2.0 \text{ g/L}}{50 \text{ Pa}} = \frac{x}{10 \text{ Pa}}$$
$$x = 0.4 \text{ g/L}$$

H. Calculate the percent by mass of benzene in a solution containing 14.2g of benzene in 28.0g of carbon tetrachloride. *Percent by Mass*

$$\frac{\text{mass of solute}}{\text{mass of solute} + \text{mass of solvent}} \times 100 = \text{percent by mass}$$
$$\frac{14.2 \text{ g}}{14.2 \text{ g} + 28.0 \text{ g}} \times 100 = 33.6\%$$

I. What is the molarity of a solution composed of 15.7g NaCl in 100.0g of H<sub>2</sub>O? *Molarity*

$$m = \frac{\text{mol solute}}{\text{L soln}}$$
$$\frac{15.7 \text{ g}}{100.0 \text{ g}} = 0.157 \text{ g/g}$$
$$\frac{0.157 \text{ g/g}}{58.44 \text{ g/mol}} = 0.00268 \text{ mol/g}$$
$$= 2.68 \text{ mol/kg}$$

1. 2.32M      5. 5.68M      9. 2.09mol/kg  
2. 33.6%    6. 3.92g      10. 144%  
3. 1.4g/L    7. 0.4g        11. 15.4%  
4. 0.111mol/kg    8. 0.64mol    12. 3.1g/L

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