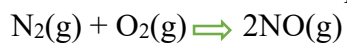


## Exam 1 Test Prep

1. What are the five factors that affect the rate of reactions?
2. What are the three factors that affect solubility?
3. Calculate the molarity of 3.7 moles of NaCl in 0.740 L solution:
4. Calculate the number of moles of solute in 36.0 mL of 5.00 M  $\text{H}_2\text{SO}_4$ :
5. Calculate the molality of 72.0 grams NaCl in 89.0 grams of  $\text{H}_2\text{O}$ :
6. Rank the following solutions from lowest to highest boiling point, a 2.5 m solution of sodium chloride, a 3.5 m solution of magnesium chloride, or a 4.5 solution of sulfur dioxide:

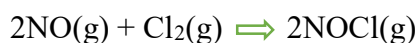
7. What is the osmotic pressure at 298 K of a 1.00 L solution containing 37.3 g of KCl (molar mass = 74.6 g/mol)?  $R = 0.0821 \text{ L} \times \text{atm} / \text{K} \times \text{mol}$
8. Calculate the freezing point of a solution made from 32.7 g of propane,  $\text{C}_3\text{H}_8$ , dissolved in 137.0 g of benzene,  $\text{C}_6\text{H}_6$ . The freezing point of benzene is  $5.50^\circ\text{C}$  and its  $k_f$  is  $5.12^\circ\text{C/m}$ .
9. Calculate the boiling point of a solution made from 227 g of  $\text{MgCl}_2$  dissolved in 700 g of water.  $K_b = 0.512^\circ\text{C/m}$
10. The vapor pressure of water at  $20^\circ\text{C}$  is 17.5 torr. What is the vapor pressure of water over a solution containing 400.0 g  $\text{C}_6\text{H}_{12}\text{O}_6$  and 565.0 g of water?

11. A scientist conducts an experiment to determine the rate of the following reaction:



If the initial concentration of  $\text{N}_2$  was 0.500 M and the concentration of  $\text{N}_2$  was 0.450 M after 0.100s, what is the rate of the reaction?

12. Given the following data, determine the rate law expression of the reaction:

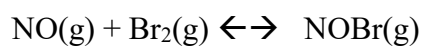


Experiment	[NO] (M)	[Cl <sub>2</sub> ] (M)	Rate (M/s)
1	0.0300	0.0100	$3.4 \times 10^{-4}$
2	0.0150	0.0100	$8.5 \times 10^{-5}$
3	0.0150	0.0400	$3.4 \times 10^{-4}$

13. The decomposition of a 0.100 M sample of  $\text{N}_2\text{O}_5$  is first order and has a k value of

$6.93 \times 10^{-3} \text{ s}^{-1}$ . What will be the concentration of  $\text{N}_2\text{O}_5$ ?

12. Balance the following expressions if they are not balanced already and then write the equilibrium expression for the following reactions:



13. At a given temperature, the  $K_{\text{eq}}$  for the following reaction is  $1.40 \times 10^{-2}$ . If the concentration of both  $\text{H}_2$  and  $\text{I}_2$  at equilibrium are  $2.00 \times 10^{-4} \text{ M}$ , find the concentration of  $\text{HI}$  at equilibrium:

