

Chemistry 101

Sample exam 3 (Chapters 7, 8 and 9)

Closed book, open homework, open notes, calculators allowed; 50 minutes, no collaboration. Partial credit for problems can be awarded only with a clear setup of the problem.

Answer all questions.

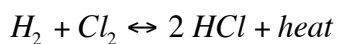
1. How many grams of pure sodium chloride solid are required to prepare 700.0 mL of 1.2 M NaCl solution?

2. What is the **percent by mass** of a solution made by adding 35 g of KOH to 944 mL of water (density: 1.00g/mL)?

3. 14.0 mL of a 1.0 M $\text{NaC}_2\text{H}_3\text{O}_2$ solution is **diluted** to a final volume of 100.0 mL. What is the diluted solution's molarity?

4. Using an **energy diagram**, demonstrate how the addition of a **catalyst** speeds up a reaction.

5. According to Le Chatelier's principle, what would be the result of adding heat to the system at equilibrium:



6. Calculate the pH of the following solutions:

a. 0.00300 M HCl

b. 4.2×10^{-5} M $Ca(OH)_2$

7. a. What is $[H^+]$ when the pH of a solution is 6.4?

b. Calculate the concentration of OH^- when the pH is 3.7.

8. Hydrocyanic acid, HCN, has a $K_a = 6.2 \times 10^{-10}$.

a. Calculate the K_b of CN^-

b. Use the Henderson-Hasselbalch to determine the pH of a buffer that was made up to be 1.00 M in HCN and 0.100 M in CN^-