Acid–Base & pKa — Answer Key

Ten carefully checked problems • Organic Chemistry • Instructor copy

INSTRUCTOR ANSWER KEY — Correct answers and explanations appear in red.

1. Which acid is stronger: pKa 3 or pKa 9?

   Answer: pKa 3 is stronger (lower pKa).

2. Which acid is weaker: pKa 12 or pKa 5?

   Answer: pKa 12 is weaker (higher pKa).

3. Write the conjugate base of CH_3COOH.

   Answer: CH_3COO^- (acetate) after losing H^+.

4. Write the conjugate acid of NH_3.

   Answer: NH_4^+ (ammonium) after gaining H^+.

5. For pKa product acid 15 and reactant acid 5, estimate K.

   Answer: $\Delta pKa = +10$; $K \approx 10^{10}$, strongly product-favored.

6. For pKa product acid 4 and reactant acid 10, estimate K.

   Answer: $\Delta pKa = -6$; $K \approx 10^{-6}$, strongly reactant-favored.

7. Why does OH^- deprotonate acetic acid easily?

   Answer: Product H_2O is a much weaker acid (pKa ~15.7) than acetic acid (pKa ~4.8).

8. What is the approximate pKa of a terminal alkyne?

   Answer: Around 25 (solvent-dependent), much less acidic than a carboxylic acid.

9. What is the conjugate acid of NH_2^-?

   Answer: NH_3 (ammonia), pKa roughly 38 in common organic chemistry reference tables.

10. Why compare pKa in similar solvents?

    Answer: Different solvents alter ion stabilization and the measured acidities.