

Chem 115 POGIL Worksheet - Week 5 - Answers
Solubility and Solution Reactions

Key Questions & Exercises

1. NaCl is a strong electrolyte when dissolved in water, but pure solid NaCl does not conduct electricity. Why?

The ions need to be able to move in order to conduct the current. The ions in an ionic solid can only vibrate (and sometimes rotate) about their fixed positions in the crystal lattice, so an ionic solid does not conduct electricity.

2. Which of the following terms might apply to an ionic solute: nonelectrolyte, strong electrolyte, weak electrolyte?

Ionic solutes break up into their component ions when they dissolve in water. Therefore, all ionic solids are strong electrolytes.

3. Which of the following terms might apply to a molecular solute: nonelectrolyte, strong electrolyte, weak electrolyte?

A molecular substance might be a nonelectrolyte (e.g., sugar, ethyl alcohol), a weak electrolyte (e.g., acetic acid, hypochlorous acid), or a strong electrolyte (e.g., hydrochloric acid).

4. Which kind(s) of solute particles (molecules, ions) exist in each of the following types of solutions? If more than one kind, which predominates?

strong electrolyte - ions only

weak electrolyte - molecules and some ions, with molecules predominating

nonelectrolyte - molecules only

5. Categorize each of the following solutes as strong electrolyte, weak electrolyte, or nonelectrolyte:

NaOH - strong

CH₃OH - nonelectrolyte

AgC₂H₃O₂ - strong

HCO₂H - weak

NiSO₄ - strong

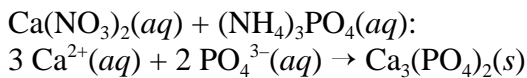
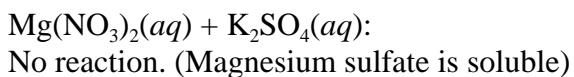
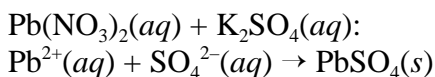
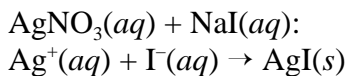
6. Indicate whether the following ionic compounds are soluble or insoluble.

Compound	Solubility	Compound	Solubility
PbCl ₂	insoluble	Pb(CH ₃ CO ₂) ₂	soluble
KOH	soluble	Mg(OH) ₂	insoluble
MgSO ₄	soluble	BaSO ₄	insoluble
CaCO ₃	insoluble	(NH ₄) ₂ CO ₃	soluble
Hg ₂ Cl ₂	insoluble	CaCl ₂	soluble
K ₂ S	soluble	CuS	insoluble

7. When two electrolyte solutions are mixed, new pairings of cations and anions may or may not result in a metathetical reaction. In order for a real reaction to take place, what possible products must a particular cation-anion pair produce?

Metathesis occurs when a new cation-anion pairing would result in any of the following: (1) an insoluble compound (a precipitate), (2) neutralization (an acid-base reaction), or (3) a gas or other molecular species.

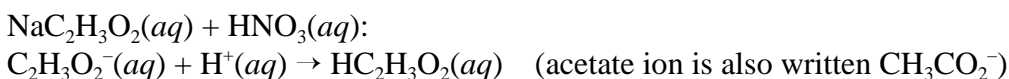
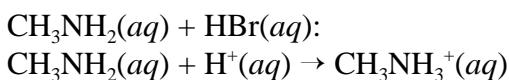
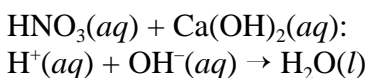
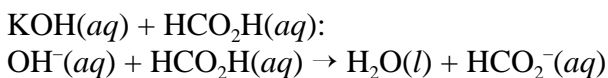
8. Write balanced ionic and net ionic equations for the reaction that occurs when each of the following pairs of solutions are mixed. If no precipitate forms, write "no reaction".



9. Indicate whether each of the following is an acid or base, whether it is strong or weak, and show how you would write it (as molecules or ions) in an ionic equation. HCl and NH₃ are given as examples.

formula	acid/base	strong/weak	written in solution as
HCl	acid	strong	H ⁺ (aq) + Cl ⁻ (aq)
NH ₃	base	weak	NH ₃ (aq)
HCO ₂ H	acid	weak	HCO ₂ H(aq)
CH ₃ NH ₂	base	weak	CH ₃ NH ₂ (aq)
HClO ₄	acid	strong	H ⁺ (aq) + ClO ₄ ⁻ (aq)
HOCl	acid	weak	HOCl(aq)

10. Write balanced net ionic equations for the following neutralizations. (Start by writing ionic equations, and then cancel any spectator ions.) Remember to write all weak electrolytes and molecular species in molecular form.



11. Write balanced net ionic equations for the following, remembering to write all solids, liquids, weak electrolytes, or molecular species in molecular form. (Start by writing ionic equations, and then cancel any spectator ions.)

