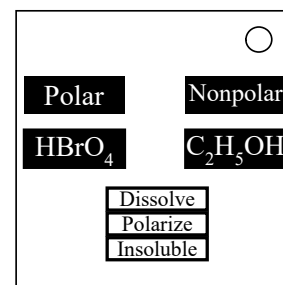


On the Subject of Solubility

Solvent: Perbromic Acid.

Solute: This bomb.

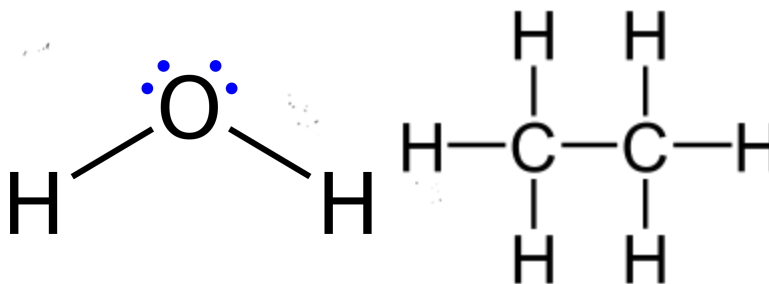
Solution: An explosion and debris.



- This module will feature two chemical formulas; the left formula will be the solvent, while the right one will be the solute.
- Determine if the solvent will dissolve the solute by determining their chemical properties.
- This module does not follow chemistry to a tee.

Determining the Polarity of a Solvent

- A molecule can be either polar or nonpolar. A solvent cannot dissolve a solute that has opposite polarity.
- The display above both molecules will show the polarity of each one. Unfortunately, the solvent's display is faulty and may display false information.
- To determine the polarity of the solvent, create a Lewis Dot Structure of the formula. If the molecule is asymmetrical or the central atom has a lone pair(s) of electrons then it is polar. Otherwise it is nonpolar.
- A valid Lewis Dot Structure has the following rules:
 - The total amount of electrons required is equal to the sum of all valence electrons in a molecule (the sum of the group numbers per atom).
 - Each atom must be paired to another atom via a molecular bond.
 - Each atom must have eight electrons in total.
 - Exceptions to this rule are Hydrogen (2), Beryllium (4), and Boron (6).
 - A bond between atoms counts as two electrons for both atoms, but counts as only two for the total amount of electrons.
 - There may be up to three bonds between atoms.
 - If an atom has leftover electrons, then they may be placed on the atom without bonding to another atom.
 - You cannot exceed the amount of required electrons.
- The image on the next page shows an example of a valid Lewis Dot Diagram. The left molecule is polar while the right is nonpolar.



Determining the Solubility of the Solute

- The solute itself may not be soluble, determine this by using the rules below. If two rules contradict each other, the preceding rule takes precedence.
 - If the solute is insoluble, then it cannot be dissolved by the solvent (duh).
1. Salts containing Group I elements are soluble. Salts containing ammonium (NH₄⁺) are also soluble.
 2. Salts containing a nitrate ion (NO₃⁻) are soluble.
 3. Salts containing Cl⁻, Br⁻, or I⁻ are soluble. Exceptions to this rule are Ag⁺, Pb²⁺, and (Hg₂)²⁺.
 4. Most silver salts (contains Ag) are insoluble. AgNO₃ and Ag(C₂H₃O₂) are soluble, virtually all others aren't.
 5. Most sulfate salts (contains SO₄) are soluble. Exceptions are CaSO₄, BaSO₄, PbSO₄, Ag₂SO₄, and SrSO₄.
 6. Hydroxide salts (contains OH⁻) are soluble, except for the salts of transition metals and Al³⁺.
 7. Sulfides (contains S) of transition metals are insoluble.
 8. Carbonates (contains CO₃) are insoluble.
 9. Chromates (contains CrO₄) are insoluble.
 10. Phosphates (contains PO₄) are insoluble.
 11. Fluorides (contains F₂) are insoluble.
- If your solvent can dissolve your solute, press the "Dissolve" button.
 - Otherwise, if your solvent and solute do not share polarity, press the "Polarize" button.
 - Otherwise, press the "Insoluble" button.
 - Upon a strike, the module will reset.